WHATCOM COUNTY
Planning & Development Services
5280 Northwest Drive,
Bellingham, WA 98226-9097
360-778-5900, TTY 800-833-6384
360-778-5901 Fax

Mark Personius, AICP
Director

PRE2023-00097 ABC Recycling

Commercial Building Permit Application

Building #1

One Structure per Permit

Permit #_________________

Agent/Contact Name: Impact Design (Scott Goodall, MS PE)
Mailing Address: 5426 Barrett Road, Suite A103 City Ferndale
State WA Zip Code 98248 Phone # ( ) 360-389-8138
Email scott@bold-impact.com

Property Owner Name ABC Recycling Realty Corp (Andy Anthony, Vice President Operations)
Mailing Address: 2219 Rimland Drive, Suite 301 City Bellingham
State WA Zip Code 98226 Phone # ( ) 360-622-1682
Email andy.anthony@abcrecycling.com

Contractor Name To be determined
Business Name: NA License#: NA
Mailing Address: NA City_____
State NA Zip Code NA Phone # ( ) NA
Email NA

Site Information

Assessor's Parcel # 3802231063740000 Div# NA Block# NA Lot# NA
Subdivision Name: Enoch Compton Don Claim (not subdivided)
Site address 741 Marine Drive, Bellingham WA 98226
Number of Buildings currently on site: 0
Valuation (cost of completed project less value of land) $750,000

Project Description *(example: New 2400 sq. ft. Warehouse w/ office space)*

This project will construct a full-service metal processing facility. This permit is submitted with others and includes all land use info for the entire site as attachment.

■ New ☐ Addition ☐ Remodel ☐ Repair ☐ Change of Occupancy ☐ Tenant Improvement

Building Height: (in feet) 32' 3-3/4" # of Stories: 1 # Employees: 15 # Parking Spaces: 18
Company Vehicles: 2 Note: # of employees/parking spaces & vehicles are for entire complex

Please Check Applicable Water & Sanitary Services: Water: ☐ Well ☐ Water Assoc.
■ Water District Name of Water Purveyor (if applicable): Whatcom Water Dist. #2

Fees will be assessed in accordance with the Whatcom County Unified Fee Schedule (UFS) in effect at the time of application submittal. Please contact Planning and Development Services to determine project specific fees. Click here to see the 2019/2020 UFS. Per UFS 2843 all permits and applications are subject to a Technology fee. The fee is calculated on the permit/application fees due.

Septic: ☐ Yes ☐ No / Septic Installed: ☐ Yes ☒ No

Sewer: ☒ Yes ☐ No Name of Sewer Purveyor (if applicable): City of Bellingham

Proposed Square Footages for this project (measured to outside wall):

Basement	0 sq.ft.	Main Floor	3,750 sq.ft.
Basement Type: ☐ Heated ☐ Unheated		Second Floor	0 sq.ft.
Other:	sq.ft.	**Total Square Feet**	3,750 sq.ft.

Heat Source (Check the primary fuel source for Heat / Hot Water)

Heating: ☒ Natural Gas ☐ Propane ☒ Electric ☐ Oil ☐ Geothermal ☐ Other

Hot Water: ☒ Natural Gas ☐ Propane ☒ Electric ☐ Oil ☐ Geothermal ☐ Other

Driveway Access and Utility Connection (work within the county right-of-way)

Does your project involve any work within the County road right-of-way (example: a new driveway or connection to utilities)? ☒ Yes ☐ No

If yes, please describe: A single driveway (for all buildings), W & SS will connect the site to Marine Drive.

Please note: If upon inspection PW Encroachment staff determines an additional Encroachment Permit is required; you will be notified and received an invoice for the fees.

List materials used in the process of business activity (be specific & list quantities used or stored)

Scrap Metals (Ave/day)	7.2 tons (full operations)	Processed
Scrap Metals (Typ stored)	0 tons (normal operations)	Stored on site

Any proposed fill, excavation or clearing must be noted below *

FILL	The deposit of earth material by artificial means.									
BY FEET	**Length (ft)**		**Width (ft)**		**Depth (ft)**		**Volume (ft^3)**	**÷ By 27**	**= Cubic Yard**	
Septic	0	x	0	x	0	=	0	/ 27 =	0	CY
Driveway/Road/Parking	160	x	65	x	1.5	=	15,600	/ 27 =	578	CY
Building site	119	x	50	x	1.5	=	8,925	/ 27 =	330	CY
Other (Total Project Area)		x		x		=		/ 27 =	12,000	CY
MATERIAL SOURCE:	Local Permitted Gravel Mine							**TOTAL VOLUME:**	12,908	CY

EXCAVATION	The mechanical removal of earth materials. Grading is an excavation or filling or combination thereof. Earth material is any rock, natural soil, fill, or any combination thereof.									
BY FEET	**Length (ft)**		**Width (ft)**		**Depth (ft)**		**Volume (ft^3)**	**÷ By 27**	**= Cubic Yard**	
Septic	0	x	0	x	0	=	0	/ 27 =	0	CY
Driveway/Road/Parking	160	x	65	x	1.5	=	15,600	/ 27 =	578	CY
Building site	119	x	50	x	1.5	=	8,925	/ 27 =	330	CY
Ditching/Trenching	154	x	8	x	3	=	3,696	/ 27 =	137	CY
Other (Total Project Area)		x		x		=		/ 27 =	50,100	CY
MATERIAL DESTINATION:	Local Permitted Fill Site							**TOTAL VOLUME:**	51,145	CY

* Cut/Fill for Building #1 and overall SITE. Cut/fill for other, individual buildings are included with permits for those buildings.

CLEARING/CONVERSION	Defined as, "the destruction of vegetation by manual, mechanical, or chemical methods resulting in exposed soils. WCC20.97.053
Required **TOTAL AREA TO BE CLEARED and/or GRUBBED, IN ACRES**:	
AREA OF TREE CLEARING, IN ACRES: 0.1	
TIMBER USE Personal Use: 100 % Sell: 0 % Burn: 0 % Give Away: 0 %	
FPA NUMBER (if applicable) NA	
If your project includes any tree cutting, a Forest Practices Application / Notification may be required. For questions related to permit requirements, contact the Washington Department of Natural Resources (DNR) at 360-856-3500.	

RECEIVED

Date: 10/24/2023 Staff: AHK

Please complete the following Agent Authorization only if an agent (someone other than the property owner) is applying for permit(s) on the property owner's behalf.

Agent Authorization

If you are authorizing an agent to apply for permits on your behalf you must complete this form and have it notarized, which will provide authorization for a designated agent to apply for permits on your behalf.

I/we, ABC RECYCLING REALTY CORP., the owner(s) of the subject property, understand by completing this form I/we hereby authorize Scott Goodall to act as agent. I/we understand said agent will be authorized to submit applications on my behalf, and any fees associated with submitted applications are due to me and not to the said agent. I/we also understand once an application has been submitted all future correspondence will be directed to the agent.

ANDREW ANTHONY Property Owner Printed Name	Property Owner Printed Name
Property Owner Signature	Property Owner Signature
10/04/2023 Date	Date

I certify that I know or have satisfactory evidence that Andrew Anthony is/are the person(s) who appeared before me, and said person(s) acknowledged it to be his/her free and voluntary act for the uses and purposes mentioned in this instrument.

Dated 10/04/2023

Notary Public Signature

Notary Public
State of Washington
KENDRA I HAWKINS
MY COMMISSION EXPIRES
AUGUST 18, 2025

Kendra I Hawkins
Notary Public Printed Name
Notary Public in and for the State of Washington
Residing at Whatcom Co.
My appointment expires: Aug/ 18/ 2025

Disclaimer

The permitee verifies, acknowledges and agrees by their signature that:

1) If this permit is for installation of a dwelling, the dwelling is/will be served by potable water;
2) The property owner is the owner of this Whatcom County Permit;
3) The signatory is the property owner or someone who has permission to represent the property owner in this transaction;
4) All construction is to be done in accordance with Whatcom County codes or ordinances- *referenced codes and ordinances are available for review at Whatcom County Planning and Development Services*;
5) This Whatcom County Permit does not permit or approve any violation of federal, state or local laws, codes or ordinances;
6) Submission of plans or additional information and subsequent approval may be required before this application can be processed;
7) Notwithstanding that this application has been submitted in the name of a company, I personally guarantee payment (or guarantee **p**ayment on behalf of the client I am representing, noted on the Agent Authorization Form above) of the fees accrued according to the terms listed in the Whatcom County Unified Fee Schedule, including the Application of Fees from Different UFS Schedule Policy PL1-74-003Z, and agree to be bound personally as a principal and not as a surety. I recognize my personal guarantee is part of the consideration for review of the application.

Scott Goodall
Print Name

Owner or Agent Signature

10/21/23
Date

ABC RECYCLING BUILDING 1 OFFICE/SHOP

741 MARINE DRIVE, Bellingham, WA

PROJECT CRITERIA

GENERAL SITE INFORMATION:

ADDRESS: 741 MARINE DRIVE, BELLINGHAM WA
PARCEL #S: 3802231063740000

THAT PTN OF ENOCH COMPTON DON CLAIM DAF-BEG ON SLY LI OF MARIETTA RD 992.4 FT S-613.2 FT E OF NW COR SEC 23 BEING COR COMM TO SECS 14-15-22-23-TH S 25 DEG 50'00" W 1170 FT M/L TO GOVT MEANDER LI OF BELLINGHAM BAY-TH SELY FOL SD MEANDER LI TO SE COR OF

NEIGHBORHOOD:
SUB AREA: 2
ZONING: HEAVY IMPACT INDUSTRIAL

PROJECT DESCRIPTION/WORK TO BE PERFORMED:

NEW CONSTRUCTION OF A PRE ENGINEERED METAL BUILDING

GENERAL BUILDING INFORMATION:

TYPE OF CONSTRUCTION:	IIB
NUMBER OF STORIES:	1 STORY
OCCUPANCY CLASSIFICATION(S):	S1
MIXED OCCUPANCY	
COMPLIANCE METHODS:	FIRE PROTECTED SEPARATIONS
SPRINKLER SYSTEM:	NOT PROVIDED
ALLOWABLE BUILDING HEIGHT:	
ACTUAL BUILDING HEIGHT:	32'-3.25"
HEAT TYPE:	NON HEATED

SITE COVERAGE INFORMATION

SEE CIVIL PLANS

PARKING REQUIREMENTS: (TOTAL PROJECT)

1 PER EMPLOYEE/SHIFT = 15 PER SHIFT =15 STALLS

PARKING PROVIDED =18 STALLS INCL. 2 H.C.

DEFERRED SUBMITTAL ITEMS:

1. PRE FAB STEEL BUILDING PLANS & ENGINEERING

APPLICABLE BUILDING CODES:

2018 INTERNATIONAL BUILDING CODE AND AMENDMENTS – CHAPTER 51-50 WAC
2018 INTERNATIONAL MECHANICAL CODE AND AMENDMENTS – CHAPTER 51-52 WAC
2018 INTERNATIONAL FUEL GAS CODE AND AMENDMENTS – CHAPTER 51-52 WAC
2018 INTERNATIONAL ENERGY CONSERVATION CODE (WECC) AND AMENDMENTS – CHAPTER 51-11C & 51-11R WAC
2017 NATIONAL FUEL GAS CODE (NFPA 54) – CHAPTER 51-52 WAC
2018 UNIFORM PLUMBING CODE (UPC) AND AMENDMENTS – CHAPTERS 51-56, 51-57 WAC
2020 NATIONAL ELECTRIC CODE (NFPA 70) -- CHAPTER 296-46B WAC
2018 INTERNATIONAL FIRE CODE (IFC) AND AMENDMENTS – CHAPTER 51-54 WAC
THE IFC IS ADOPTED AND AMENDED PER REGULATIONS SET FORTH IN BMC 17.20.

ALLOWABLE AREA (PER IBC TABLE 506.2) (MOST RESTRICTIVE USE):

BASIC AREA ALLOWANCE NS, IIB, (F2)	=17500 SF PER FLOOR
ACTUAL AREA	=6294 SF
BASIC STORY ALLOWANCE NS, IIB, (F2)	=2 STORIES
ACTUAL STORY	=1 STORY

BUILDING COMPLIES WITH AREA AND STORIES

OCCUPANT LOADS (IBC 1004.1.2):

OCCUPANT LOAD 200 SF (GROSS) = 6294/200 =31 OCC.

DRAWING SHEET LIST

Sheet List

Sheet Number	Sheet Name
A1.0	Cover Sheet
A1.1	General Notes
A1.3	Site Plan
A2.0	Floor Plan
A3.0	Elevations
A3.2	Perspective Views
A4.0	Building Section
A5.0	Roof & RCP Plan

STRUCTURAL SHEETS:

SEE STRUCTURAL COVER SHEET

BUILDING MANUFACTURER:

SEE MANUFACTURER COVER SHEET

CIVIL SHEETS:

SEE CIVIL COVER SHEET

PROJECT TEAM

ARCHITECT:
TRC ARCHITECTURE, LLC
ROBERT MATICHUK
PO BOX 1075
BELLINGHAM, WA 98227
p/f: 360.393.3131

OWNER:
A B C RECYCLING REALTY CORP
2219 RIMLAND DR STE 301
BELLINGHAM, WA 98226-8759

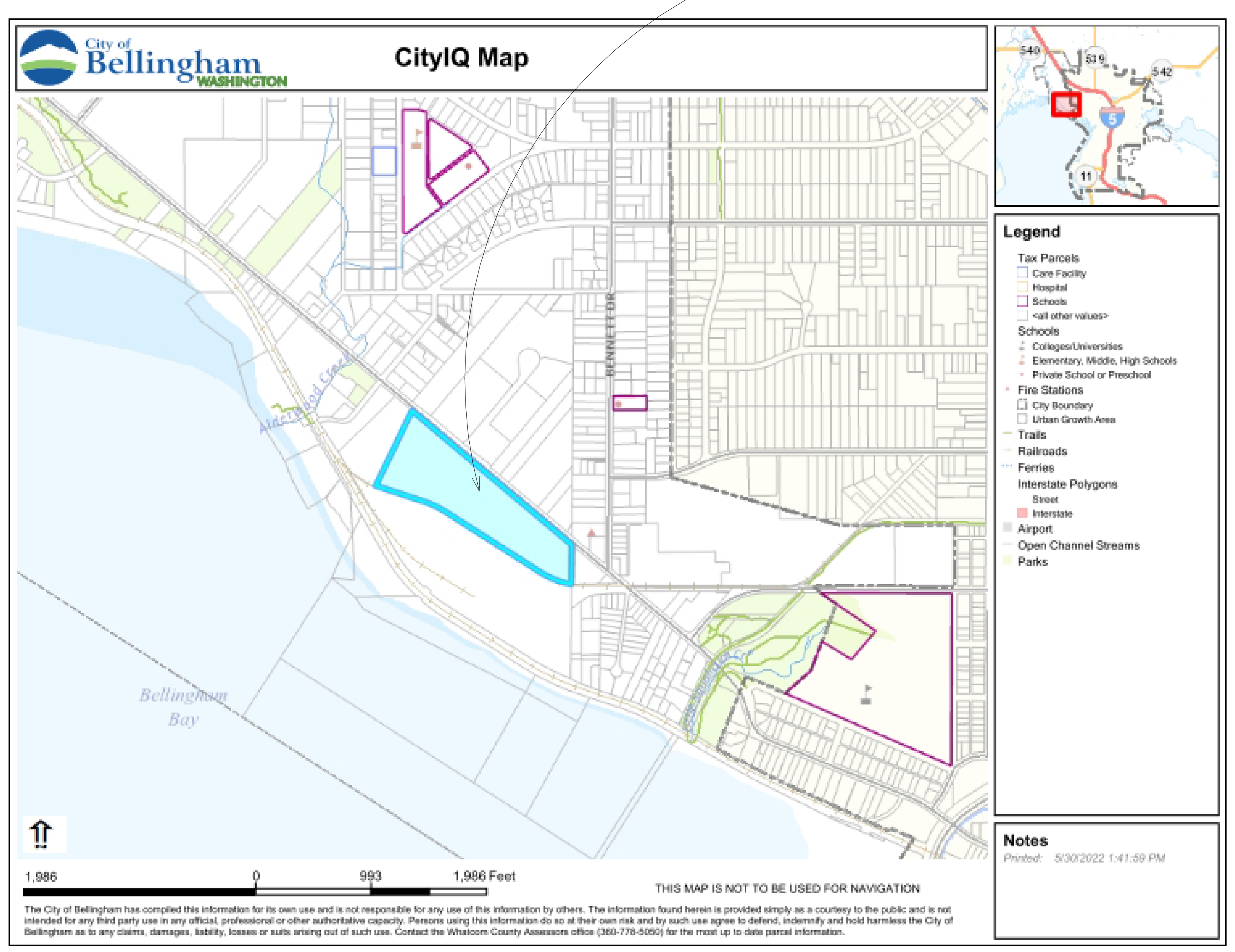
GENERAL CONTRACTOR:
T.B.D.

BUILDING JURISDICTION:
WHATCOM COUNTY
BUILDING SERVICES
5280 NORTHWEST DR.
BELLINGHAM, WA 98226
360.778.5900

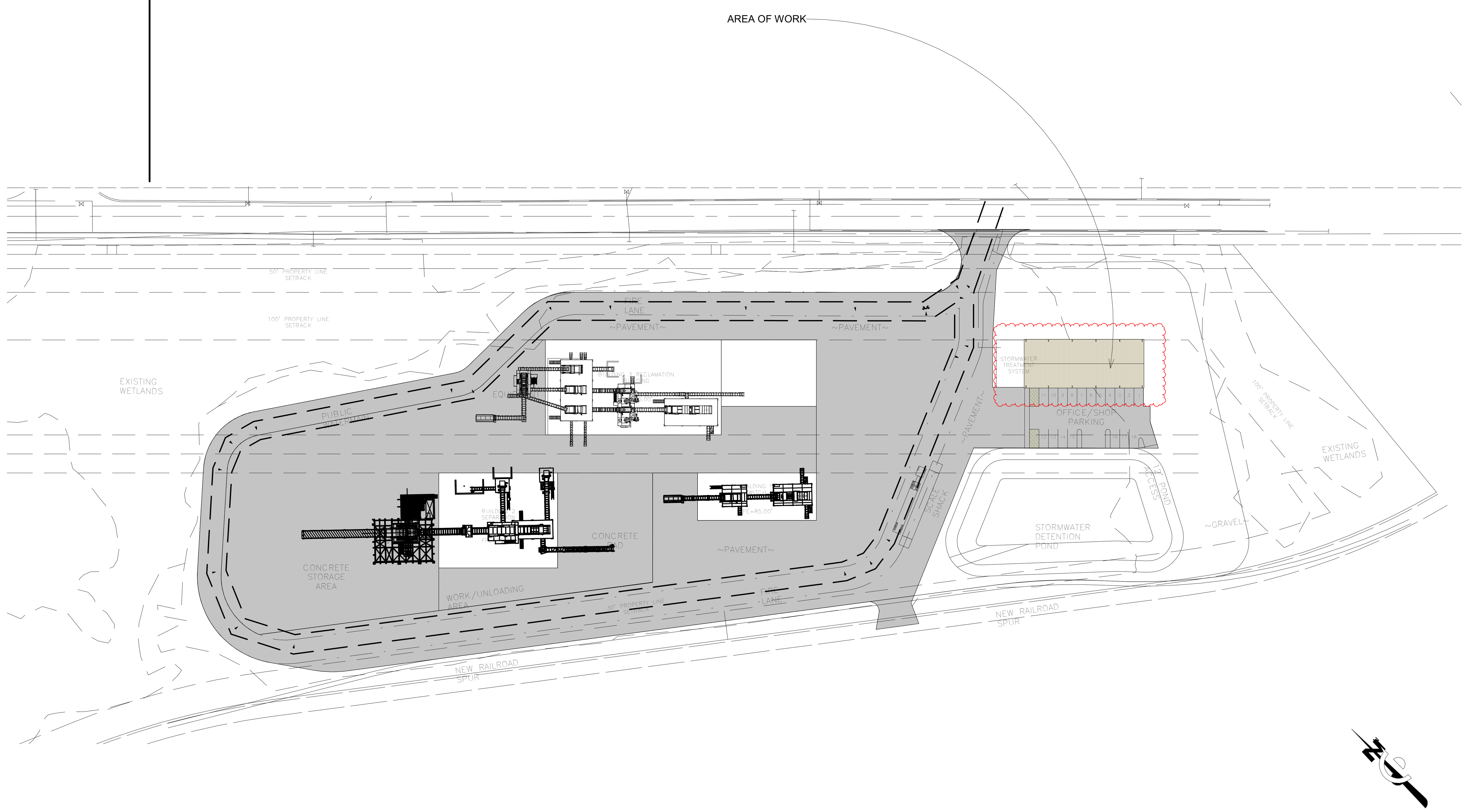
STRUCTURAL ENGINEER:
Brandon Hausmann, PE
Principal
Direct: (360) 474-7541
Office: (360) 200-8703 ex 1
203 W. Chestnut St.
Bellingham WA 98225

CIVIL ENGINEER:
Scott Goodall, MS, PE
Principal
Impact Design, LLC
5426 Barrett Road, Suite A103
Ferndale, WA 98248
(360) 389-8138
www.bold-impact.com

AREA OF WORK



AREA OF WORK



2 Site -Cover Sheet
1" = 80'-0"

www.trcarchitecture.com
PO Box 1075
Bellingham, WA 98227
360.393.3131
trc architecture

7852 REGISTERED ARCHITECT
ROBERT K. MATICHUK
STATE OF WASHINGTON

Custom Design For: ABC RECYCLING
Building 1 Office/Shop
741 Marine Dr
Bellingham WA 98226

Project number	TRC 22-001
Date	Oct 20 2023
Design by:	RKM
Drawn by:	RKM
Checked by:	RKM
Set Description:	
Permit Set	

Cover Sheet

A1.0

ABBREVIATIONS

A	
ADJ	ADJACENT
A.F.F.	ABOVE FINISH FLOOR
A.F.G.	ABOVE FINISH GRADE
B	
BLK	BLOCKING
B.O.	BOTTOM OF
C	
CL	CENTERLINE
CLR	CLEAR
CLG	CEILING
CONC	CONCRETE
COL	COLUMN
CONT	CONTINUOUS
CONST	CONSTRUCTION
CTR	COUNTER
D	
DTL	DETAIL
DIM	DIMENSION
DWG	DRAWING
E	
ELEC	ELECTRICAL
EQ	EQUAL
EXST'G	EXISTING
ENG	ENGINEER
F	
F.F.	FINISH FLOOR
F.C.I.C	FURNISHED BY CONTRACTOR INSTALLED BY CONTRACTOR
F.O.I.C	FURNISHED BY OWNER INSTALLED BY CONTRACTOR
F.O.I.O.	FURNISHED BY OWNER INSTALLED BY OWNER
F.R.	FIRE RESISTANT
F.E.	FIRE EXTINGUISHER
FBGL.	FIBERGLASS
F.O.W.	FACE OF WALL
G	
GA	GAUGE
G.C.	GENERAL CONTRACTOR
GLAM	GLUE LAMINATE
GYPBD	GYPSUM WALL BOARD
H	
HDWR	HARDWARE
HDR	HEADER
H.M.	HOLLOW METAL
HGT	HEIGHT
I	
INST.	INSTALL / INSTALLED
INSUL.	INSULATION
M	
MAT	MATERIAL
MECH	MECHANICAL
MLV	MICRO LAMINATE WOOD
MIN.	MINIMUM
N	
N/A	NOT APPLICABLE
N.I.C.	NOT IN CONTRACT
N.T.S.	NOT TO SCALE
P	
PL	PLATE LINE
PLYWD.	PLYWOOD
P-LAM	PARALLEL LAMINATE WOOD
PT	PRESSURE TREATED
R	
REQ'D	REQUIRED
REV.	REVISION/REVISED
S	
SCH'D	SCHEDULE
SIM	SIMILAR
S.O.G.	SLAB ON GRADE
SQ.FT.	SQUARE FOOT
SUSP.	SUSPENDED
T	
TEMP	TEMPERED
TYP	TYPICAL
T.O.	TOP OF
V	
V.I.F.	VERIFY IN FIELD

CONSTRUCTION NOTES:

1. APPLICABLE BUILDING CODES VERIFY LOCAL ZONING AND BUILDING CODES PRIOR TO BEGINNING CONSTRUCTION.
2. ALL MECHANICAL (INCL. FIRE SPRINKLERS) , ELECTRICAL AND PLUMBING BID-DESIGN UNDER SEPARATE PERMIT TO COMPLY WITH ALL APPLICABLE LOCAL CODES.
3. DO NOT SCALE DRAWINGS. CONSULT BUILDING DESIGNER AND OWNER FOR ANY DIMENSIONAL CLARIFICATIONS, ERRORS OR CONFLICTS. FLOOR PLANS TAKE PRECEDENCE OVER ELEVATIONS IF CONFLICTING. GENERAL CONTRACTOR MUST VERIFY DIMENSIONS PRIOR TO PROCEEDING.
4. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION OF WORK BETWEEN SUB-CONTRACTOR TRADES, AND FOR PROVIDING WEATHER-TIGHT SEALS, FLASHING AND CAULKING AT ALL CONNECTIONS AND PENETRATIONS. REFER TO IBC CHAPTER 11 FOR MINIMUM WEATHER PROTECTION REQMTS., INCLUDING, BUT NOT LIMITED TO, HEAD FLASHING AT ALL OPENINGS.
5. PROVIDE ENGINEERED SHOP DRAWINGS FOR ALL TRUSSES, TRUSS TYPE JOISTS, STEEL BEAMS AND GLU-LAM BEAMS. SUBMIT TO ENGINEER FOR REVIEW.
6. THESE DRAWINGS ARE BID-DESIGN DOCUMENTS. THE OWNER/DEVELOPER AND CONTRACTOR SHALL ASSUME RESPONSIBILITY, LIABILITY AND INDEMNIFY THE BUILDING DESIGNER FOR COORDINATION OF BID-DESIGN WORK, INCLUDING BUT NOT LIMITED TO GENERAL CONSTRUCTION, ELECTRICAL, PLUMBING, HEATING AND VENTILATION. THE BUILDING DESIGNER IS NOT LIABLE FOR CHANGES/CORRECTIONS MADE BY ON SITE INSPECTION DURING THE COURSE OF CONSTRUCTION OR FOR DETAILS AND SPECIFICATIONS NOT INCLUDED.
7. THE CONTRACTOR SHALL UTILIZE CONSTRUCTION TECHNIQUES AND PRACTICES STANDARD AND ACCEPTABLE TO THE CONSTRUCTION INDUSTRY. THE BUILDING DESIGNER DOES NOT ASSUME LIABILITY OR RESPONSIBILITY FOR METHODS OF CONSTRUCTION DETAILS & SPECIFICATIONS NOT INCLUDED IN THESE BUILDING PERMITS ONLY CONTRACT DOCUMENTS.
8. THE BUILDING DESIGNER HAS NOT BEEN RETAINED OR COMPENSATED TO PROVIDE DESIGN AND/OR CONSTRUCTION REVIEW SERVICES RELATING TO THE CONTRACTOR'S SAFETY PRECAUTIONS OR TO MEANS, METHODS, TECHNIQUES OR PROCEDURES REQUIRED FOR THE CONTRACTOR TO PERFORM HIS WORK. THE UNDERTAKING OF PERIODIC SITE VISITS BY THE BUILDING DESIGNER SHALL NOT BE CONSTRUED AS SUPERVISION OF ACTUAL CONSTRUCTION NOR MAKE HIM RESPONSIBLE FOR THE PERFORMANCE OF WORK BY THE CONTRACTOR OR CONTRACTORS EMPLOYEES, OR EMPLOYEES OF SUPPLIERS OR SUBCONTRACTORS, OR FOR ACCESS, VISITS, USE, WORK, TRAVEL OR OCCUPANCY BY ANY PERSON.
9. THESE DOCUMENTS HAVE BEEN PREPARED FOR A NEGOTIATED CONSTRUCTION CONTRACT, AND MAY LACK SOME DETAIL AND SPECIFICATIONS REQUIRED FOR A COMPLETE COMPETITIVE BID SELECTION PROCESS.
10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING BUILDING AND SITE SECURITY DURING CONSTRUCTION PERIODS.
11. WHERE A CONSTRUCTION DETAIL IS NOT SHOWN OR NOTED, THE DETAIL SHALL BE THE SAME AS FOR OTHER SIMILAR WORK.
12. THE CONTRACTOR MUST VERIFY THE ROOF SYSTEM IS CONSTRUCTED PER MANUFACTURES REQUIREMENTS TO CREATE A WEATHERPROOF AND WATERPROOF ROOF. VERIFY INSTALLATION OF ALL ROOF PENETRATIONS, CURBS, CANTS & FLASHING TO PROPERLY SHED WATER AND STOP WIND DRIVEN RAIN & SNOW. VERIFY ENTIRE ROOF SYSTEM IS DESIGNED & CONSTRUCTED TO ALLOW FOR THE PROPER EXPANSION & CONTRACTION OF THE SUPPORTING STRUCTURE & THE ROOF SYSTEM. CONDENSATION WILL BE CREATED ON THE HEATED SIDE OF ALL ROOF SYSTEMS SURFACES AND PARTS; THEREFORE, CARE MUST BE TAKEN TO PROPERLY INSTALL THE CORRECT INSULATION, VENTILATION AND VAPOR BARRIERS.
13. CONTRACTOR IS TO VERIFY STRUCTURAL INFORMATION, SPECIFICATIONS AND DETAILS WITH THE STRUCTURAL ENGINEER AND/OR ATTACHED STRUCTURAL SHEET(S). FAILURE TO VERIFY MAY RESULT IN CONFLICTING INFORMATION CONTAINED ON THE ARCHITECTURAL SHEETS. THE DESIGNER DOES NOT TAKE RESPONSIBILITY FOR STRUCTURAL COMPONENTS OR CALCULATIONS.

FRAMING (STRUCTURAL NOTES TO TAKE PRIORITY):
1. THIS STRUCTURE TO COMPLY WITH MINIMUM NAILING SCHEDULE PER ENG. CALCS. OR IBC TABLE 2304.6.1.
2. SOLID BLOCKING REQUIRED AT ALL BEARING POINTS OF FLOOR, CEILING & ROOF SYSTEMS.
3. PROVIDE APPROVED ANCHORAGE OF BEAMS OR GIRDERS TO POSTS.
4. T.J.I. OR EQUIVALENT FLOOR JOISTS. FLOOR JOIST DESIGN BY LICENSED WASH. STATE MANUFACTURER. FLOOR JOIST DESIGN AND SPECIFICATIONS INCLUDING ALL METAL CONNECTORS. HANGERS AND CLIPS TO BE ON-SITE DURING CONSTRUCTION AND INSTALLED AS PER MANF. INSTRUCTIONS.
5. ALL WINDOW AND DOOR HEADERS TO BE 4x10 DF-2 IN A ONE-FLOOR OR THE TOP FLOOR OF A MULTI-FLOOR BLD. 6x10 FOR BASEMENTS AND OTHER FLOORS OTHER THAN THE TOP FLOOR. UNLESS NOTED OTHERWISE BY ENGINEER OF RECORD.
6. FRAMING LUMBER: KD, 19 % MAX MOISTURE CONTENT, S4S GRADE TO WWPA. AND IRC SPECIFICATIONS. DOUGLAS FIR-LARCH IS PREFERRED. MINIMUM GRADED STRESS VALUES: 2x STUDS @ 1200 PSI; JOISTS AND RAFTERS @ 1250 PSI; POSTS A 700 PSI, SAWN BEAMS @ 1300 PSI. NOMINAL SIZES, MAXIMUM SPANS, SPACING, BLOCKING AND OTHER DETAILING IN COMPLIANCE WITH INTERNATIONAL BUILDING CODE.
7. PRESSURE TREATED LUMBER: WOLMANIZED, CCA PRESSURE TREATED LUMBER AT MUD SILLS, EXPOSED DECK FRAMING, EXTERIOR STRUCTURAL POSTS, POSTS SUPPORTING MAIN FLOOR STRUCTURE, AND OTHER WOOD / CONCRETE CONTACT LOCATIONS.
8. ROOF TRUSSES: FACTORY FABRICATED GANG-NAILED WOOD TRUSSES, ENGINEERED BY MFR. FOR SITE WIND LOADING AND COMBINED NORMAL LOADS SPANS AND CONFIGURATIONS AS SHOWN ON DRAWINGS AND AS REQUIRED.
9. GLUE LAMINATED BEAMS (GLB):DOUGLAS FIR, 24F-V4, BUILDING DESIGN RURAL APPEARANCE (ONLY IF EXPOSED) GRADE LEAVE PROTECTIVE WRAP IN PLACE UNTIL FINISH PROCESSES ARE UNDERWAY.
10. ANCHORS: SIMPSON PLY CLIPS AT EDGES OF ROOF SHEATHING PANELS, MID-SPAN BETWEEN RAFTERS OR TRUSSES; TRUSS/PLATE HOLD DOWNS AT EACH BEARING AND OTHER INTERSECTION AS REQUIRED.
11. STUDS: EXTERIOR WALL STUDS ARE TO BE 2"x6"s OF B FIR KILN DRIED SPACED AT 16" O.C. INTERIOR STUDS ARE TO BE 2"x4"s OF B FIR KILN DRIED SPACED AT 16" O.C. STUDS IN BEARING WALLS ARE LIMITED TO 10 FEET IN HEIGHT UNLESS APPROVED BY ENGINEER.

STAIRS:
1. IBC 1005 & 1011
2. IBC 1011.2 STAIRWAY WIDTH. THE WIDTH OF THE STAIRWAYS SHALL BE DETERMINED AS SPECIFIED IN SECTION 1005.1, BUT SUCH WIDTH SHALL NOT BE LESS THAN 44 INCHES. EXCEPTION: STAIRWAYS SERVING AN OCCUPANT LOAD OF LESS THAN 50 SHALL HAVE A WIDTH OF NOT LESS THAN 36 INCHES.
3. IBC 1011.3 HEADROOM. STAIRWAYS SHALL HAVE A MINIMUM HEADROOM CLEARANCE OF 80 INCHES MEASURED VERTICALLY FROM A LINE CONNECTING THE EDGE OF THE NOSINGS. SUCH HEADROOM SHALL BE CONTINUOUS ABOVE THE STAIRWAY TO THE POINT WHERE THE LINE INTERSECTS THE LANDING BELOW, ONE TREAD DEPTH BEYOND THE BOTTOM RISER. THE MINIMUM CLEARANCE SHALL BE MAINTAINED THE FULL WIDTH OF THE STAIRWAY AND LANDING.
4. IBC 1011.5.2 RISER HEIGHT AND TREAD DEPTH. STAIR RISER HEIGHTS SHALL BE 7 INCHES MAXIMUM AND 4 INCHES MINIMUM. THE RISER HEIGHT SHALL BE MEASURED VERTICALLY BETWEEN THE LEADING EDGES OF ADJACENT TREADS. RECTANGULAR TREAD DEPTHS SHALL BE 11 INCHES MINIMUM MEASURED HORIZONTALLY BETWEEN THE VERTICAL PLANES OF THE FOREMOST PROJECTION OF ADJACENT TREADS AND AT A RIGHT ANGLE TO THE TREAD'S LEADING EDGE. WINDER TREADS SHALL HAVE A MINIMUM TREAD DEPTH OF 11 INCHES MEASURED BETWEEN THE VERTICAL PLANES OF THE FOREMOST PROJECTION OF ADJACENT TREADS AT THE INTERSECTIONS WITH THE WALKLINE AND A MINIMUM TREAD DEPTH OF 10 INCHES WITHIN THE CLEAR WIDTH OF THE STAIR.

DECKS:
1. WOOD DECK CONSTRUCTION SHALL BE OF WOLMANIZED / PRESSURE TREATED WOOD. DECKING (SEE PLANS) DECK RAILINGS (REQUIRED IF DECK IS 30" ABOVE GRADE) SHALL BE A MINIMUM OF 42" IN HEIGHT WITH A MAXIMUM OF 4" SPACING BETWEEN PICKETS. PER IBC 1015.
2. METAL OR BOLT ON DECK CONSTRUCTION SHALL BE A DEFERRED SUBMITTAL IN ALL CASES.

DISCLOSURE:
1. THE PLAN REVIEW GUIDE INCLUDED WITH YOUR PERMIT DOCUMENTS CONTAINS A LISTING OF COMMON CODE ERRORS AND OMISSIONS. APPROVAL OF THE PLANS DOES NOT PERMIT THE VIOLATION OF ANY BUILDING. MECHANICAL, PLUMBING, ELECTRICAL, FIRE, OR ZONING CODE OR ANY OTHER FEDERAL, STATE, OR CITY REGULATIONS.
2. CONTRACTOR TO VERIFY LOCATIONS OF EXISTING SMOKE DETECTORS. ENSURE FULL COMPLIANCE WITH CURRENT FIRE CODE.
3. CONTRACTOR IS TO SECURE BUILDING SITE/LOCATION. VERIFY STRUCTURAL AND NON-STRUCTURAL COMPONENTS PRIOR TO COMMENCING CONSTRUCTION.
4. DO NOT SCALE THESE DRAWINGS. DISCREPANCIES WITH PROVIDED DIMENSIONS MUST BE COMMUNICATED TO THE DESIGN FIRM AT THE EARLIEST CONVENIENCE
5. TRC ARCHITECTURE (DESIGN FIRM) IS NOT RESPONSIBLE FOR EXISTING SITE CONDITIONS, DIMENSIONS, COMPLIANT OR NON-COMPLIANT CODE ISSUES, ETC.
6. ALL MARKUPS BY THE BUILDING / PLANNING DEPARTMENTS MUST BE FORWARD TO THE DESIGN FIRM PRIOR TO CONSTRUCTION COMMENCING.

VENTILATION NOTES

1203.1 GENERAL:
BUILDINGS SHALL BE PROVIDED WITH NATURAL VENTILATION IN ACCORDANCE WITH SECTION 1203.4, OR MECHANICAL VENTILATION IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE.

MECHANICAL VENTILATION IS REQUIRED IN GROUP R OCCUPANCIES

1203.2 ATTIC SPACES:
ENCLOSED ATTICS AND ENCLOSED RAFTER SPACES FORMED WHERE CEILINGS ARE APPLIED DIRECTLY TO THE UNDERSIDE OF ROOF FRAMING MEMBERS SHALL HAVE CROSS VENTILATION FOR EACH SEPARATE SPACE BY VENTILATING OPENINGS PROTECTED AGAINST THE ENTRANCE OF RAIN AND SNOW. BLOCKING AND BRIDGING SHALL BE ARRANGED SO AS NOT TO INTERFERE WITH THE MOVEMENT OF AIR. A MINIMUM OF 1 INCH OF AIRSPACE SHALL BE PROVIDED BETWEEN THE INSULATION AND THE ROOF SHEATHING. THE NET FREE VENTILATING AREA SHALL NOT BE LESS THAN 1/300 OF THE AREA OF THE SPACE VENTILATED, WITH 50 PERCENT OF THE REQUIRED VENTILATING AREA PROVIDED BY VENTILATORS LOCATED IN THE UPPER PORTION OF THE SPACE TO BE VENTILATED AT LEAST 3 FEET ABOVE EAVE OR CORNICE VENTS WITH THE BALANCE OF THE REQUIRED VENTILATION PROVIDED BY EAVE OR CORNICE VENTS.

EARTHWORK NOTES

1. BUILDING BACKFILL: CLEAN GRANULAR SOIL MATERIAL, FREE OF STICKS, DEBRIS, TURF AND ROCKS OVER 6" DIAMETER.
2. GARAGE SLAB BALLAST: PIT RUN GRAVEL.
3. BASEMENT SLAB BALLAST: CLEAN SAND, OR PEA GRAVEL (8' BED).
4. FOOTING DRAINS: WASHED (3/4" MIN.) DRAIN ROCK, 12" MIN. COVER OVER PERIMETER DRAIN.
5. CRAWL SPACE BED: PEA GRAVEL OR CLEAN SAND, 2" MIN. BED OVER VAPOR
6. 6 MIL BLACK VISQUEEN BARRIER (FOR CRAWL SURFACE).
7. BACKFILL, SLOPE ALL FINISH GRADES AWAY FROM BUILDING WALLS AT A 2 % (MIN.)
8. REFER TO SOILS REPORT FOR RECOMMENDED BACK FILL AND SOIL COMPACTION.

SEWERAGE + DRAINAGE:
1. FOUNDATION DRAIN PER IBC 1805.4.2.
2. DRAINAGE DISCHARGE TO AN APPROVED DRAINAGE SYSTEM PER IBC 1805.4.3.

ROOF CONSTRUCTION NOTES

GENERAL:
1. APPROVED ROOFING MATERIAL
2. 30# FELT PAPER, COUNTER FLASHED
3. 1/2" CDX PLYWOOD SHEATHING OR PER ENGINEER'S SCHEDULE, USE SIMPSON PSCL (PANEL SHEATHING CLIPS) 1 PER BAY.
4. PRE-ENGINEERED TRUSSES
5. R-49 INSULATION, MINIMUM.
6. 2 LAYERS OF 5/8" TYPE X G.W.B. LID.
7. ONE COAT VAPOR BARRIER PRIMER.
8. FINISH PAINT - OWNER TO SPECIFY COLOR.
9. ROOF PITCH, AS SHOWN ON PLAN.
10. SIMPSON CLIPS AT EACH TRUSS/RAFTER TO PLATE CONNECTION.
11. TYPICAL SOFFIT OVERHANGS, AS SHOWN ON PLAN, USE VENTED BLOCKING PER TRUSS/RAFTER BAY.
12. ADEQUATE CONNECTION AND TRANSFER OF LOAD FROM ROOF SYSTEM TO BEARING WALLS REQUIRED.
13. DRAFT STOPS WHERE NECESSARY PER CODE.
14. ALL PERIMETER AND BEARING WALL HEADERS TO BE 4x10 DF#2, U.N.O.

TRUSSES:
1. TRUSSES TO BE ENGINEERED BY LICENSED TRUSS MANUFACTURER.
2. HANG TRUSSES AND RAFTERS WITH APPROVED SIMPSON HANGERS AS PER ENGINEERS SPECIFICATIONS.

FOR ADDITIONAL INFORMATION REFER TO 2015 IBC, SECTION 15, ROOF ASSEMBLIES & ROOFTOP STRUCTURES.

TYPICAL SHEET DISCLAIMER

REFER TO STRUCTURAL SHEETS (S) FOR SPECIFICATIONS & CALCULATIONS. USE ARCHITECTURAL SHEET FOR DIMENSIONAL INFORMATION ONLY.

STRUCTURAL FILL NOTES

STRUCTURAL FILL ADDED TO THIS SITE WHICH WILL SUPPORT BUILDING STRUCTURES SHALL BE APPROVED BY A GEO-TECHNICAL ENGINEER LICENSED TO WORK IN THE STATE OF WASHINGTON. A REPORT FROM SAID ENGINEER REGARDING THE SUITABILITY OF THE PREPARED SITE TO SUPPORT THE PROPOSED STRUCTURE SHALL BE SUBMITTED TO BUILDING SERVICES PRIOR TO ANY REQUESTS FOR FOUNDATION INSPECTION(S).

NOTES:
1. CONTRACTOR IS TO VERIFY STRUCTURAL INFORMATION, SPECIFICATIONS AND DETAILS WITH THE STRUCTURAL ENGINEER AND/OR ATTACHED STRUCTURAL SHEET(S). FAILURE TO VERIFY MAY RESULT IN CONFLICTING INFORMATION CONTAINED ON THE ARCHITECTURAL SHEETS. THE DESIGNER DOES NOT TAKE RESPONSIBILITY FOR STRUCTURAL COMPONENTS OR CALCULATIONS.
2. REFER TO STRUCTURAL SHEETS (S) FOR SPECIFICATIONS & CALCULATIONS.
3. A GEO ENGINEER IS REQUIRED TO BE ONSITE FOR PLACEMENT OF ALL STRUCTURAL FILL MATERIALS.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL COMPLY WITH THE 2018 INTERNATIONAL BUILDING CODE, WASHINGTON STATE REGULATIONS FOR BARRIER FREE DESIGN, WASHINGTON STATE ENERGY CODE, AND ALL APPLICABLE LOCAL CODES, ORDINANCES, AND STANDARDS.
2. CONTRACTOR IS TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONAL DETAILS, ETC, AND NOTIFY THE ARCHITECT OF ANY AND ALL DISCREPANCIES PRIOR TO PROCEEDING WITH THE WORK.
3. ALL ITEMS MARKED "N.I.C.' ARE NOT PART OF THIS CONTACT.
4. ALL WORK SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURE'S LATEST RECOMMENDED OR WRITTEN DIRECTIONS.
5. DO NOT-SCALE DRAWINGS, DIMENSIONS GOVERN. THE CONTRACTOR SHALL NOTIFY ARCHITECT IMMEDIATELY OF ANY AND ALL DISCREPANCIES.
6. ALL DIMENSIONS ARE TO FACE OF STUD OR CENTER LINE OF STUD, OR FACE OF FOUNDATION WALL UNLESS OTHERWISE NOTED.
7. WHERE CONSTRUCTION DETAILS ARE NOT SHOWN OR NOTED FOR ANY PART OF THE WORK, THE DETAILS SHALL BE THE SAME AS' FOR OTHER SIMILAR WORK.
8. WHERE DEVICES, OR ITEMS OR PARTS THEREOF ARE REFERRED TO IN SINGULAR, IT IS INTENDED THAT SUCH SHALL APPLY TO AS MANY SUCH DEVICES, ITEMS OR PARTS AS ARE REQUIRED TO PROPERLY COMPLETE THE WORK.
9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES WHETHER SHOWN HEREON OR NOT AND TO PROTECT THEM FROM DAMAGE.
10. THE CONTRACTOR WILL VERIFY AND CONFORM TO ALL REQUIREMENTS OF ALL UTILITY COMPANIES UNLESS OTHERWISE NOTED IN THE PLANS AND SPECIFICATIONS.
11. EXISTING ELEVATIONS AND LOCATIONS TO BE JOINED SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION.
12. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THE SAFETY OF THE OCCUPANTS AND WORKERS AT ALL TIMES.
13. CONTRACTOR SHALL SECURE RELEVANT CITY AND STATE APPROVALS RELATING TO FIRE CONSTRUCTION, LABOR, HEALTH AND LICENSING.
14. CONTRACTOR SHALL SECURE AND PROVIDE ALL PERMITS FOR OCCUPANCY, UTILITIES AND ANY OTHERS REQUIRED BY GOVERNING AUTHORITIES BEYOND THE BASIC BUILDING PEN-NIT, MAKING TIMELY APPLICATIONS AND INQUIRES, PAYING ALL FEES AND POSTING ALL BONDS TO BE RELEASED AT FT COMPLETION OF CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE DRAWINGS, SHOP DRAWINGS AND CALCULATIONS AS REQUIRED FOR OWNER APPROVAL AND PERMITTING OF THE FIRE ALARM / MONITORING SYSTEM, AND ALL OTHER SYSTEMS REQUIRING BIDDER DESIGN. SUCH REVIEW AND APPROVAL SHALL BE BY THE OWNER. ALLOW A MINIMUM OF TWO WEEKS FOR REVIEW.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE SECURITY OF THE BUILDING AND SITE WHILE JOB IS IN PROGRESS AND UNTIL THE JOB IS COMPLETED.
17. LATHING, PLASTER, AND GYPSUM WALL BOARD SYSTEMS SHALL CONFORM TO THE 2015 INTERNATIONAL BUILDING CODE.
18. ALL EXPOSED GYPSUM BOARD TO HAVE METAL EDGES AT ALL CORNERS AND WALL INTERSECTIONS,.
19. ALL GLASS AND GLAZING SHALL COMPLY WITH SECTION 24 OF THE 2015 IBC. AND THE U.S. PRODUCT SAFETY COMMISSION, SAFETY STANDARD FOR ARCHITECTURAL GLAZING MATERIALS (42 FR 1426; 16 CFR PART 1202)
20. THE CONTRACTOR SHALL VERIFY ALL DOOR AND WINDOW ROUGH OPENING DIMENSIONS WITH DOOR AND WINDOW MANUFACTURES.
21. ALL REQUIRED FIRE DOORS SHALL BEAR A LABEL FROM A RECOGNIZED AGENCY SHOWING THE SPECIFIC RATING.
22. ELECTRICAL ROUGH-IN, AND REFLECTED CEILING PLAN ARE FOR THE GENERAL INFORMATION OF THE CONTRACTOR. EXACT LOCATIONS SHALL BE VERIFIED.
23. EXIT DOORS SHALL BE OPERABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT.
24. PROVIDE PORTABLE FIRE EXTINGUISHER, EACH HAVING A MINIMUM UL CLASSIFICATION OF 2A:10B:C. EXTINGUISHER SHALL BE DISTRIBUTED THROUGHOUT PREMISES ON THE BASIS OF ONE EXTINGUISHER PER EACH 3,000 FEET OF FLOOR AREA. ALL EXTINGUISHERS SHALL BE HUNG IN CONSPICUOUS LOCATIONS SO THAT THEIR TOPS ARE NOT MORE THAN FIVE FEET A.F.F. WHERE EXTINGUISHERS ARE NOT VISIBLE IN ALL DIRECTIONS PROVIDE APPROVED INDICATING SIGNS.
25. SOUND INSULATE ALL PLUMBING WALLS AND LINES.
26. PROVIDE BLOCKING IN ALL WALLS TO SUPPORT CABINETRY, SHELVING, BATHROOM FIXTURES, DISPLAY RAILS AND ALL OTHER EQUIPMENT OR IMPROVEMENTS AS REQUIRED.
27. THE PREMISES ADDRESS SHALL BE PROMINENTLY DISPLAYED ON OR ADJACENT TO THE MAIN ENTRANCE. NUMBERS SHALL BE A MINIMUM 8 INCHES IN HEIGHT WITH A PRINCIPAL STROKE WIDTH OF 3/4" AND SHALL PROVIDE A POSITIVE CONTRAST WITH THEIR BACKGROUND.
28. APPROVED PLANS AND CALCULATIONS, SIGNED, SEALED AND DATED SHALL BE ON SITE AT ALL TIMES OF INSPECTION AND CONSTRUCTION.
29. AT ALL TUB/SHOWER LOCATIONS, WALL COVERINGS SHALL BE PLASTIC OR LAMINATE TO A MINIMUM 70 INCHES ABOVE DRAIN.
30. ALL SMOKE DETECTORS TO BE HARD WIRED WITH APPROVED BATTERY BACK-UP'S.ALL GAS APPLIANCES SHALL HAVE AN INTERMITTENT IGNITION DEVICE.
31. FLASH AND COUNTER FLASH ALL ROOF TO WALL CONNECTIONS. U.N.O.
32. WATERPROOF MATERIAL SHALL BE INSTALLED AROUND TUBS AND SHOWERS TO A MIN. HEIGHT OF SIX FEET ABOVE FINISH FLOOR.
33. DRYERS SHALL BE VENTED TO OUTSIDE. PER LOCAL CODE.

CONTRACTOR NOTES

1. CONTRACTOR IS TO VERIFY STRUCTURAL INFORMATION, SPECIFICATIONS AND DETAILS WITH THE STRUCTURAL ENGINEER AND/OR ATTACHED STRUCTURAL SHEET(S). FAILURE TO VERIFY MAY RESULT IN CONFLICTING INFORMATION CONTAINED ON THE ARCHITECTURAL SHEETS. THE DESIGNER DOES NOT TAKE RESPONSIBILITY FOR STRUCTURAL COMPONENTS OR CALCULATIONS.

CONCRETE NOTES

REFER TO STRUCTURAL ENGINEERS NOTES

FIRE CODE NOTES

1. VERIFY LOCATION OF 110v SMOKE ALARMS & CARBON MONOXIDE ALARMS WITH LOCAL FIRE DEPT. AND/OR LOCAL BUILDING DEPT. ALL SMOKE ALARMS WITHIN INDIVIDUAL UNITS WILL BE INTERCONNECTED.
2. BEFORE ANY COMBUSTIBLE CONSTRUCTION BEGINS AN APPROVED WATER SUPPLY SHALL BE AVAILABLE.
3. STAIRWELL STANDPIPES SHALL BE INSTALLED WHEN THE PROGRESS OF CONSTRUCTION IS NOT MORE THAN 40 FEET IN HEIGHT ABOVE THE LOWEST LEVEL OF FIRE DEPARTMENT ACCESS.
4. FIRE SAFETY DURING CONSTRUCTION SHALL BE PER IFC 2015, CHAPTER 33, ENTITLED "FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION."

FIRE RATED PENETRATIONS

AS PER UL LISTED SYSTEM NO. F-C-2134, USE APPROVED 3M FIRE BARRIER CP 25WB+ CAULK OR FD 150+ CAULK FOR ALL THROUGH FLOOR-WALL-CEILING PENETRATIONS. NOT TO EXCEED 1/2" DIAMETER BEAD CONTINUOUSLY AROUND PIPE.

FIRE BLOCKING NOTES

718.1 General. Fireblocking and draftstopping shall be installed in combustible concealed locations in accordance with this section. Fireblocking shall comply with Section 718.2. Draftstopping in floor/ceiling spaces and attic spaces shall comply with Sections 718.3 and 718.4, respectively.
718.2 Fireblocking. In combustible construction, Fireblocking shall be installed to cut off concealed draft openings (both vertical and horizontal) and shall form an effective barrier between floors, between a top story and a roof or attic space. Fireblocking shall be installed in the locations specified in Sections 718.2.2 through 718.2.7.
718.2.2 Concealed wall spaces. Fireblocking shall be provided in concealed spaces of stud walls and partitions, including furred spaces, and parallel rows of studs or staggered studs, as follows:
1. Vertically at the ceiling and floor levels.
2. Horizontally at intervals not exceeding 10 feet (3048 mm).

718.2.5 Ceiling and floor openings. Where required by Section 712.1.7, Exception 1 of Section 714.4.1.2 or Section 714.4.2, fireblocking of the annular space around vents, pipes, ducts, chimneys and fireplaces at ceilings and floor levels shall be installed with a material specifically tested in the form and manner intended for use to demonstrate its ability to remain in place and resist the free passage of flame and the products of combustion.

* REFER TO IBC CODE TEXT FOR MORE DETAILED INFORMATION REGARDING FIREBLOCKING

DRAFTSTOP NOTES

718.3 Draftstopping in floors. In combustible construction, draftstopping shall be installed to subdivide floor/ceiling assemblies in the locations prescribed in Sections 718.3.2 through 718.3.3.
718.3.2 Groups R-1, R-2, R-3 and R-4. Draftstopping shall be provided in floor/ceiling spaces in Group R-1 buildings, in Group R-2 buildings with three or more dwelling units, in Group R-3 buildings with two dwelling units and in Group R-4 buildings. Draftstopping shall be located above and in line with the dwelling unit and sleeping unit separations.
Exceptions:
1. Draftstopping is not required in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Draftstopping is not required in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.2, provided that automatic sprinklers are also installed in the combustible concealed spaces where the draftstopping is being omitted.

718.4 Draftstopping in attics. In combustible construction, draftstopping shall be installed to subdivide attic spaces and concealed roof spaces in the locations prescribed in Sections 718.4.2 and
718.4.2 Groups R-1 and R-2. Draftstopping shall be provided in attics, mansards, overhangs or other concealed roof spaces of Group R-2 buildings with three or more dwelling units and in all Group R-1 buildings. Draftstopping shall be installed above, and in line with, sleeping unit and dwelling unit separation walls that do not extend to the underside of the roof sheathing above.
Exceptions:
1. Where corridor walls provide a sleeping unit or dwelling unit separation, draftstopping shall only be required above one of the corridor walls.
2. Draftstopping is not required in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
3. In occupancies in Group R-2 that do not exceed four stories above grade plane, the attic space shall be subdivided by draftstops into areas not exceeding 3,000 square feet (279 m2) or above every two dwelling units, whichever is smaller.
4. Draftstopping is not required in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.2, provided that automatic sprinklers are also installed in the combustible concealed space where the draftstopping is being omitted.

* REFER TO IBC CODE TEXT FOR MORE DETAILED INFORMATION REGARDING FIREBLOCKING

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STATE OF WASHINGTON

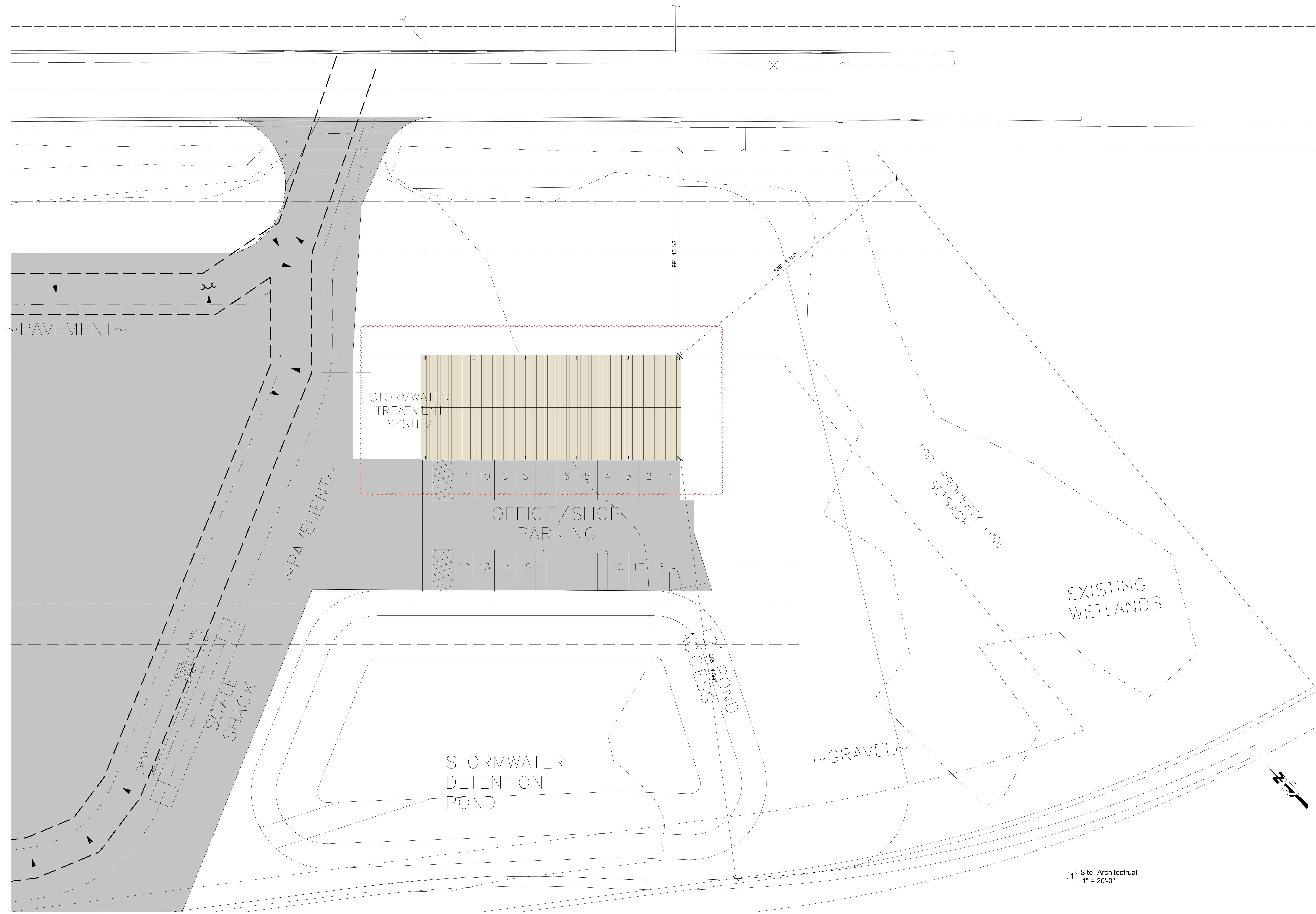
Custom Design For: ABC RECYCLING

Building 1 Office/Shop
741 Marine Dr
Bellingham WA 98226

Project number	TRC 22-001
Date	Oct 20 2023
Design by:	RKM
Drawn by:	RKM
Checked by:	RKM
Set Description:	Permit Set

General Notes

A1.1



1 Site -Architectrual
1" = 20'-0"

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Site Plan

A1.3

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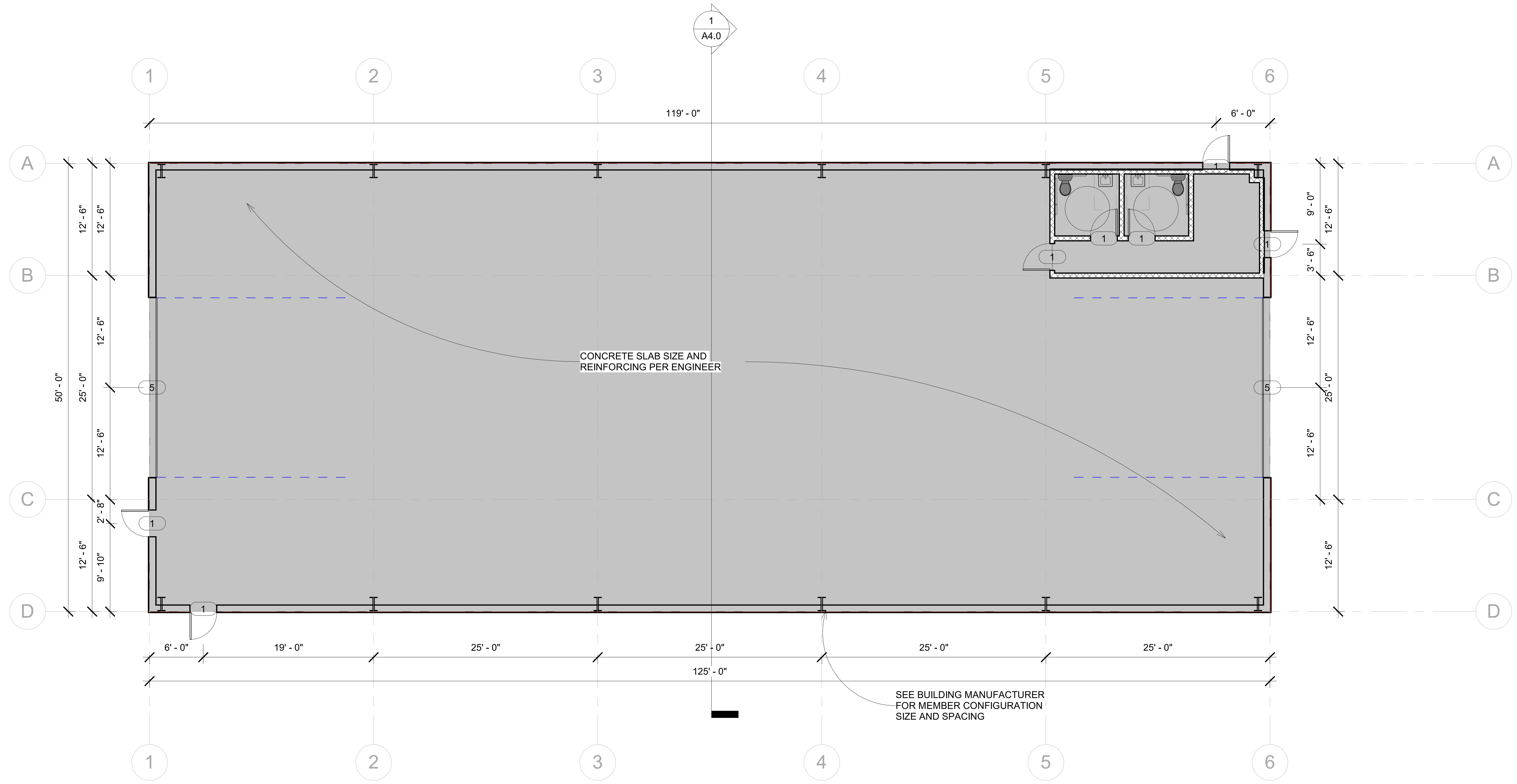
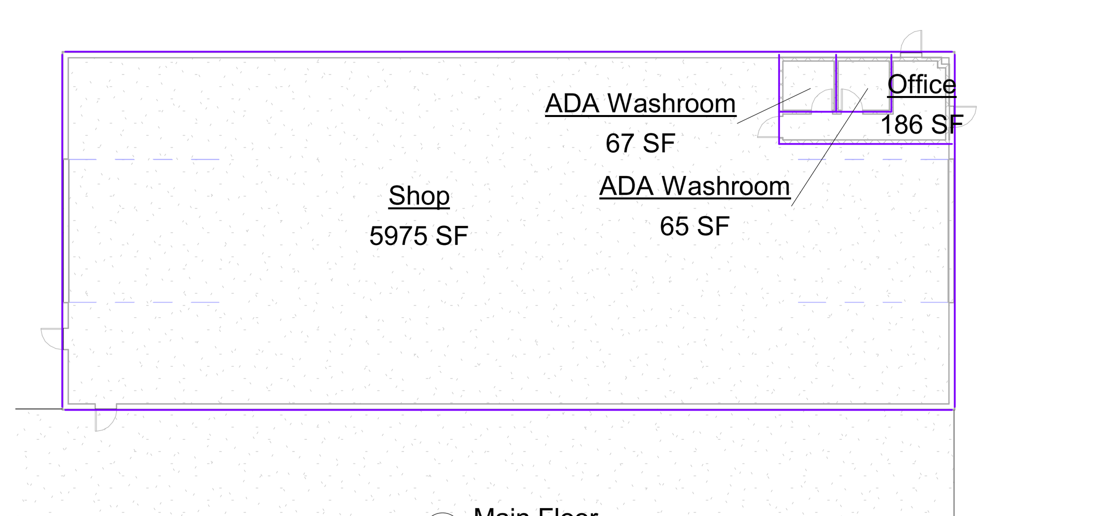


1 Main Floor Plan
1/8" = 1'-0"



2 Main Floor
3/64" = 1'-0"

Door Schedule				
Door Type	Count	Function	Door Size	Type Comments
1	7	Exterior	3/0 7/0 Flush Steel	Insulated metal door and frame, key pad exterior lock, ADA lever latchas required
5	2	Exterior	20' x 20' Overhead	W/Locking Pull Chain

Grand total: 9

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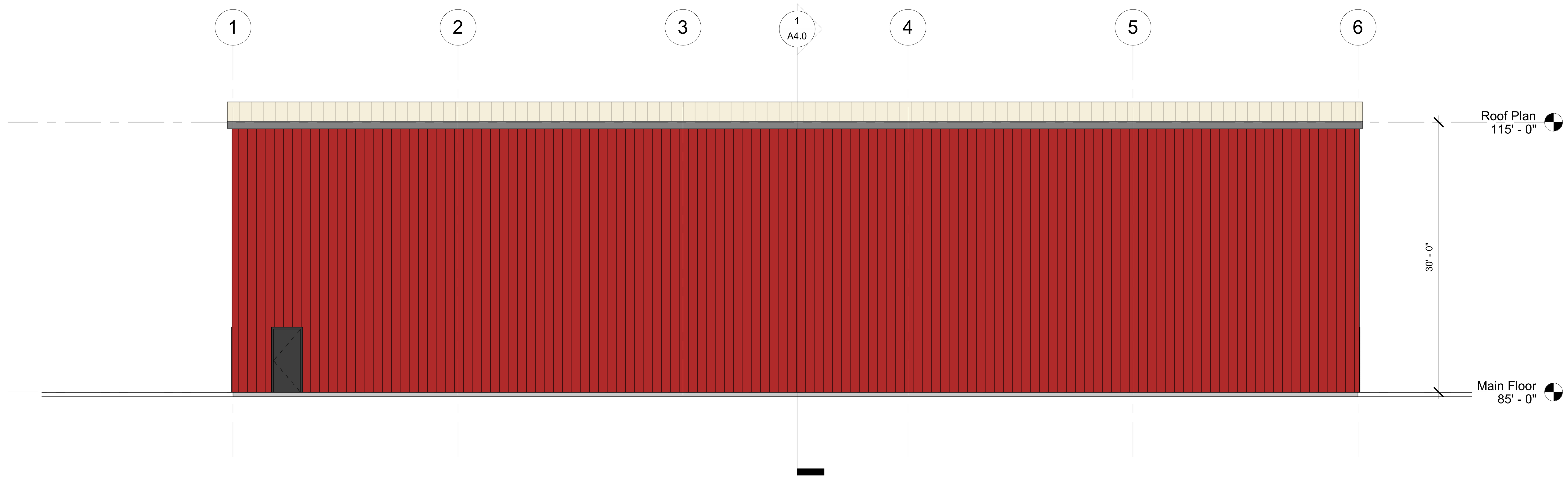
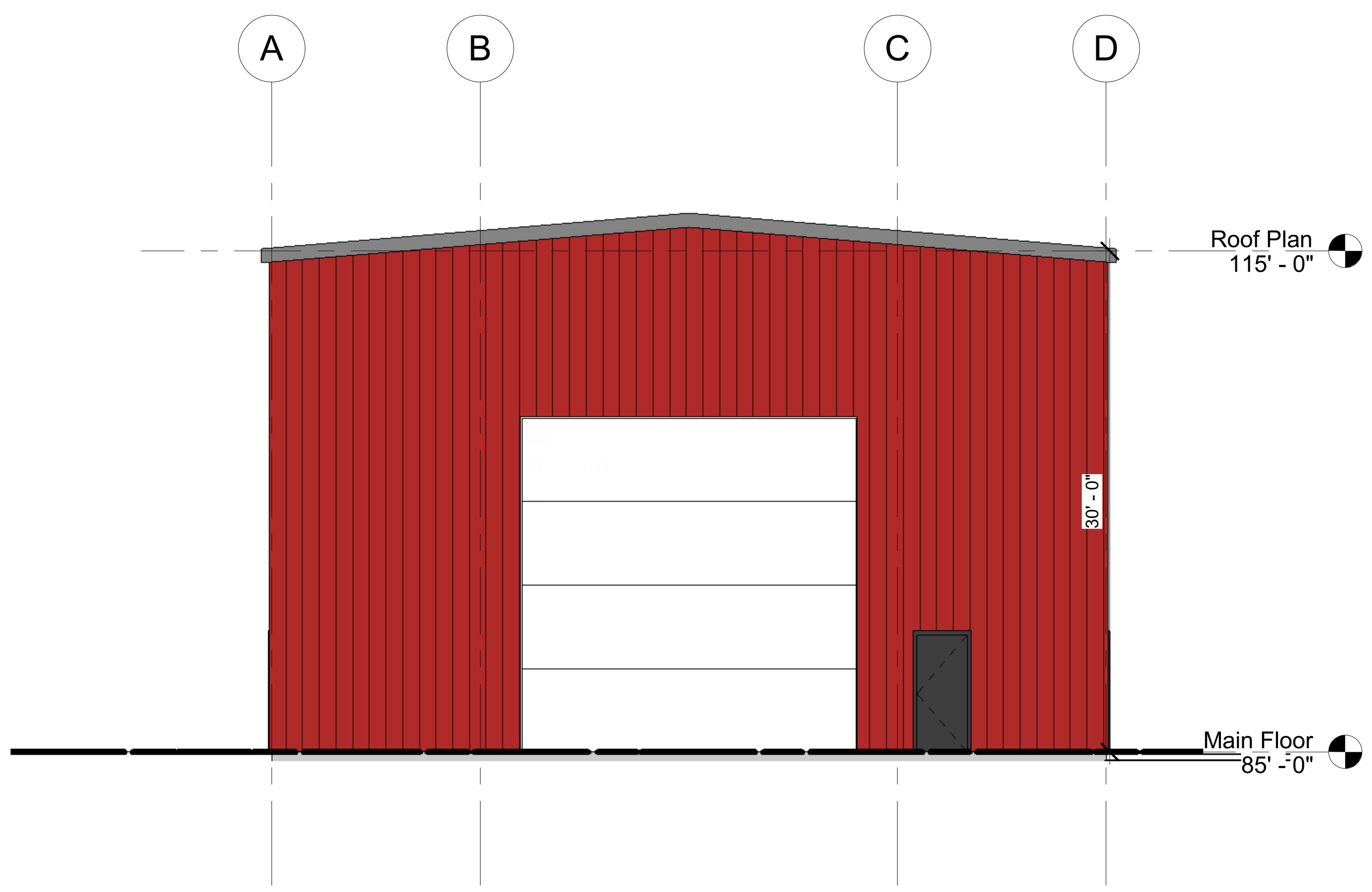
Floor Plan

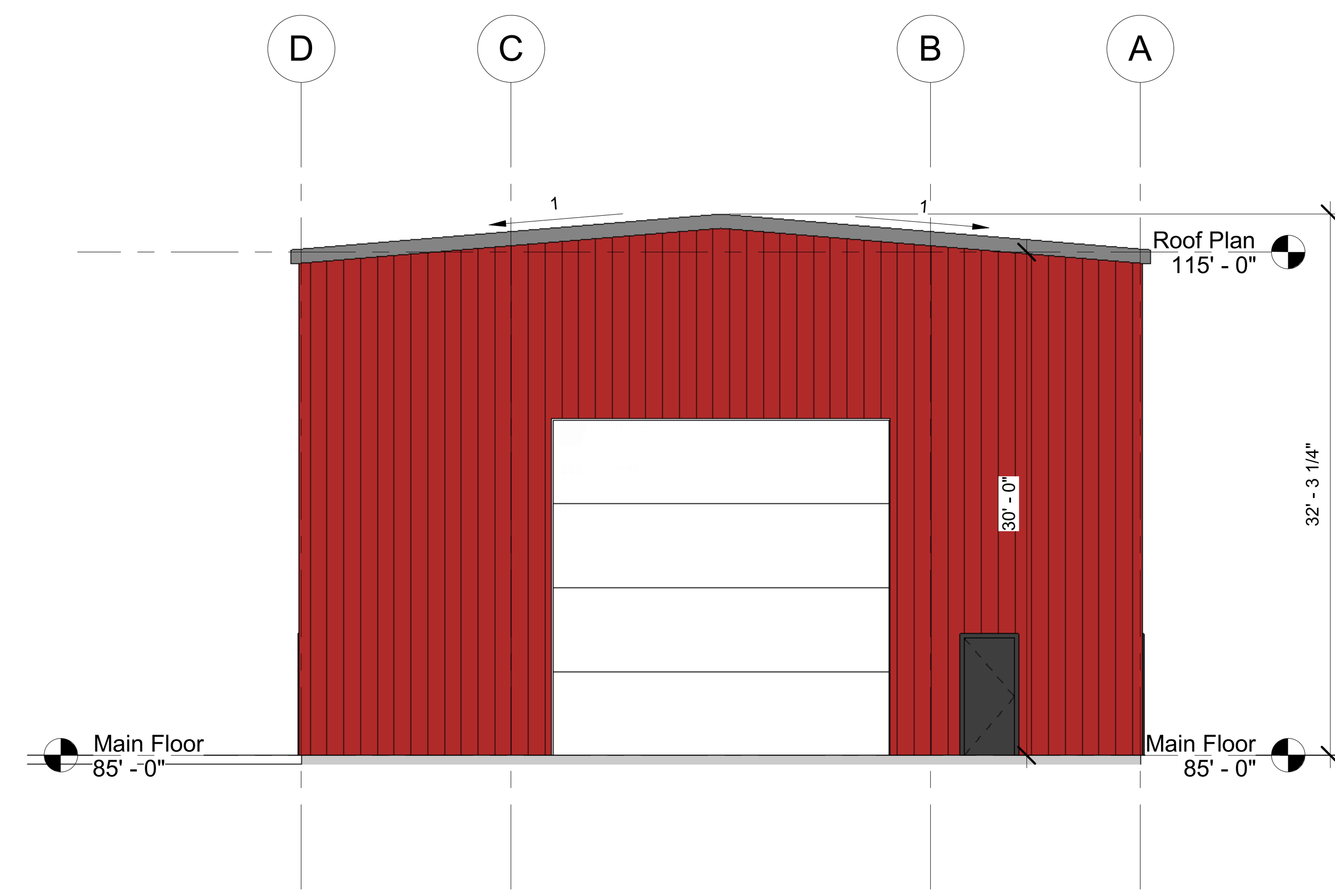
A2.0



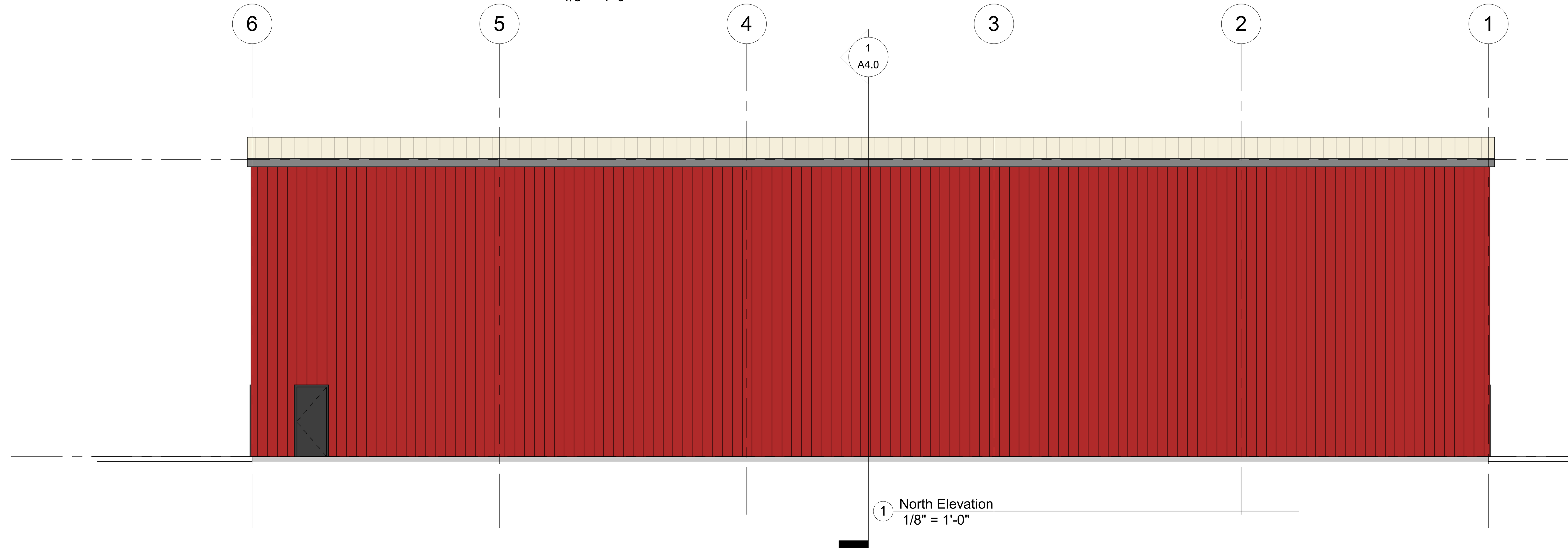
4 South Elevation
1/8" = 1'-0"



2 West Elevation
1/8" = 1'-0"



3 East Elevation
1/8" = 1'-0"



1 North Elevation
1/8" = 1'-0"

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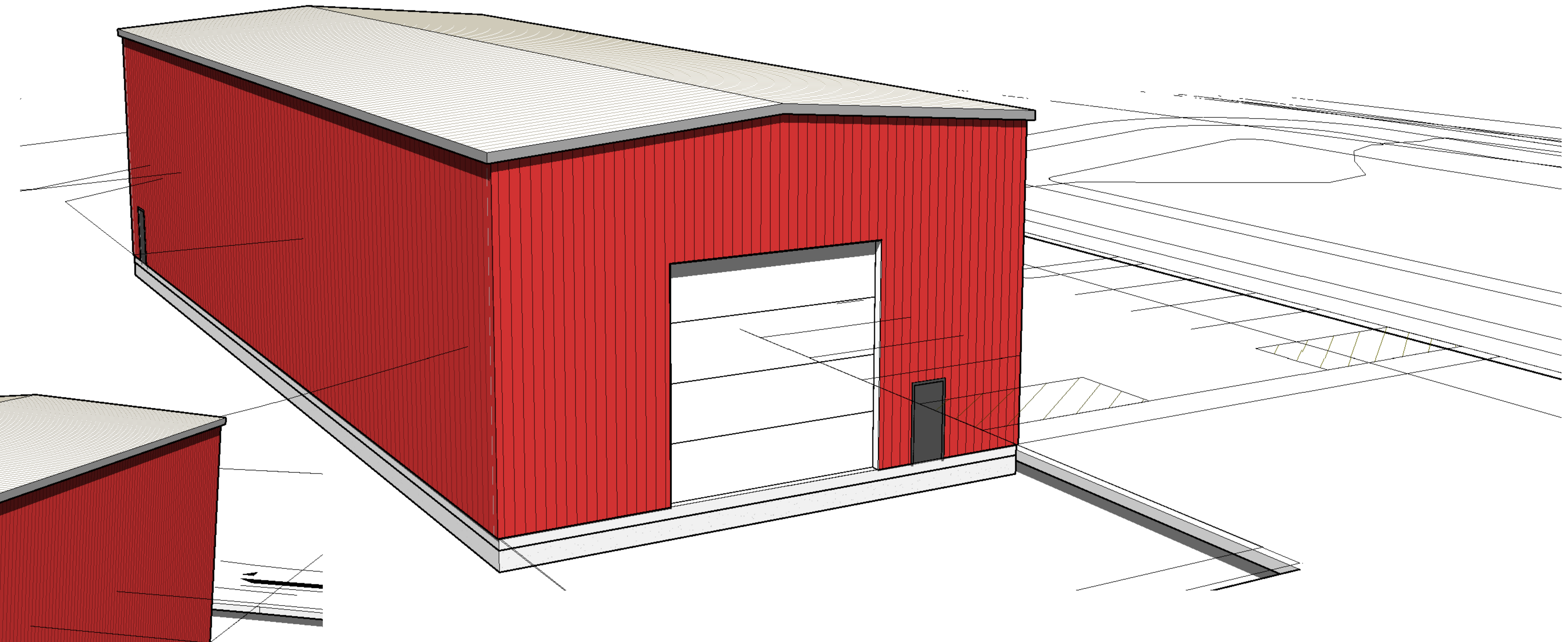
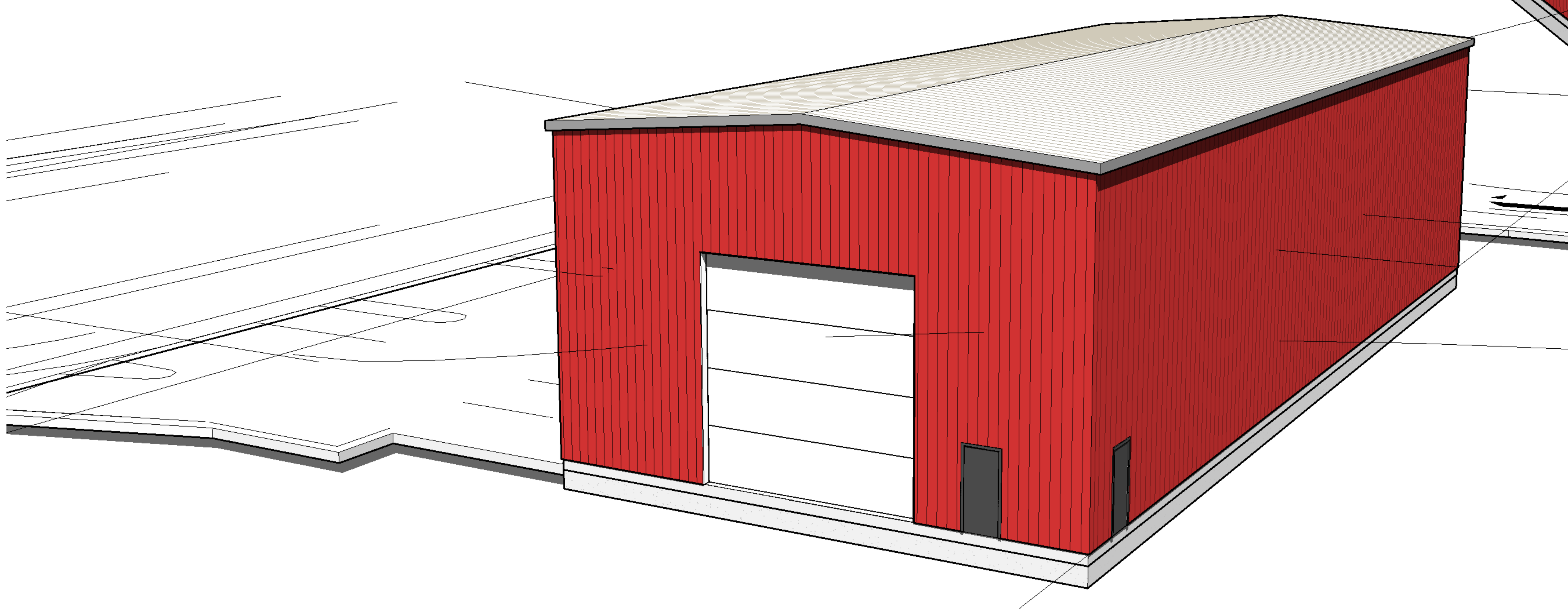
Elevations

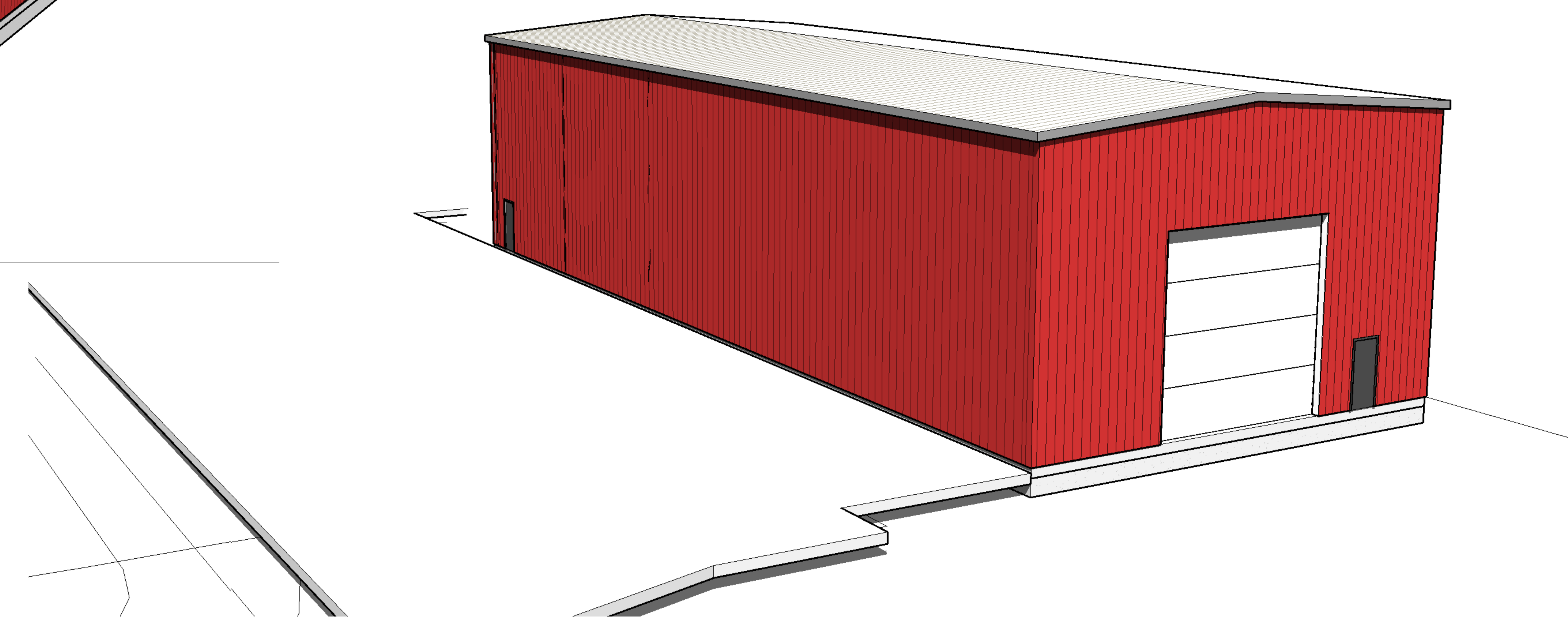
A3.0



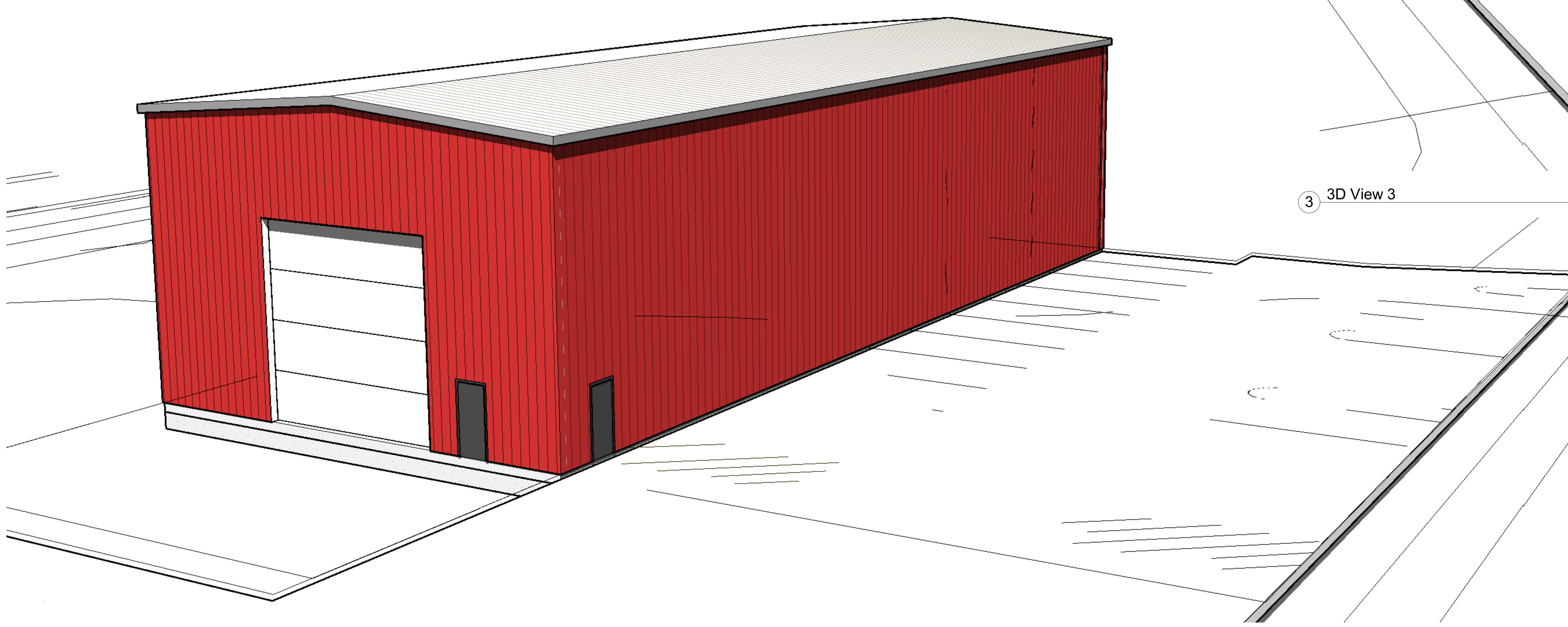
1 3D View 1



2 3D View 2



3 3D View 3



4 3D View 4

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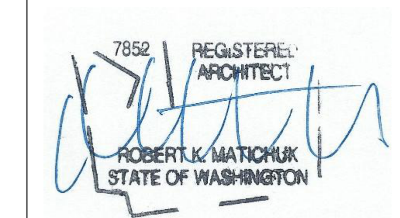

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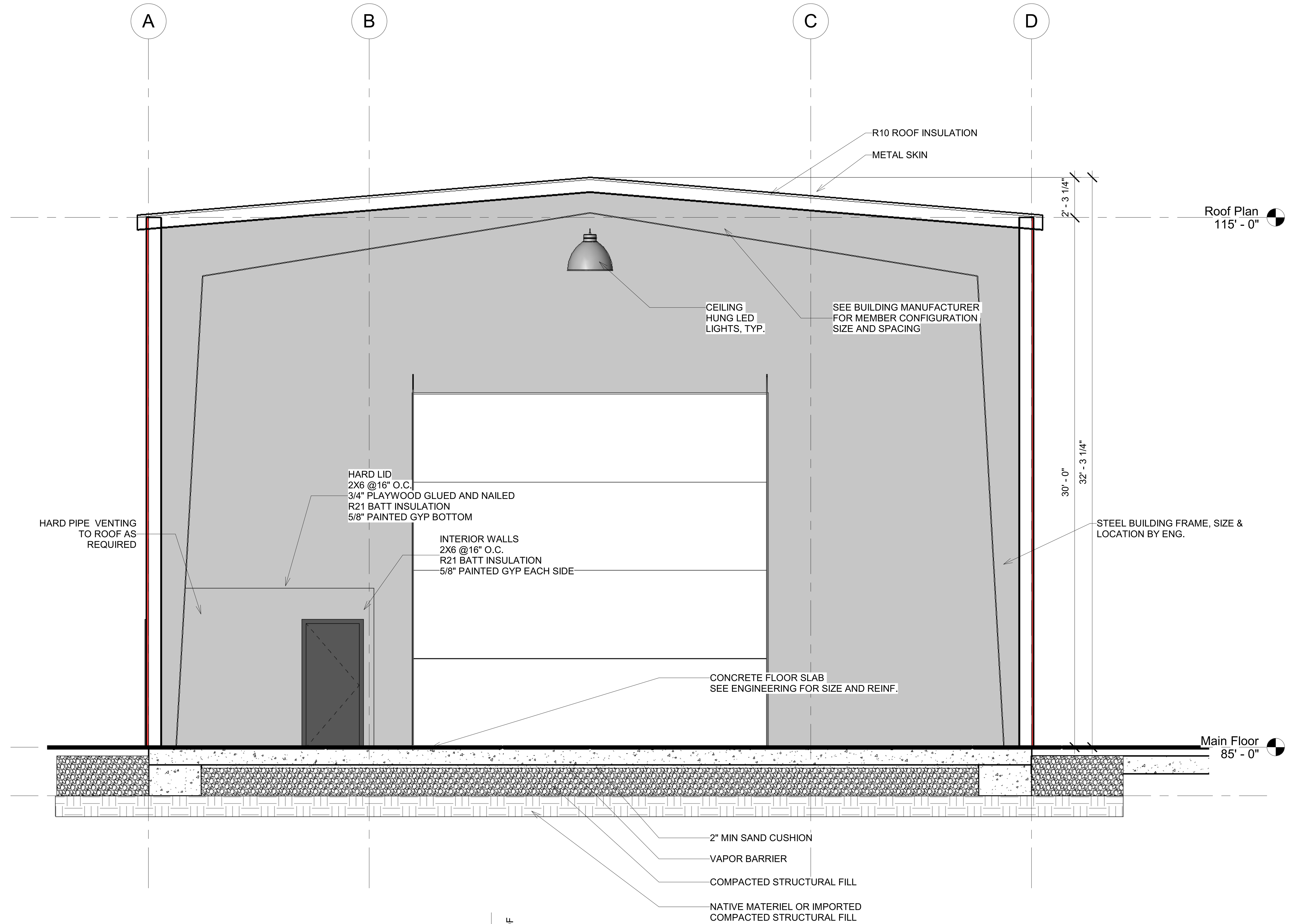
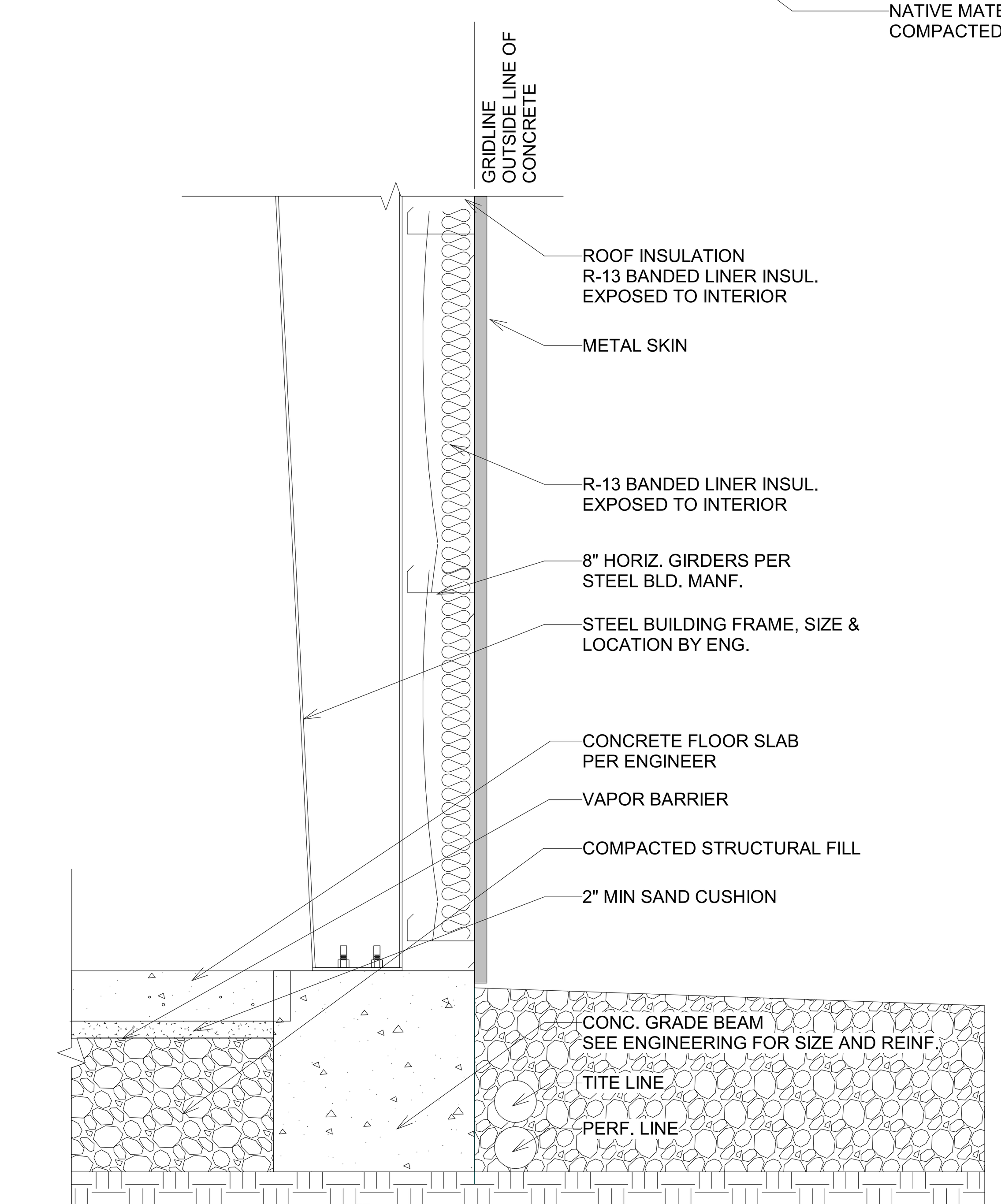
Perspective Views

A3.2



1 Section 1
1/4" = 1'-0"



2 Wall - Non Rated Exterior Main Frame
3/4" = 1'-0"

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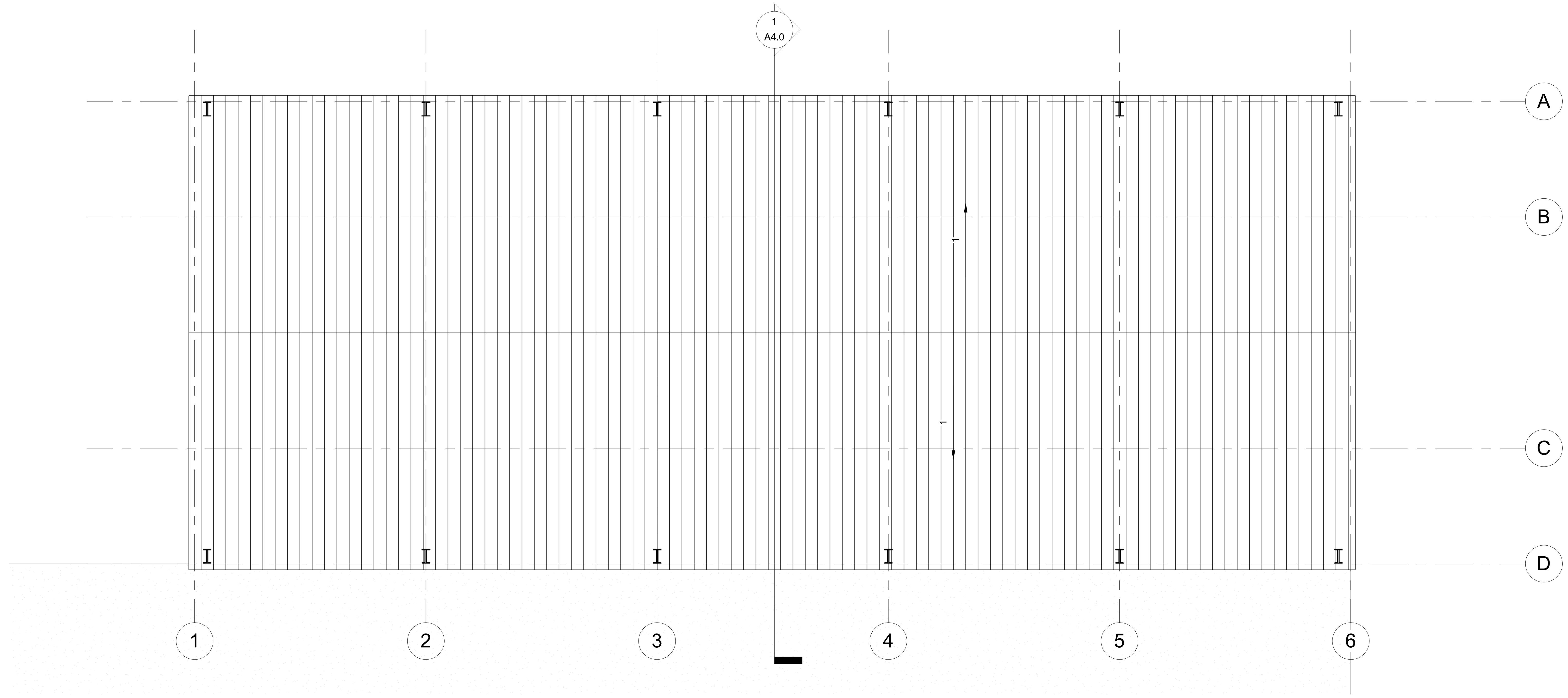
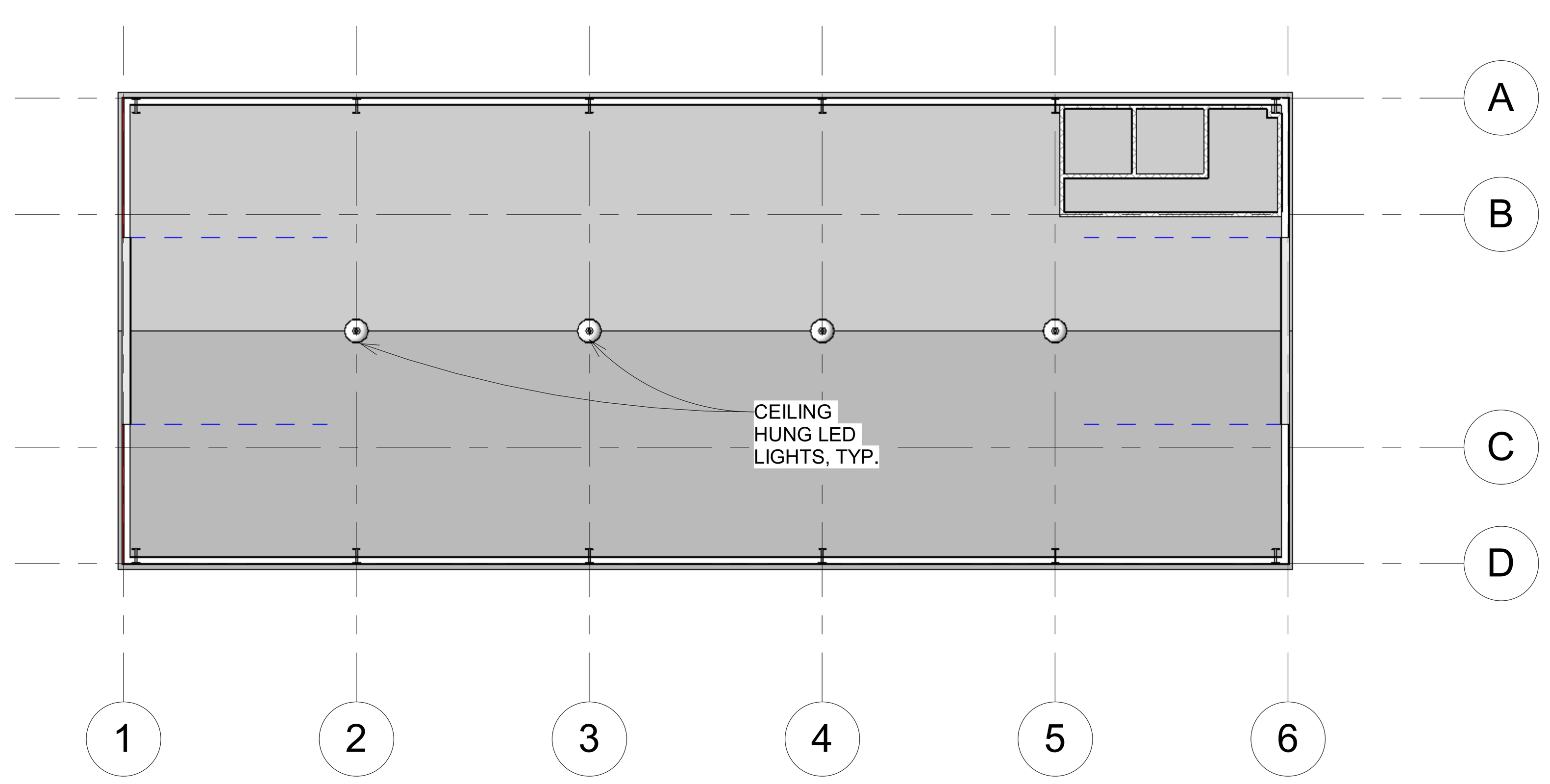
Building Section

A4.0



1 Roof Plan
1/8" = 1'-0"



2 Reflected Ceiling Plan
1/16" = 1'-0"

3 Lighting - High Bay LED
12" = 1'-0"

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Roof & RCP Plan

A5.0

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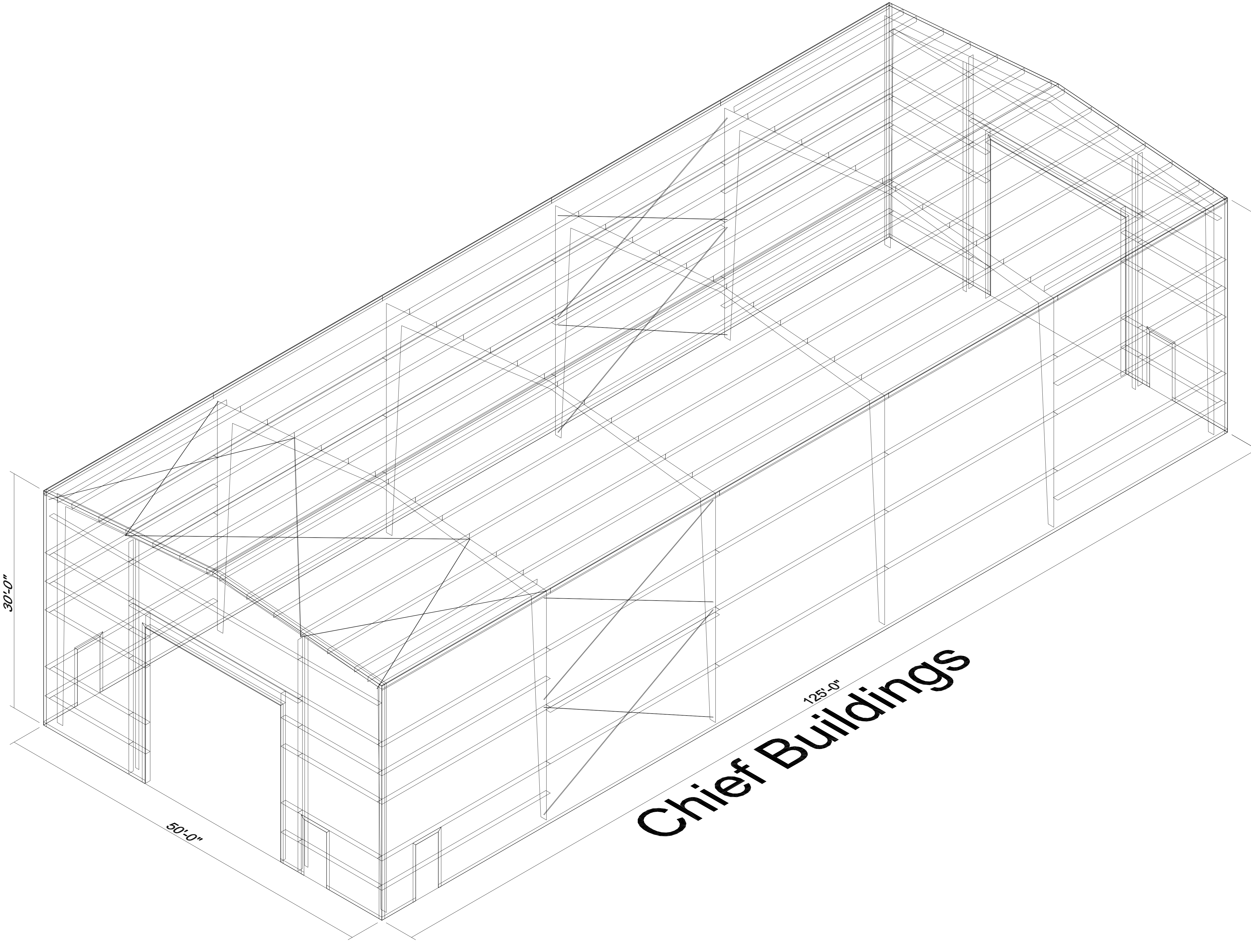
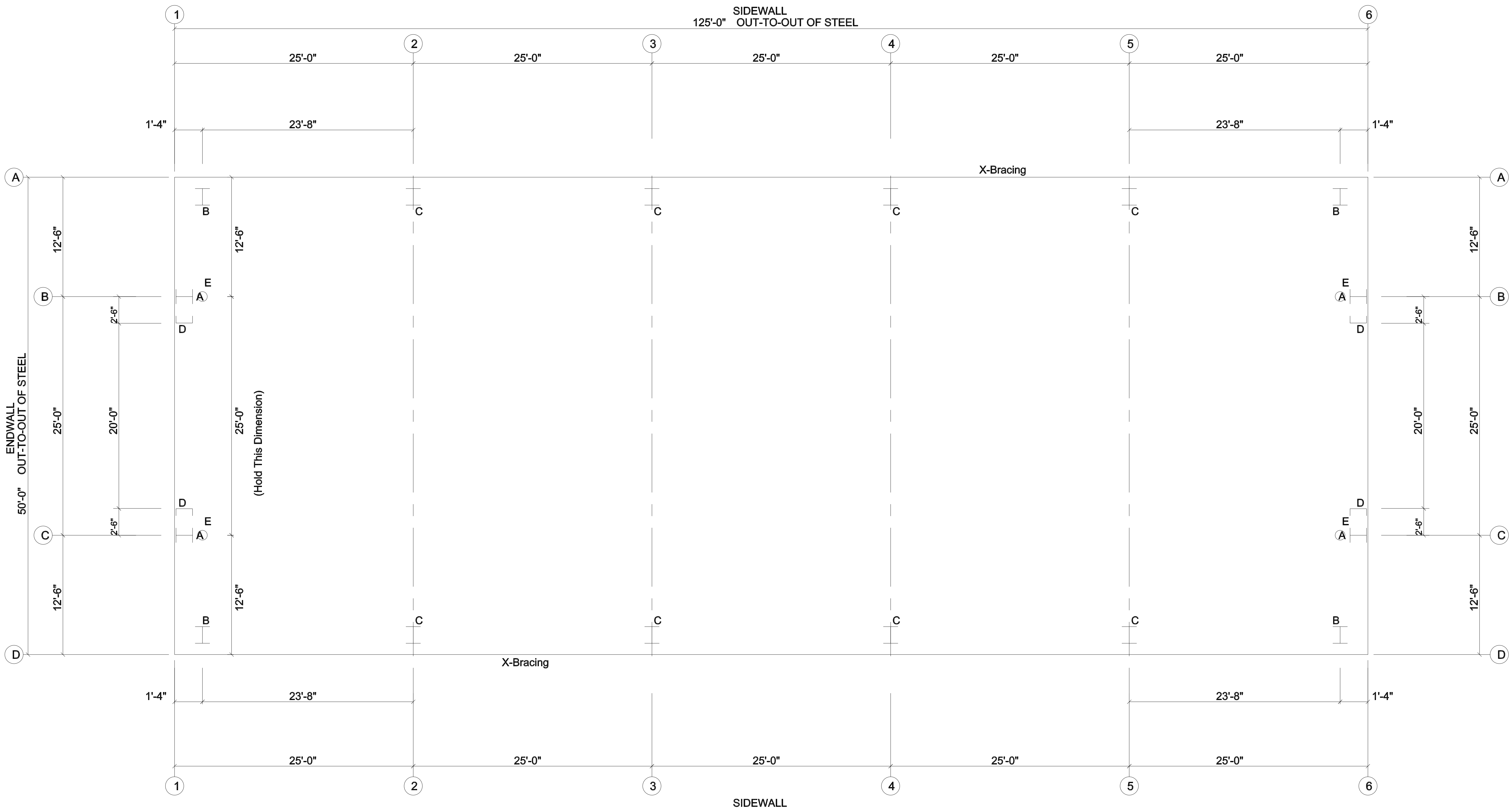

30'-0"
30'-0"
50'-0"
125'-0"
Chief Buildings



ANCHOR ROD PLAN

NOTE: All Base Plates @ 100'-0" (U.N.)

REFERENCE NOTES:

1. All Anchor Rods including nuts and washers for same are not furnished by CHIEF BUILDINGS.
2. Anchor Rod material shall conform to ASTM F1554 having a yield of 36 KSI or greater.
3. Rod projections are recommended minimums based on the base plate bearing directly on the concrete pier. If the base plate is to bear on grout, the rod projection must be increased accordingly.
4. Concrete shall have a minimum strength of 3000 PSI.
5. ALL DRAWINGS ARE NOT TO SCALE.
6. Anchor Rod Summary Table
   - Quantity includes all buildings, all phases.
   - However anchor rods for Partitions and Smart Canopies are found on separate pages (when applicable).

ANCHOR ROD SUMMARY

Qty	Locate	Dia (in)	Type	Proj (in)
● 8	Jamb	1/2"	F1554	1.50
⊕ 16	Endwall	3/4"	F1554	2.00
⊕ 64	Frame	3/4"	F1554	2.00

PRELIMINARY

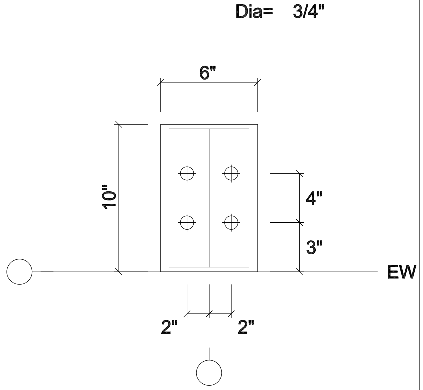
- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

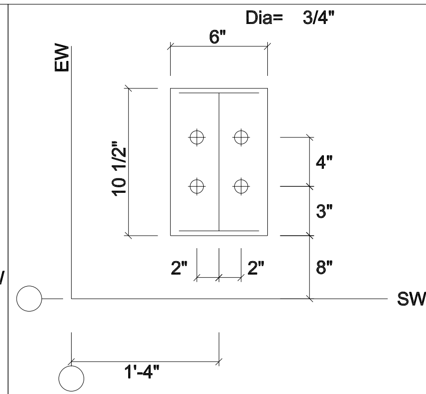
Drawing	ANCHOR ROD
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS

DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A



DETAIL A



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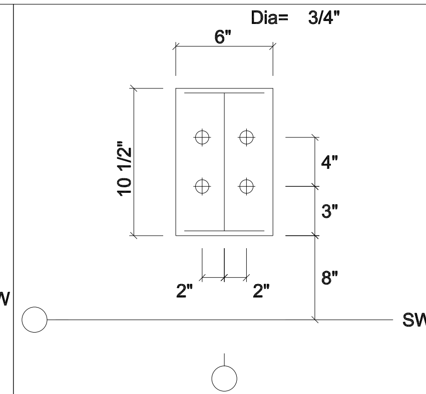

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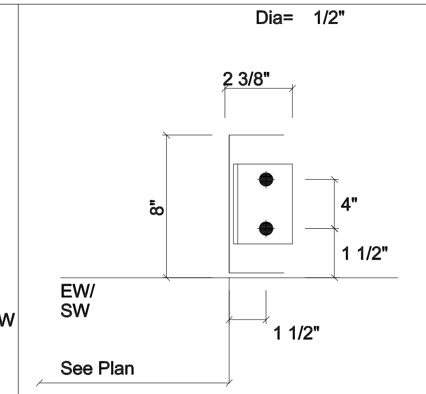

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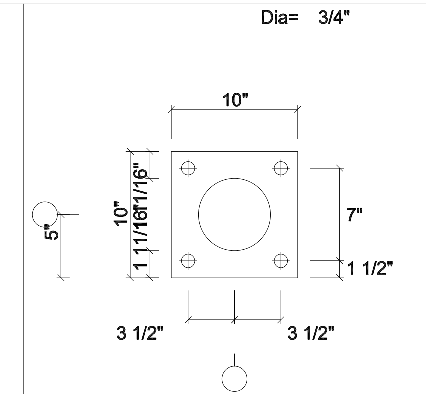
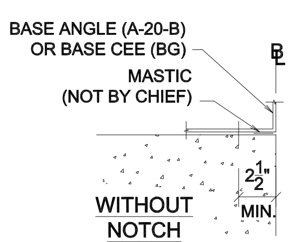


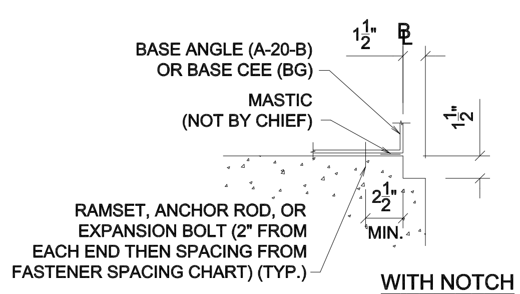
DETAIL E

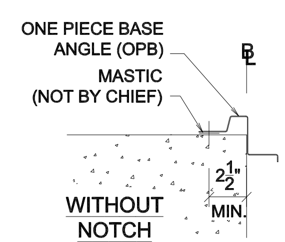
BASE ANCHORAGE SPACING FOR STANDARD BASE ANGLE, BASE CEE OR ONE PIECE BASE WITH CS OR AP WALLS		
FASTENER TYPE & DIAMETER	MINIMUM EMBEDMENT	MAXIMUM SPACING
1/4" WEDGE ANCHOR (1)	1 1/4"	3'-0"
1/4" SCREW TYPE ANCHOR (2)	1 1/2"	3'-0"
3/8" CAST-IN ANCHOR	4" WITH HOOK OR HEAD	3'-0"
1/4" HAMMER-IN (3)	1 3/8"	2'-0"
0.14 POWDER ACTUATED (4)	1 1/4"	1'-6"

(1) HILTI KWIK BOLT®, RAMSET TRUBOLT®, POWERS POWERSTUD®, OR EQUAL
(2) CFS TAPCON®, HILTI KWIK-CON II®, POWERS WEDGE-BOLT®, OR EQUAL
(3) POWERS ZAMAC HAMMER SCREW®, HILTI METAL HIT ANCHOR®, OR EQUAL
(4) POWERS BALLISTIC POINT PIN, RAMSET 1500/1600 SERIES, HILTI UNIVERSAL NAIL OR EQUAL

FASTENER SPACING CHART







BASE MEMBER DETAILS

CONTRACTOR IS RESPONSIBLE FOR ANCHORING BASE MEMBER TO CONCRETE.

REFERENCE NOTES:

1. ACTUAL BASE PLATE DIMENSIONS MAY BE SMALLER THAN BASE PLATE DIMENSIONS SHOWN.

PRELIMINARY

- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

Drawing	ANCHOR ROD
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS	DATE DRAWN	QUOTE NO.
	8/25/23	FQ74801A

RIGID FRAME: BASIC COLUMN REACTIONS (k)

Frame Line	Column Line	-----Dead---- Horiz	Vert	--Collateral- Horiz	Vert	-----Live---- Horiz	Vert	-----Snow---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert
1*	A	0.0	0.6	0.0	0.1	0.0	0.5	0.0	0.7	-4.4	-9.3	5.3	6.4
1*	D	0.0	0.6	0.0	0.1	0.0	0.5	0.0	0.7	-5.3	6.4	4.4	-9.3
1*	B	0.0	1.4	0.0	0.9	0.0	3.5	0.0	5.1	0.0	0.7	0.0	-14.0
1*	C	0.0	1.4	0.0	0.9	0.0	3.5	0.0	5.1	0.0	-14.0	0.0	0.7

Frame Line	Column Line	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert
1*	A	-5.9	-7.5	3.8	8.3	2.8	-3.2	2.5	-3.3	-0.5	-1.5	0.5	1.5
1*	D	-3.8	8.3	5.9	-7.5	-2.5	-3.3	-2.8	-3.2	-0.5	1.5	0.5	-1.5
1*	B	0.0	2.2	0.0	-12.5	0.0	-4.6	0.0	-2.0	0.0	1.7	0.0	-1.7
1*	C	0.0	-12.5	0.0	2.2	0.0	-2.0	0.0	-4.6	0.0	-1.7	0.0	1.7

Frame Line	Column Line	-MIN_SNOW-- Horiz	Vert	F1PAT_LL_1- Horiz	Vert	F1PAT_LL_2- Horiz	Vert	F1PAT_LL_3- Horiz	Vert	F1PAT_LL_4- Horiz	Vert	F1UNB_SL_L- Horiz	Vert
1*	A	0.0	0.8	0.0	0.4	0.0	-0.6	0.0	1.1	0.0	-0.6	0.0	0.7
1*	D	0.0	0.8	0.0	-0.6	0.0	0.4	0.0	1.1	0.0	-0.6	0.0	-0.1
1*	B	0.0	5.8	0.0	3.6	0.0	2.5	0.0	0.9	0.0	2.6	0.0	5.9
1*	C	0.0	5.8	0.0	2.5	0.0	3.6	0.0	0.9	0.0	2.6	0.0	2.6

Frame Line	Column Line	F1UNB_SL_R- Horiz	Vert
1*	A	0.0	-0.1
1*	D	0.0	0.7
1*	B	0.0	2.6
1*	C	0.0	5.9

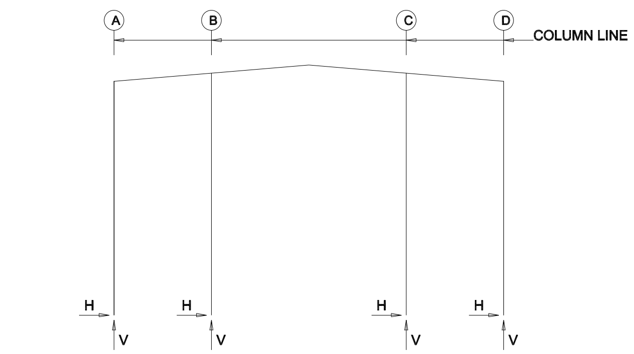
Frame Line	Column Line	-----Dead---- Horiz	Vert	--Collateral- Horiz	Vert	-----Live---- Horiz	Vert	-----Snow---- Horiz	Vert	--Wind_Left1- Horiz	Vert	-Wind_Right1- Horiz	Vert
2*	A	0.5	2.5	0.5	1.9	1.9	7.5	2.8	10.9	-9.0	-18.1	5.1	-6.7
2*	D	-0.5	2.5	-0.5	1.9	-1.9	7.5	-2.8	10.9	-5.1	-6.7	9.0	-18.1

Frame Line	Column Line	--Wind_Left2- Horiz	Vert	-Wind_Right2- Horiz	Vert	--Wind_Long1- Horiz	Vert	--Wind_Long2- Horiz	Vert	-Seismic_Left Horiz	Vert	Seismic_Right Horiz	Vert
2*	A	-10.9	-11.8	3.1	-0.4	3.3	-22.9	2.8	-20.6	-1.0	-1.1	1.0	1.1
2*	D	-3.1	-0.4	10.9	-11.8	-2.8	-20.6	-3.3	-22.9	-1.0	1.1	1.0	-1.1

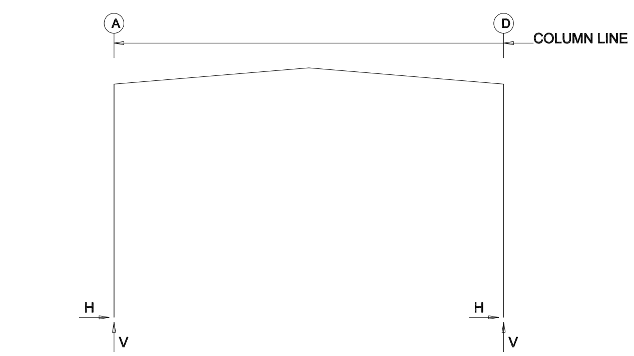
Frame Line	Column Line	-Seismic_Long Horiz	Vert	-MIN_SNOW-- Horiz	Vert	F2UNB_SL_L- Horiz	Vert	F2UNB_SL_R- Horiz	Vert
2*	A	0.0	-6.0	3.2	12.5	2.3	10.9	2.3	6.1
2*	D	0.0	-6.0	-3.2	12.5	-2.3	6.1	-2.3	10.9

1* Frame lines: 1 6
2* Frame lines: 2 3 4 5

FRAME LINES: 1 6



FRAME LINES: 2 3 4 5



CONTROLLING LOAD CASES

1 Dead+0.6Wind_Left2
2 Dead+0.6Wind_Right2
3 Dead+Collateral+0.75Snow+0.45Wind_Left1+0.75Slide_Snow
4 Dead+Collateral+0.75Snow+0.45Wind_Right1+0.75Slide_Snow
5 0.6Dead+0.6Wind_Left1
6 0.6Dead+0.6Wind_Right1
7 0.6Dead+0.6Wind_Left2
8 0.6Dead+0.6Wind_Right2
9 0.6Dead+0.6Wind_Long1L
10 0.6Dead+0.6Wind_Long2L
11 1.07Dead+1.07Collateral+0.7Seismic_Right
12 Dead+Collateral+MIN_SNOW
13 Dead+Collateral
14 0.6Dead+0.6Wind_Right2+0.6Wind_Suction
15 0.6Dead+0.6Wind_Pressure+0.6Wind_Long2L

RIGID FRAME: MAXIMUM REACTIONS

Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin
		Column_Reactions(k)					
1*	A	6	3.2	4.2	7	-3.6	-4.1
		2	2.3	5.6	5	-2.7	-5.2
1*	D	8	3.6	-4.1	5	-3.2	4.2
		1	-2.3	5.6	6	2.7	-5.2
1*	B	6	0.0	-7.6	6	0.0	-7.6
		13	0.0	8.2			
1*	C	5	0.0	-7.6	5	0.0	-7.6
		13	0.0	8.2			

1* Frame lines: 1 6

RIGID FRAME: MAXIMUM REACTIONS

Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin
		Column_Reactions(k)					
2*	A	4	5.4	9.6	7	-6.2	-5.6
		12	4.2	16.9	9	2.3	-12.2
2*	D	8	6.2	-5.6	3	-5.4	9.6
		12	-4.2	16.9	10	-2.3	-12.2

2* Frame lines: 2 3 4 5

BUILDING BRACING REACTIONS

Wall Loc	Line	Col Line	± Reactions(k) Wind Horz	Vert	Seismic Horz	Vert	Panel_Shear (lb/ft) Wind	Seis	Note
L_EW	1								(h)
F_SW	D	2,3	8.2	9.3	5.3	6.0			
R_EW	6								(h)
B_SW	A	5,4	8.2	9.3	5.3	6.0			

(h)Rigid frame at endwall

Reactions for seismic represent shear force, Eh

ENDWALL COLUMN: BASIC COLUMN REACTIONS (k)

Frm Line	Col Line	Dead Vert	Wind Press Horz	Wind Suct Horz	Seis Long Horz
1	B	0.4	-6.9	7.6	0.1
1	C	0.4	-6.9	7.6	0.1
6	C	0.4	-6.9	7.6	0.1
6	B	0.4	-6.9	7.6	0.1

ENDWALL COLUMN: MAXIMUM REACTIONS

Frm Line	Col Line	Load Id	Hmax H	V Vmax	Load Id	Hmin H	V Vmin
		Column_Reactions(k)					
1	B	14	4.6	0.3	15	-4.2	0.3
		11	0.0	0.5			
1	C	14	4.6	0.3	15	-4.2	0.3
		11	0.0	0.5			
6	C	14	4.6	0.3	15	-4.2	0.3
		11	0.0	0.5			
6	B	14	4.6	0.3	15	-4.2	0.3
		11	0.0	0.5			

1. COLUMN FOOTINGS AND PIERS MUST BE DESIGNED TO WITHSTAND HORIZONTAL AND VERTICAL REACTIONS AS SHOWN ON THE ANCHOR ROD PLAN. CHIEF BUILDINGS IS NOT RESPONSIBLE FOR DESIGN OF CONCRETE FOUNDATION. CHIEF BUILDINGS RECOMMENDS THAT THE SERVICES OF A QUALIFIED ENGINEER IS OBTAINED BY THE CONTRACTOR / BUILDER TO DESIGN THE FOUNDATIONS FOR THE INDICATED REACTIONS.

2. REACTIONS ARE GIVEN IN KIPS. (1 KIP = 1000 LBS.) MOMENTS, IF ANY, ARE GIVEN IN KIP-FT.

3. ANCHOR ROD DESIGN IS BASED ON SHEAR, TENSION, AND COMBINED TENSION AND SHEAR. CHIEF BUILDINGS IS NOT RESPONSIBLE FOR ANCHOR ROD SIZE RECOMMENDATIONS WHEN ANCHOR ROD CONFIGURATION PLACES THE RODS IN A BENDING MODE. WHEN THE COLUMN BASE PLATE BEARS ON GROUT, THE CONTRACTOR / BUILDER OR FOUNDATION ENGINEER SHALL INVESTIGATE BENDING IN THE ANCHOR RODS AND PROVIDE A SHEAR KEY FOR THE COLUMN BASE TO THE PIER WHEN THE ANCHOR RODS ARE NOT ADEQUATE IN BENDING ABOUT THE PIER.

DESCRIPTIONS OF REACTION ABBREVIATIONS

DL	DEAD
CL OR COLL	COLLATERAL
LL	LIVE
SL	SNOW
DRIFT	SNOW DRIFT
SLIDE	SLIDING SNOW
WL1 OR WIND_L1	WIND 1 LEFT (WITH POSITIVE INTERNAL PRESSURE, +GCPI)
WR1 OR WIND_ R1	WIND 1 RIGHT (WITH POSITIVE INTERNAL PRESSURE, +GCPI)
WL2 OR WIND_L2	WIND 2 LEFT (WITH NEGATIVE INTERNAL PRESSURE, -GCPI)
WR2 OR WIND_R2	WIND 2 RIGHT (WITH NEGATIVE INTERNAL PRESSURE, -GCPI)
LW1 OR LNWIND1	LONGITUDINAL WIND, CASE 1
LW2 LNWIND2	LONGITUDINAL WIND, CASE 2
WP	WIND PRESSURE
WS	WIND SUCTION
SEISL OR SEIS_L	SEISMIC LEFT
SEISR OR SEIS_R	SEISMIC RIGHT
LNSEIS OR LN_SEISMIC	LONGITUDINAL SEISMIC
TEMP	TEMPERATURE CHANGE
LW1_L2E	LONGITUDINAL WIND, CASE 1, WIND LEFT EDGE ZONE 2E
LW1_R2E	LONGITUDINAL WIND, CASE 1, WIND RIGHT EDGE ZONE 2E
LW2_L3E	LONGITUDINAL WIND, CASE 2, WIND LEFT EDGE ZONE 3E
LW2_R3E	LONGITUDINAL WIND, CASE 2, WIND RIGHT EDGE ZONE 3E
E#PAT_LL_*	ENDWALL PATTERN LIVE (1 - LEFT, 2 - RIGHT ENDWALL)
E#PAT_SL_*	ENDWALL PATTERN SNOW (1 - LEFT, 2 - RIGHT ENDWALL)
F#PAT_LL_*	RIGID FRAME PATTERN LIVE
F#PAT_SL_*	RIGID FRAME PATTERN SNOW
E#UNB_SL_L	ENDWALL UNBALANCED SNOW LEFT
E#UNB_SL_R	ENDWALL UNBALANCED SNOW RIGHT
F#UNB_SL_L	RIGID FRAME UNBALANCED SNOW LEFT
F#UNB_SL_R	RIGID FRAME UNBALANCED SNOW RIGHT
F#CRANEA*	CRANE LOADING, SINGLE CRANE
F#CRNA2 $	A2 - TWO LARGEST CRANES IN ANY AISLE
F#CRNAM $$	AM - SIMPLE MAXIMUM SIZE IN ONE AISLE
F#CRNA $$	A - SINGLE CRANE IN ONE AISLE
F#CRNBM $	BM - LARGEST CRANE IN EACH AISLE FOR TWO ADJACENT AISLE
F#CRNC2 $	C2 - TWO CRANES IN ANY AISLE PLUS ONE CRANE IN ANY NON-ADJACENT AISLE. ALSO SINGLE CRANE AT C2 LOCATION AND DOUBLE CRANE AT OTHER LOCATION.
F#CRN B $$	B - SINGLE CRANE IN TWO ADJACENT AISLES
F#CRN C $$	C - SINGLE CRANE IN TWO NON-ADJACENT AISLES

THIS TABLE PROVIDES A DESCRIPTION OF ABBREVIATIONS FOR COMMONLY USED REACTIONS/LOADS.

PRELIMINARY

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- Subject to change during order process.

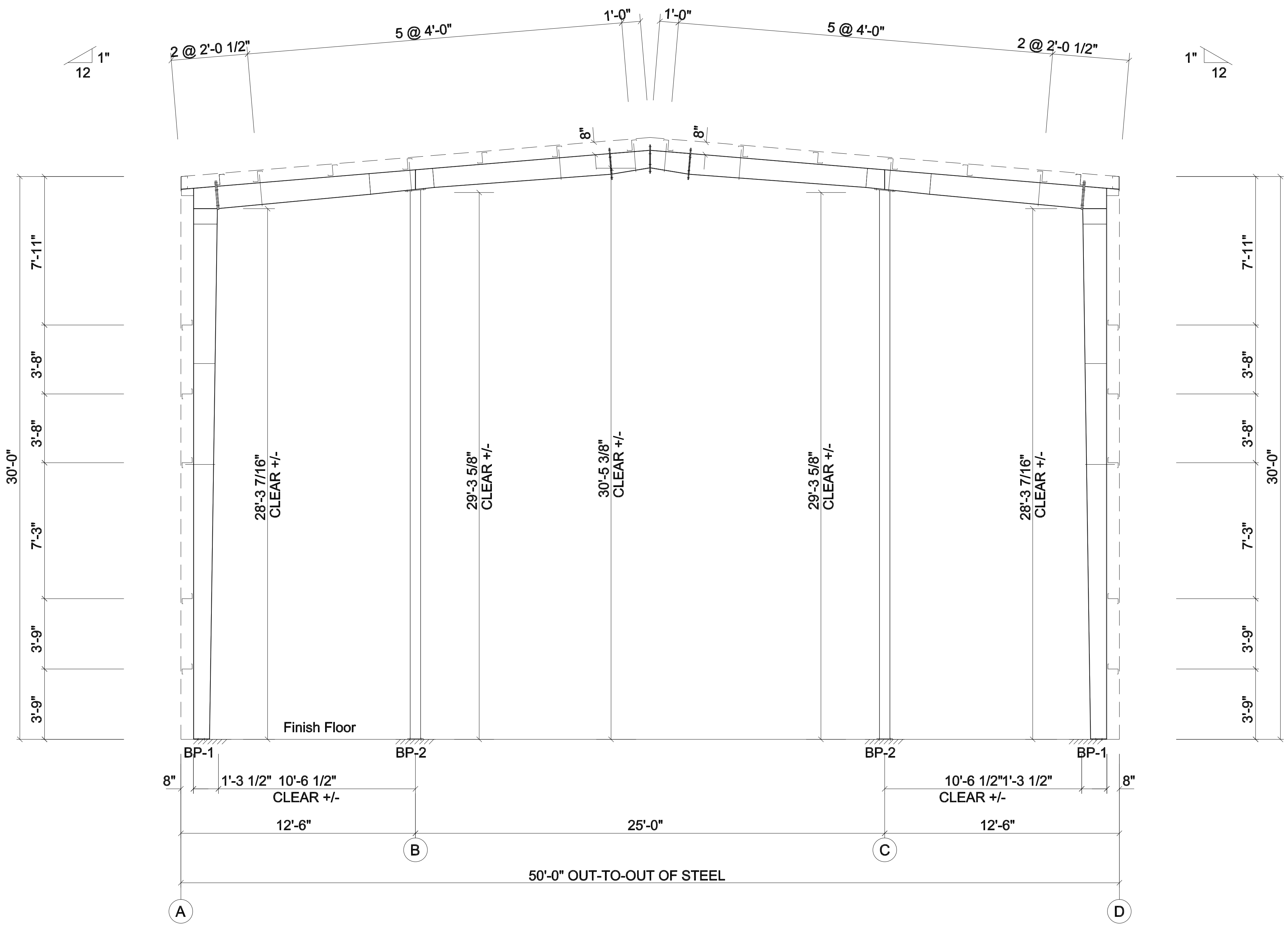
NOT FOR CONSTRUCTION

Drawing	ANCHOR ROD
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

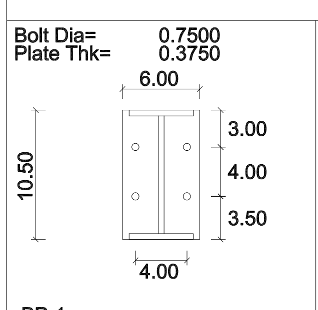
CHIEF BUILDINGS

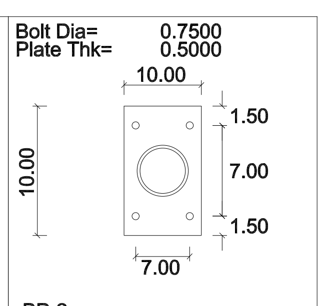
DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A

STIFFENER TABLE				
	Stiff	Plate Size		
Mark	Mark	Width	Thick	Length
RF1-1	ST1	2.750	0.250	14.94
RF1-2	ST2	2.750	0.250	12.31



RIGID FRAME ELEVATION: FRAME LINE 1 6





PRELIMINARY

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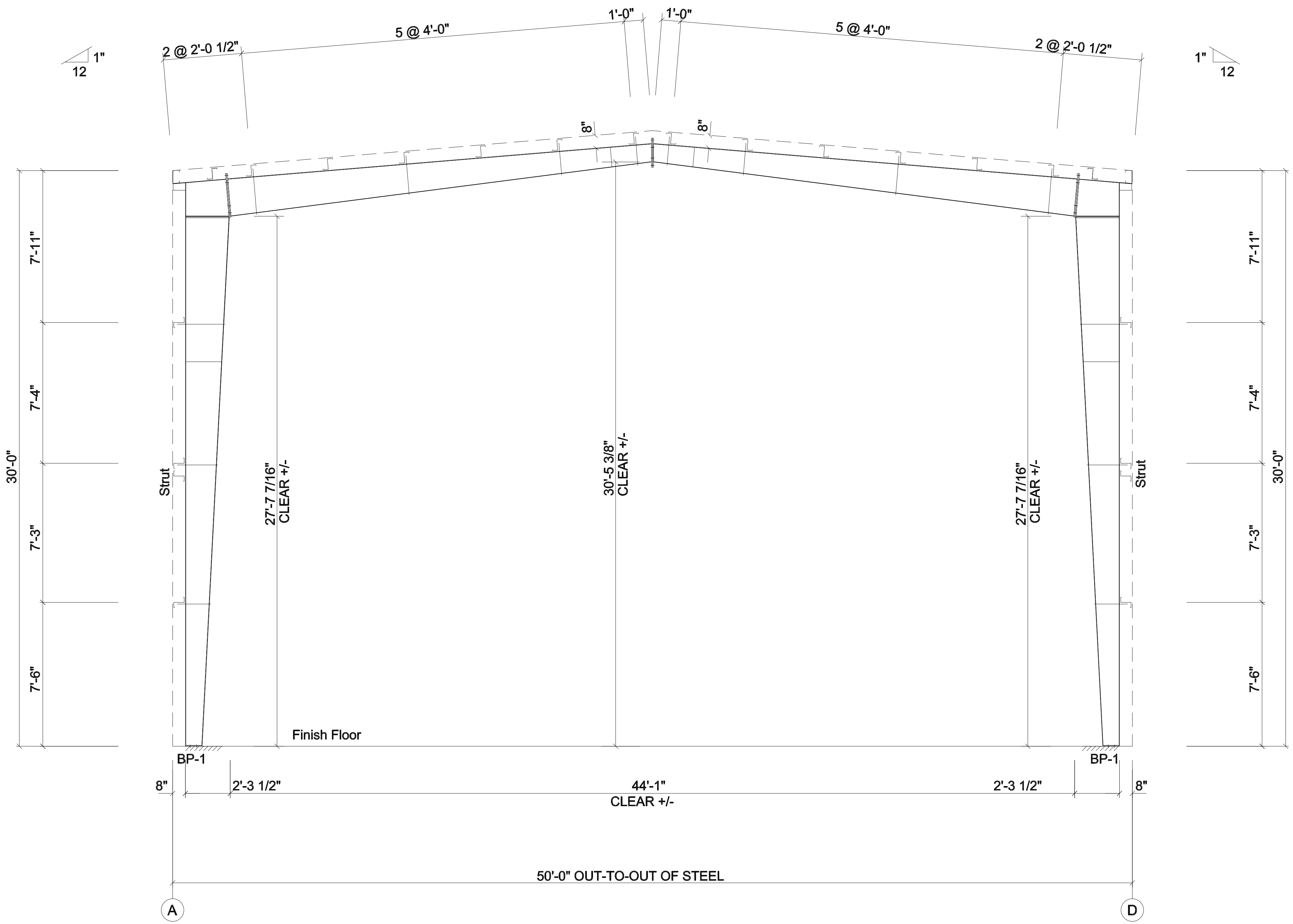
- Subject to change during order process.

NOT FOR CONSTRUCTION

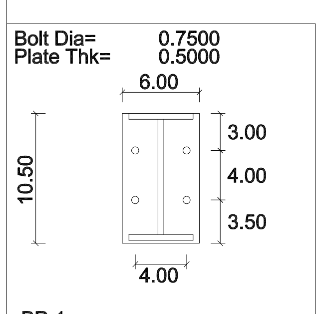
Drawing	CROSS SECTION
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS	DATE DRAWN	QUOTE NO.
	8/25/23	FQ74801A

STIFFENER TABLE				
Mark	Stiff Mark	Plate Size Width	Thick	Length
RF2-1	ST1	2.750	0.250	26.94



RIGID FRAME ELEVATION: FRAME LINE 2 3 4 5

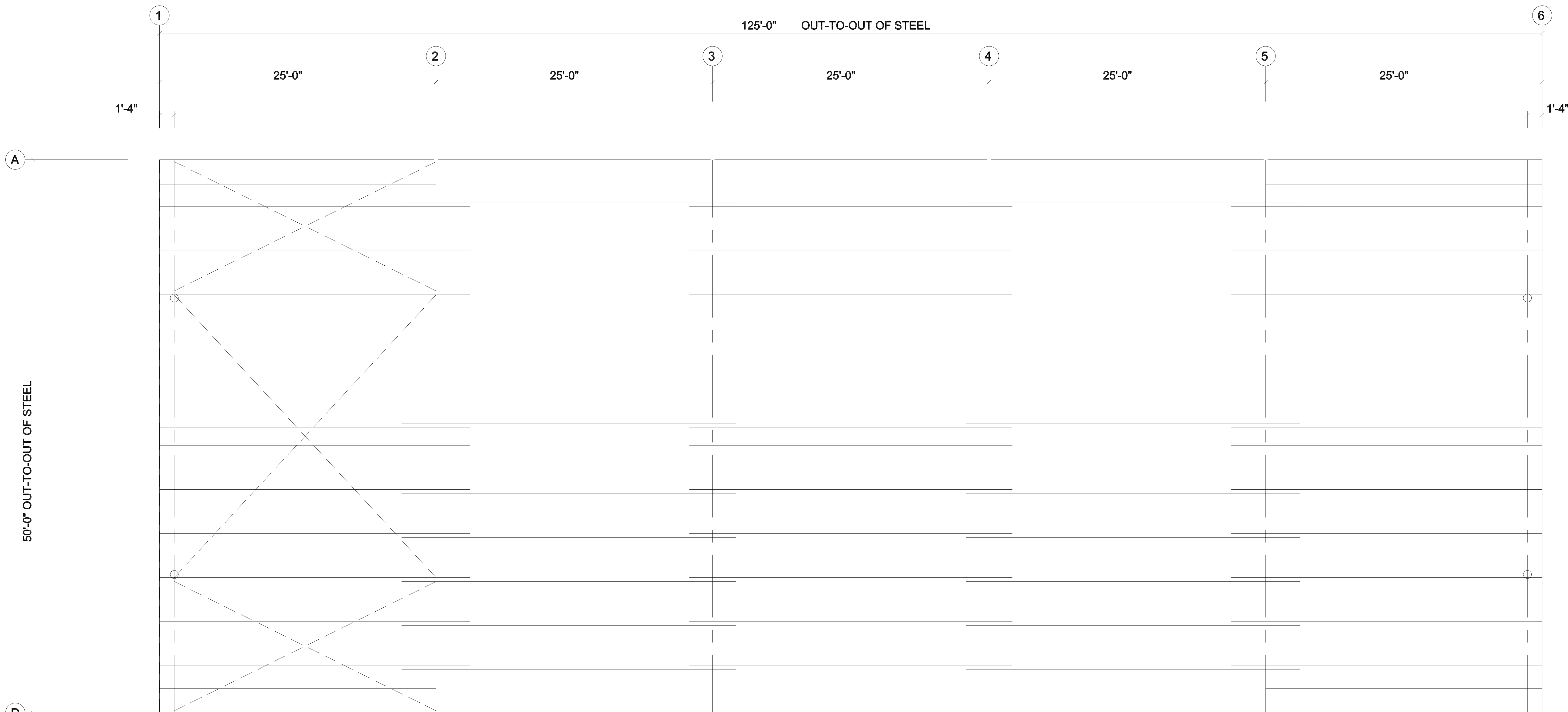


PRELIMINARY

- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

Drawing	CROSS SECTION
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3
DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A



ROOF FRAMING PLAN

PRELIMINARY

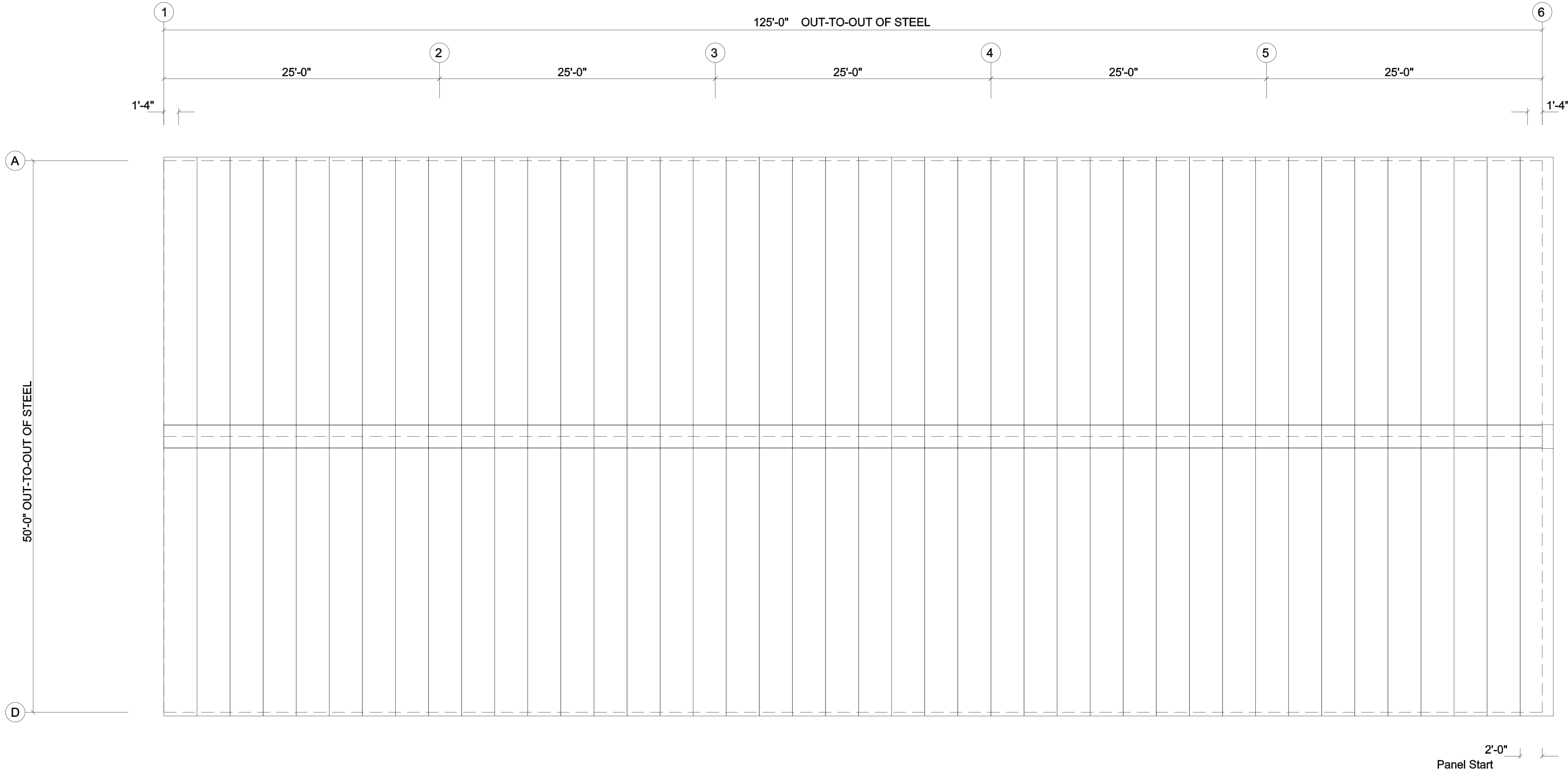
- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

Drawing	ROOF FRAMING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS

DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A



ROOF SHEETING PLAN

PANELS: 26 Ga. CS - Std.PVDF-FEVE Finish

PRELIMINARY

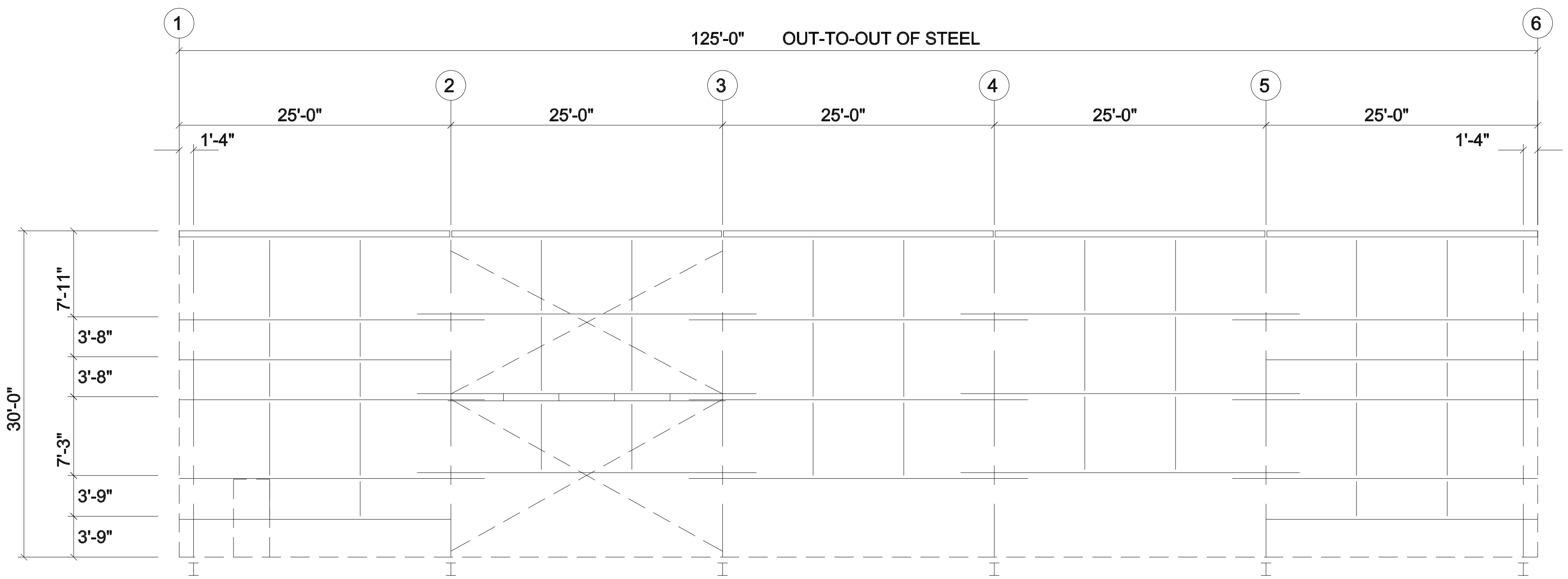
- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

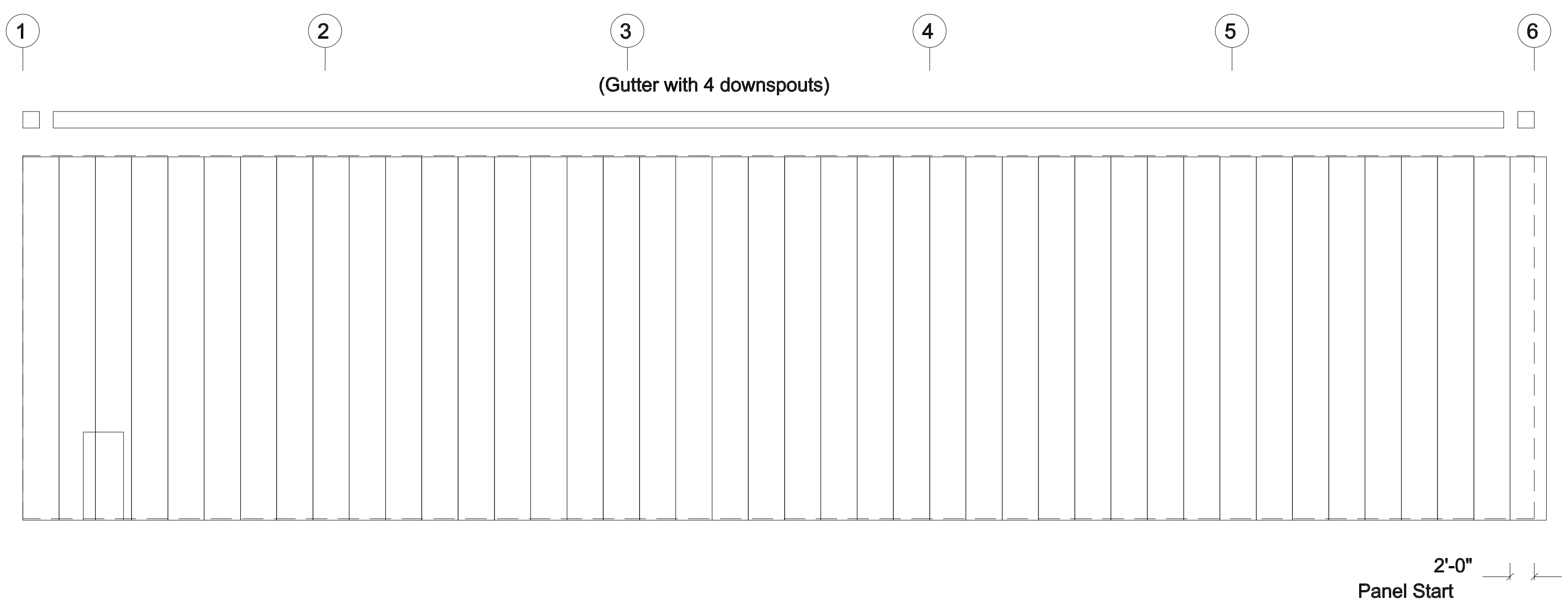
Drawing	ROOF SHEETING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS

DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A



SIDEWALL FRAMING: FRAME LINE D



SIDEWALL SHEETING & TRIM: FRAME LINE D

PANELS: 26 Ga. TBD - Std. SMP Finish

GIRT DEPTH: 8.00

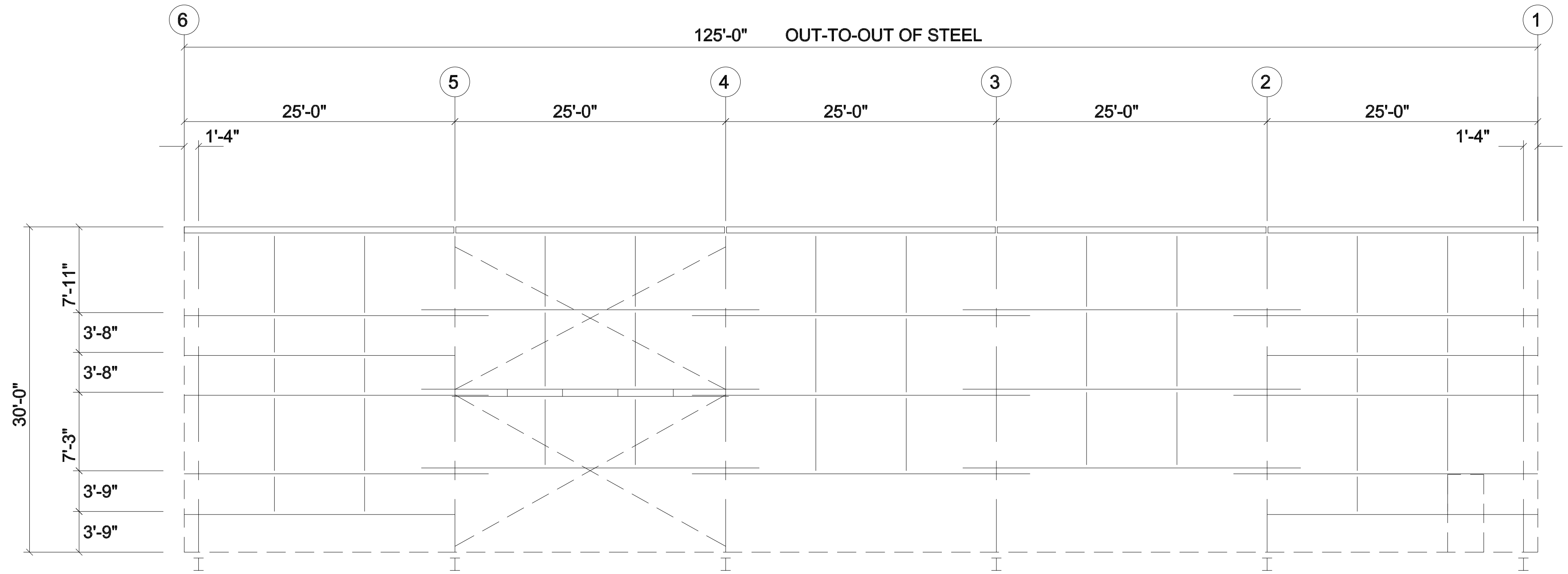
PRELIMINARY

- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

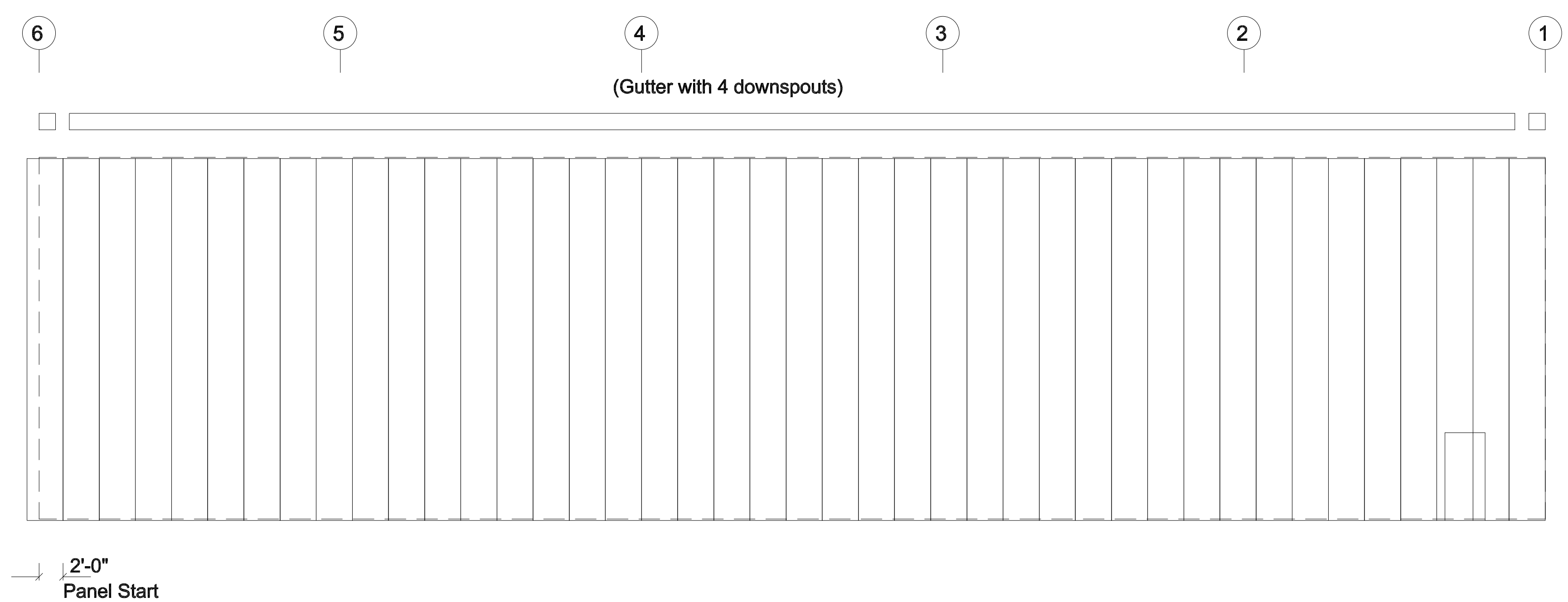
NOT FOR CONSTRUCTION

Drawing	SIDEWALL DRAWING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3
DATE DRAWN	8/25/23
QUOTE NO.	FQ74801A

CHIEF BUILDINGS



SIDEWALL FRAMING: FRAME LINE A



SIDEWALL SHEETING & TRIM: FRAME LINE A

PANELS: 26 Ga. TBD - Std. SMP Finish

GIRT DEPTH: 8.00

PRELIMINARY

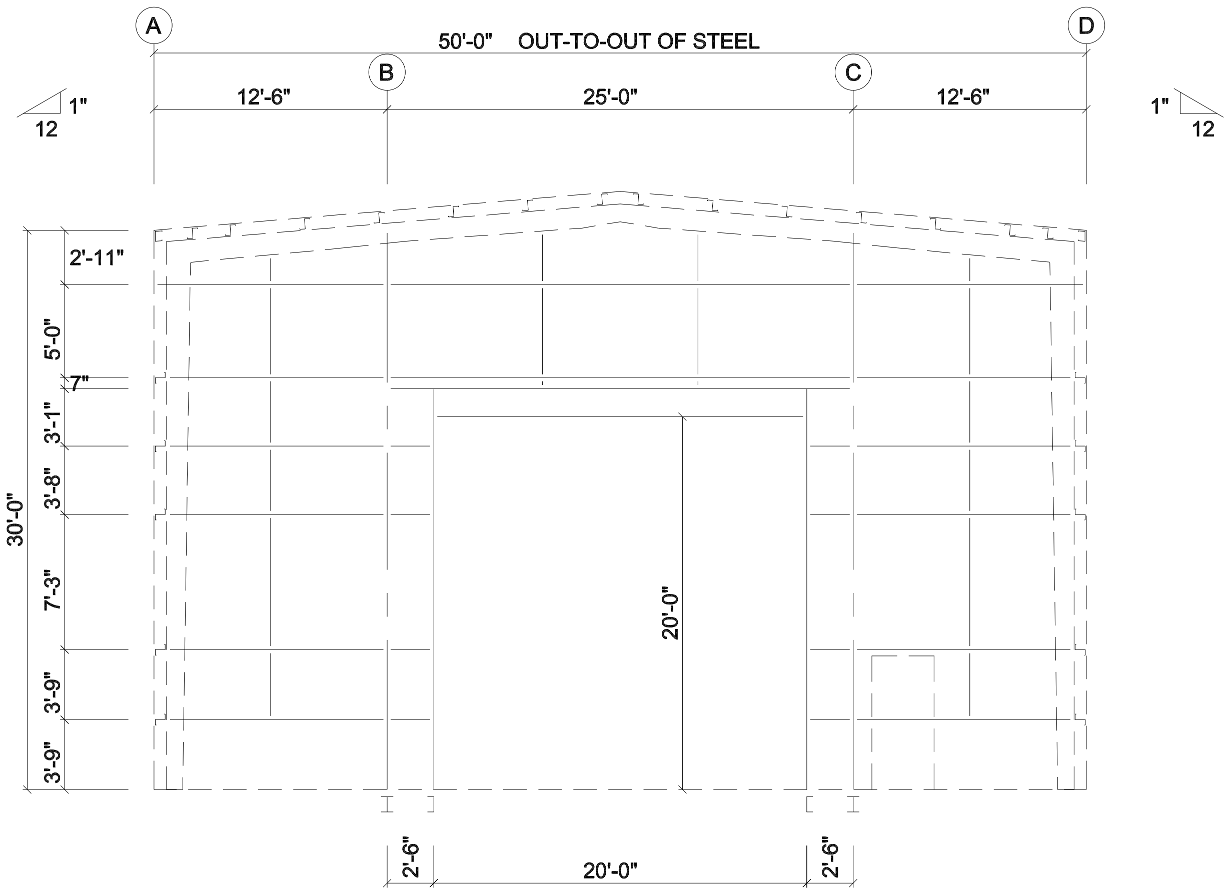
- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

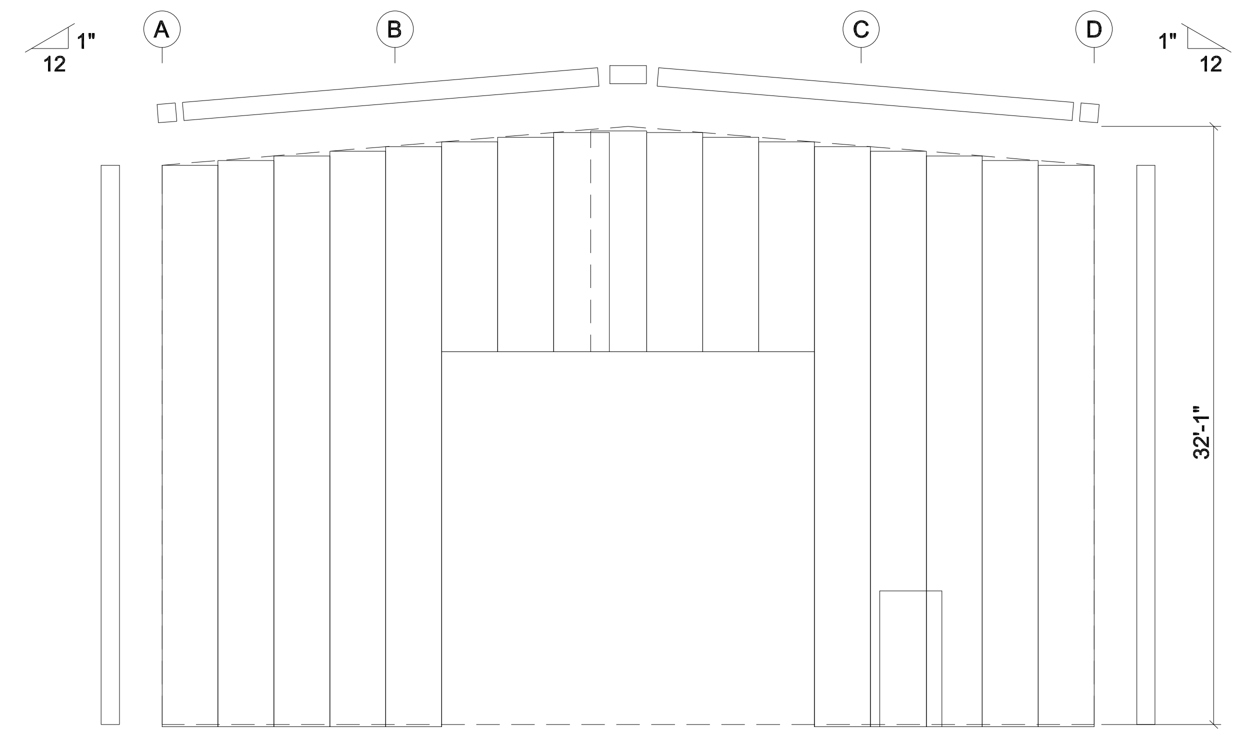
Drawing	SIDEWALL DRAWING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS

DATE DRAWN	QUOTE NO.
8/25/23	FQ74801A



ENDWALL FRAMING: FRAME LINE 1



ENDWALL SHEETING & TRIM: FRAME LINE 1

PANELS: 26 Ga. TBD - Std. SMP Finish

GIRT DEPTH: 8.00

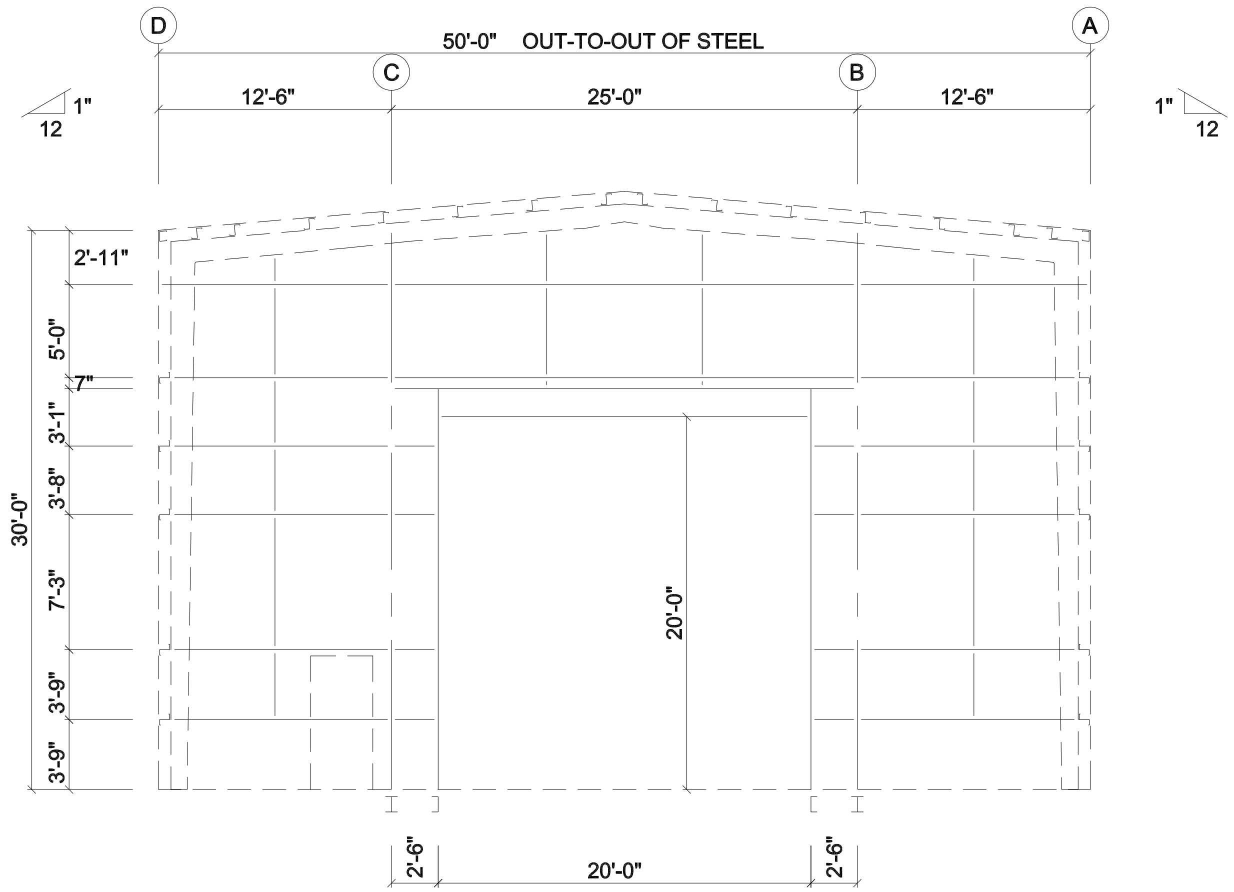
PRELIMINARY

- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

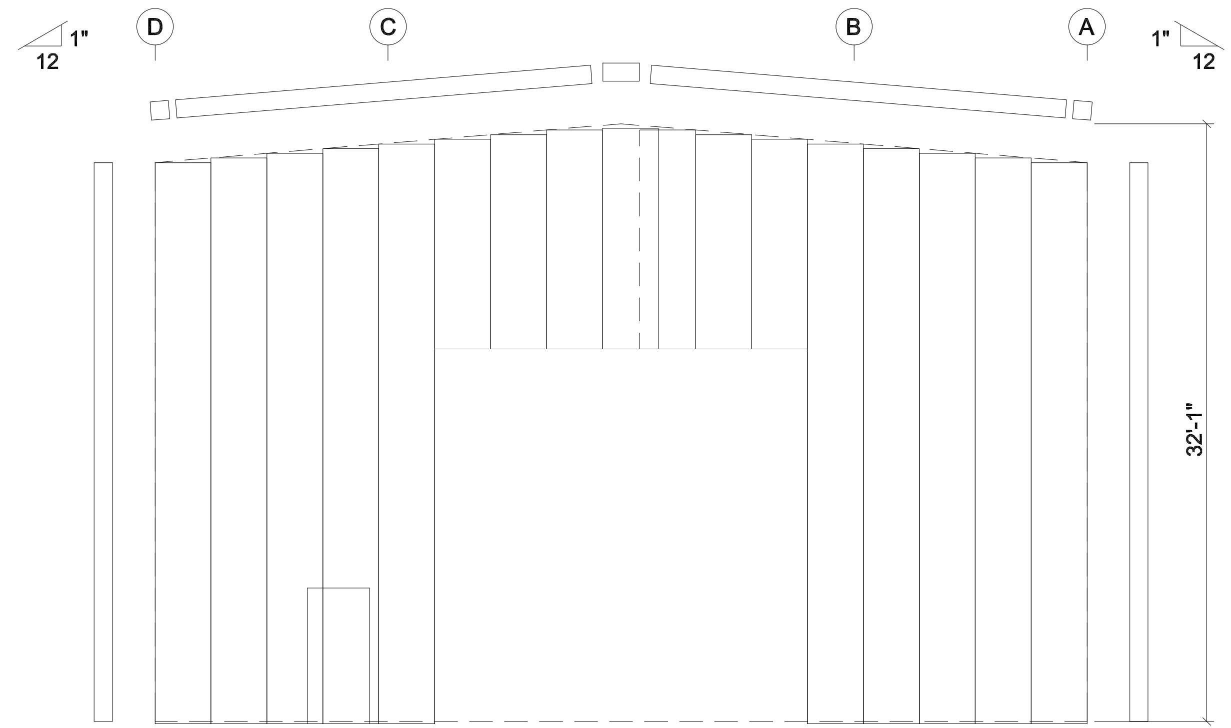
NOT FOR CONSTRUCTION

Drawing	ENDWALL DRAWING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS	DATE DRAWN	QUOTE NO.
	8/25/23	FQ74801A



ENDWALL FRAMING: FRAME LINE 6



ENDWALL SHEETING & TRIM: FRAME LINE 6

PANELS: 26 Ga. TBD - Std. SMP Finish

GIRT DEPTH: 8.00

PRELIMINARY

- Preliminary drawings for sales and estimating purposes only.
- Subject to change during order process.

NOT FOR CONSTRUCTION

Drawing	ENDWALL DRAWING
Buyer	Steel Buildings Northwest, Inc
Customer	ABC Recycling Bellingham, WA 98225
Project Name	ABC Recycling - bldg 3

CHIEF BUILDINGS	DATE DRAWN	QUOTE NO.
	8/25/23	FQ74801A

SPECIFICATIONS

GENERAL NOTES

1. The following notes, details, schedules & specifications shall apply to all phases of this project unless specifically noted otherwise. Notes and details on the structural plans shall take precedence over general notes and typical details. Where no details are given, construction shall be as shown for similar work.
2. All drawings are considered to be part of the contract documents. The Contractor shall be responsible for the review and coordination of all drawings and specifications prior to the start of construction. Any discrepancies shall be brought to the attention of the Engineer prior to the start of construction so that a clarification can be issued. Any work performed in conflict with the contract documents or any applicable code requirements shall be corrected by the Contractor at no expense to the Owner or Engineer.
3. All information on existing conditions shown on the structural plans are based on best present knowledge available, but without guarantee of accuracy. The Contractor shall be responsible for the verifications of all dimension and conditions at the site. Any discrepancies between actual site conditions and information shown on the drawings or in the specifications shall be brought to the attention of the EOR prior to the start of construction.
4. Refer to the Architectural plans for the following:
   (a) Dimensions
   (b) Size and location of all interior and exterior wall locations.
   (c) Size and location of all floor, roof and wall openings
   (d) Size and location of all drains, slopes, depressions, steps, etc.
   (e) Specification of all finishes & waterproofing
   (f) All other non-structural elements
5. Refer to the mechanical, electrical and plumbing plans for the following:
   (a) Size and location of all equipment
   (b) Pipe runs, sleeves, hangers and trenches
   (c) All other mechanical, electrical or plumbing related elements
6. **DO NOT** scale structural plans. Contractor shall use all written dimensions on Architectural plans.
7. Construction materials shall be uniformly spread out if placed on floor or roof so as to not overload the framing. Load shall not exceed the design live load per square foot. It is the Contractor's responsibility to provide adequate shoring and/or bracing as required.
8. Specifications and detailing of all waterproofing and drainage items, while sometimes shown on the structural plans for general information purposes only, are solely the design responsibility of others.
9. The Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the construction delineated by these plans. It should be understood that the Contractor or his/her agent(s) shall supervise and direct all work and shall be solely and completely responsible for all construction means, methods, techniques, sequences, procedures and conditions on the job site, including safety of all persons and property during the entire period of construction. Periodic observations by the Engineer, his staff or representatives are not intended to include verification of dimensions or review the adequacy of the Contractor's safety measures on or near the construction site.
10. Modifications of the plans, notes, details and specifications shall not be permitted without prior approval from the Engineer.
11. All workmanship shall conform to the best practice prevailing in the various trades performing the work. The Contractor shall be responsible for coordinating the work of all trades.
12. It is the Contractor's responsibility to ensure that only approved structural plans are used during the course of construction. The use of unapproved documents shall be at the contractor's own risk. Corrections of all work based on such documents shall be performed at the Contractor's expense.
13. These plans and specifications represent the structural design only. No information nor warranty is provided for the work of any other Consultant (Architect, Mechanical, Electrical, etc.). This includes, but is not limited to, waterproofing, drainage, ventilation, accessibility, or dimensions.

FOUNDATIONS

1. Refer to Structural Design Parameters section on sheet S-1.1 for all soil design values used in calculations.
2. Soils values per to be confirmed by Geotechnical during construction.
3. It is the Contractor's responsibility to obtain a copy of the soils report from the Owner. A copy of the soils report shall be on the job site during the course of construction.
4. Unexpected Soil Conditions: Allowable values and subsequent foundation designs are based on soil conditions which are shown by test borings. Actual soil conditions which deviate appreciably from that shown in the test borings shall be reported to the Engineer immediately.
5. All compaction, fill, backfilling and site preparation shall be performed in accordance with project soils report or the Governing Building Code Chapter 18 & Appendix J. All such work shall be performed per the recommendations of the project soils engineer.
6. Excavate to required depths and dimensions (as indicated in the drawings), cut square and smooth with firm level bottoms. Care shall be taken not to over-excavate foundation at lower elevation and prevent disturbance of soils around high elevation.
7. Foundations shall be poured in neat excavations.
8. Excavate all foundations to required depths into compacted fill or natural soil (as per plans and details) and as verified by the building official and/or soils engineer.
9. All foundations shall be inspected and approved by the appropriate building official and/or a representative of the soils engineer prior to forming and placement of reinforcing or concrete.
10. Foundations shall not be poured until all required reinforcing steel, framing hardware, sleeves, inserts, conduits, pipes, etc. and formwork is properly placed and inspected by the appropriate building official/inspector(s).
11. It is the responsibility of the contractor in charge of framing to properly position all holdown bolts, anchor bolts, column bases, and all other cast-in-place hardware. Refer to typical details. All hardware to be secured prior to foundation inspections.
12. The sides and bottoms of dry excavations must be moistened just prior to placing concrete. Conversely, de-water footings as required to remove standing water and to maintain optimum working conditions.
13. The Contractor shall be solely responsible for all excavation procedures including lagging, shoring, and the protection of adjacent property, structures, streets, and utilities in accordance with all federal, state and local safety ordinances. The Contractor shall provide for the design and installation of all cribbing, bracing and shoring required.

CONCRETE

1. All concrete shall have:
   (a) an ultimate compressive strength (f'c) of 3,000 psi at 28 days (UNO).
   (b) a maximum slump of 5" at point of placement.
   (c) a W/C ratio of 0.55 or less for all slabs, walls, and columns, and 0.60 or less for all foundations.
   (d) a normal dry-weight density (UNO).
2. Testing of materials used in concrete construction must be performed as noted on structural plans or at the request of the Building Department to determine if materials are quality specified. Tests of materials and of concrete shall be made by an approved agency and at the expense of the contractor; such tests shall be made in accordance with the standards listed in the Governing Building Code, Table 1704.4. When testing of concrete is required, four (4) test cylinders shall be taken from each 150 yards, or fraction thereof, poured in any one day. One (1) cylinder shall be tested at seven (7) days; two (2) at 28 days; one (1) shall be held in reserve. If Contractor elects to have additional tests performed for "early-break" results, additional test cylinders must be taken. At no time shall the Contractor instruct the testing agency to perform tests on a schedule different than above without the prior authorization of the Engineer. Contractor is responsible for complying with applicable testing requirements of theBuilding Department. Copies of all test reports shall be provided to Engineer and Building Department for review in a timely manner.
3. The Contractor shall remove and replace any concrete which fails to attain specified 28 day compressive strength if so directed by the Engineer. Any defects in the hardened concrete shall be repaired to the satisfaction of the Engineer and/or Architect or the hardened concrete shall be replaced at the Contractor's expense.
4. All concrete work shall conform with the Governing Building Code, Chapter 19.
5. All cement shall be Portland Cement Type I or II and shall conform to ASTM C 150.
6. All aggregates shall conform to ASTM C33. Maximum aggregate sizes:
   (a) Footings: 1-1/2"
   (b) All other work: 3/4"
7. Where not specifically detailed, the minimum concrete cover on reinforcing steel shall be:
   (a) Permanently exposed to earth or weather
      i. Cast against earth: 3"
      ii. Cast against forms: 2"
   (b) Not exposed to earth or weather
      i. Slabs, walls, joists: 3/4"
      ii. Beams, girders, columns: 1-1/2"
8. The minimum lap splice length for all reinforcing steel shall be as noted in the typical details on sheet S-1.1. All lap splices to be staggered.
9. All reinforcing steel, anchor bolts, dowels, inserts, and any other hardware to be cast in concrete shall be well secured in position prior to foundation inspection. All hardware to be installed in accordance with respective manufacturer's specifications. Refer to architectural and structural plans for locations of embedded items.
10. Locations of all construction joints, other than specified on the structural plans, shall be approved by the Architect and Engineer prior to forming. Construction joints shall be thoroughly air and water cleaned and heavily roughened so as to expose coarse aggregates. All surfaces to receive fresh concrete shall be maintained continuously wet at least three (3) hours in advance of concrete placement. Unless specifically detailed or otherwise noted, construction and control joints shall be provided in all concrete slabs-on-grade. Joints shall be located such that the area does not exceed 400 sq. feet.
11. The Architect, Engineer and appropriate inspectors shall be notified in a timely manner for a reinforcement inspection prior to the placement of any concrete.
12. The Contractor shall obtain approval from the Architect and the Engineer prior to placing sleeves, pipes, ducts, chases, coring and opening on or through structural concrete beams, walls, floors, and roof slabs unless specifically detailed or noted on the plans. All piles or conduits passing through concrete members shall be sleeved with standard steel pipe sections.
13. The Contractor is responsible for design, installation, maintenance and removal of all formwork. Forms shall be properly constructed, sufficiently tight to prevent leakage, sufficiently strong, and braced to maintain their shape and alignment until no longer needed for concrete support. Joints in formwork shall be tightly fitted and blocked, and shall produce a finished concrete surface that is true and free from blemishes. Forms for exposed concrete shall be pre-approved by the Architect to ensure conformance with design intent.
14. Remove form work in accordance with the following schedule:
   (a) Forms at slab edge: 1 day
   (b) Side forms at footings: 2 days
   (c) All other vertical surfaces: 7 days
   (d) Beams, columns, girders: 15 days
   (e) Elevated slabs: 28 days
   Engineer reserves the right to modify removal schedule above based on field observations, concrete conditions, and/or concrete test results.
15. All concrete (except slabs-on-grade 6" or less) shall be mechanically vibrated as it is placed. Vibrator to be operated by experienced personnel. The vibrator shall be used to consolidate the concrete. The vibrator shall not be used to convey concrete, nor shall it be placed on reinforcing and/or forms.
16. Concrete shall be maintained in a moist condition for a min. of five (5) days after placement.
17. Concrete shall not be permitted to free fall more than six (6) feet. For heights greater than six (6) feet, use tremie, pump or other method consistent with applicable standards.
18. When specified ultimate compressive strength is greater than 2500 psi, Contractor shall submit mix designs to Architect and Engineer for approval seven (7) days prior toplacement. Mix designs shall be prepared by an approved testing laboratory. Sufficient data must be provided for all admixtures.
19. Refer to Architectural plans for locations of all dimensions, slab depressions, slopes, drains, curbs, and control joints.

REINFORCEMENT

1. Reinforcing steel shall be to deformed, clean, free of rust, grease or any other material likely to impair concrete bond.
2. All bars shall conform to ASTM A615, Grade 60 minimum (UNO on structural plans). All weld wire fabric (WWF) shall conform to ASTM A185.
3. Reinforcing steel that is to be welded shall conform to ASTM A706. All welding of reinforcement shall be subject to special inspection.
4. Contractor shall take necessary steps (standard ties, anchorage devices, etc.) to secure all reinforcing steel in their true position and prevent displacement during concrete placement.
5. Fabrication, placement and installation of reinforcing steel shall conform to:
   (a) Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice
   (b) the Governing Building Code, Section 1907.
6. Shop drawings for fabrication of reinforcing steel shall be approved by the Contractor and submitted to the Architect and Engineer for review and approval prior to fabrication. Shop drawings are not required for slabs-on-grade or foundations unless specifically noted on the structural plans.
7. Heating of reinforcing steel to aid in bending and shaping of bars is not permitted. All bends in reinforcing steel are to be made cold. All bend radii shall conform to CRSI Manual of Standard Practice.
8. Refer to Concrete and Masonry notes for specific minimum splice length and splice staggering requirements. Lap welded wire fabric (WWF) reinforcement two (2) modules minimum (UNO). All splices are to be staggered.

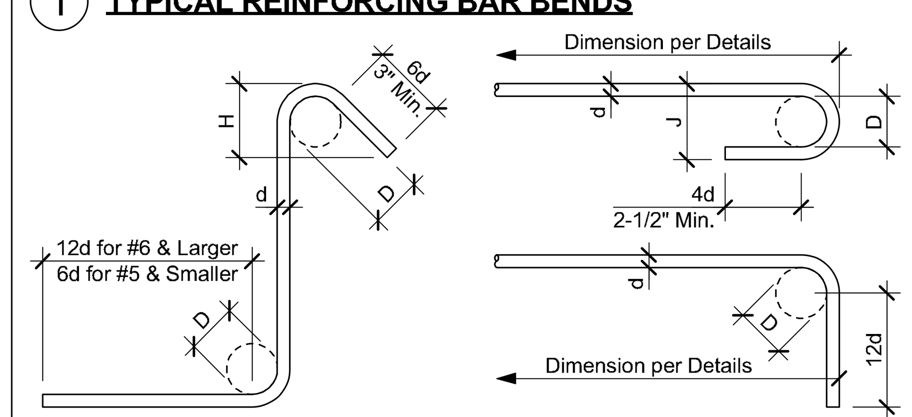
ABC Recycling

Building 1 Office / Shop

741 Marine Drive
Bellingham, Washington

STANDARD DETAILS

1 TYPICAL REINFORCING BAR BENDS



STANDARD TIES & STIRRUPS

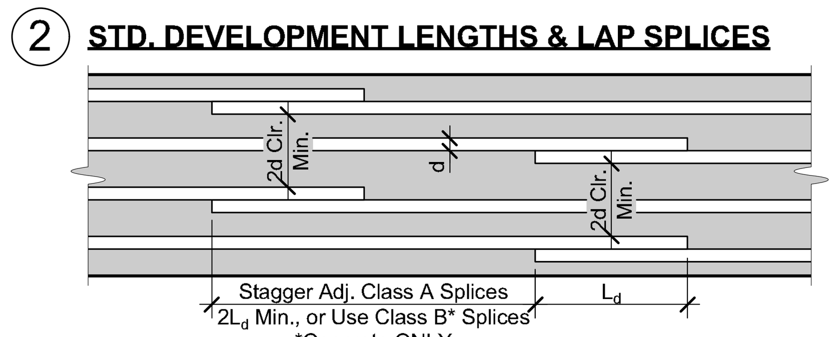
Bar Size	D	H (Approx.)
#3	1-1/2"	3"
#4	2"	3"
#5	2-1/2"	3-3/4"
#6	4-1/2"	4-1/2"
#7	5-1/4"	5-1/4"
#8	6"	6"

STANDARD END HOOKS

Bar Size	D	J
#3	2-1/4"	3"
#4	3"	4"
#5	3-3/4"	5"
#6	4-1/2"	6"
#7	5-1/4"	7"
#8	6"	8"

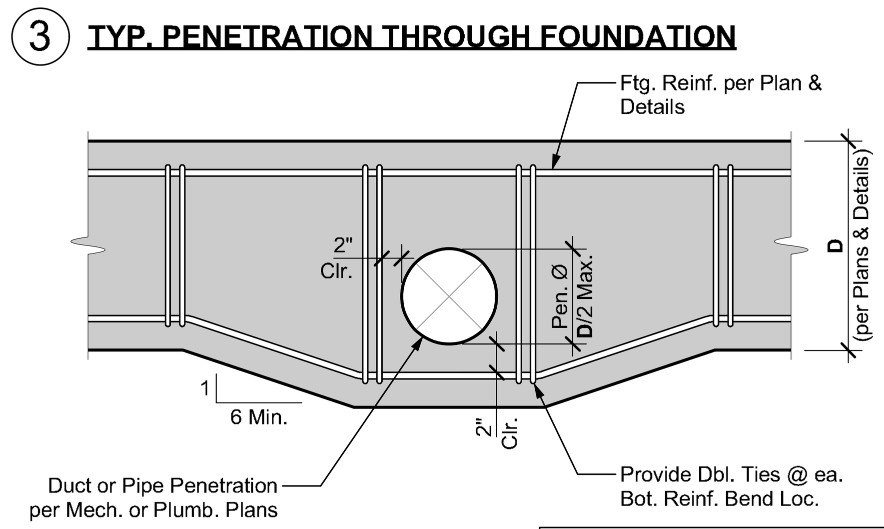
Note:
All Bar Bend Diameters & End Lengths Must Conform to the CRSI Manual of Standard Practice

2 STD. DEVELOPMENT LENGTHS & LAP SPLICES



	CONCRETE		
Bar Size	Length of Lap, L_d Class A	Class B	Embed. of Hook, L_{dh}
#3	16"	21"	7"
#4	22"	28"	9"
#5	27"	35"	11"

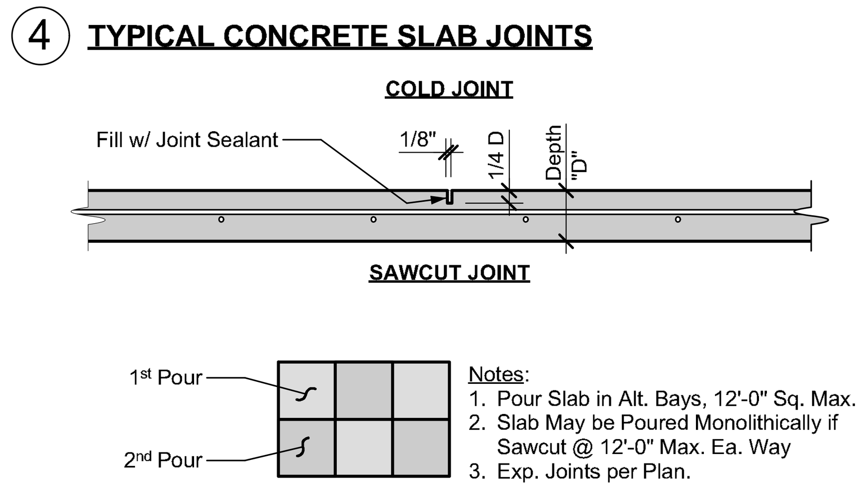
3 TYP. PENETRATION THROUGH FOUNDATION



DO NOT Locate Pen. w/n 24" of Any Holdowns

Ties:
Ftg. Reinf. = (1) Bar T&B, Use #3 Vert. w/ 180º Hook ea. End
Ftg. Reinf. > (1) Bar T&B, Use #3 Stirrup w/ 135º Hooks @ Top

4 TYPICAL CONCRETE SLAB JOINTS



Notes:
1. Pour Slab in Alt. Bays, 12'-0" Sq. Max.
2. Slab May be Poured Monolithically if Sawcut @ 12'-0" Max. Ea. Way
3. Exp. Joints per Plan.

ABBREVIATIONS

AB	Anchor Bolt	Mas.	Masonry
A&B	Above and Below	Max.	Maximum
Abv.	Above	MB	Machine Bolt
Adn.	Addition (al)	MF	Moment Frame
Adj.	Adjacent, Adjustable	Mfr.	Manufacture(r)
Alt.	Alternate (ive)	Min.	Minimum, Minute
Appd.	Approved	Mod.	Modif(y), (ication)
Arch.	Architect(ural)	Mtl.	Metal
Avg.	Average	(N)	New
Bdry.	Boundary	N/A	Not Applicable
Bldg.	Building	Nat.	Natural
Blk(g).	Block (ing)	NTS	Not to Scale
Bm.	Beam	o/	Over
BN	Boundary Nailing	oc	On Center
B-O	Bottom of	OD	Outside Diameter
BO	By Others	Opng.	Opening
Bot.	Bottom	Opp.	Opposite
Brg.	Bearing	Opt.	Optional
Btwn.	Between	Para.	Parallel
BW	Both Ways	PCF	Lbs per Cubic Ft.
Cant.	Cantilever(ed)	Pen.	Penetrate, (tion)
CIP	Cast in Place	Perf.	Perforated
CJ	Ceiling Joist	Perim.	Perimeter
CJP	Complete Joint Penetration	Perp.	Perpendicular
		PI	Panel Index
CL	Center Line	PJP	Partial Joint Pen.
Clg.	Ceiling	PL	Plate
CMU	Conc. Masonry Unit	PLF	Lbs per Linear Ft.
Col.	Column	Pl.	Plate
Com.	Common	Ply.	Plywood
Comp.	Component	Prep.	Prepare, (tion)
Conc.	Concrete	Press.	Pressure
Conn.	Connection	Proj.	Project
Const.	Construction	Prop.	Property
Cont.	Continue (ous)	PSF	Lbs per Square Ft.
Ctr.	Center	PSI	Lbs per Square In.
d	Penny	PT	Pressure-Treated
Dbl.	Double	R	Radius
Defl.	Deflection	Rec(s).	Recommendation(s)
Deg.	Degree	Rect.	Rectangular
Demo.	Demolish (tion)	Ref.	Reference
Dep.	Depress(ed)	Reinf.	Reinforce(d), (ment), (ing)
DF	Douglas Fir		
Dia.	Diameter	Req(d).	Require(d)
Diaph.	Diaphragm	Reqs.	Requirements
Dif.	Different	Ret.	Retain(ing)
Dim.	Dimension	RJ	Roof Joist
Dist.	Distance	RR	Roof Rafter
DJ	Deck Joist	RW	Redwood
DL	Dead Load	SAD	See Arch Dwg's
Dwg.	Drawing	Sched.	Schedule
(E)	Existing	Sgl.	Single
Ea.	Each	Shtg.	Sheathing
EF	Each Face	Sim.	Similar
EFP	Equivalent Fluid Pressure	SIP	Str. Insulated Panel
		SM	Sheet Metal
Elev.	Elevator, Elevation	SMS	Sheet Metal Screw
Embed.	Embed(ed), (ment)	SOG	Slab on Grade
Engr.	Engineer	Spec.	Specif(ed), (cations)
EOR	Engineer of Record	Std.	Standard
Eq.	Equal, Equivalent	Stl.	Steel
ES	Each Side	Struc.	Structure, (al)
EW	Each Way	SW	Shear Wall
Exp.	Expand, Expansion	Sym.	Symmet(ry), (rical)
Ext.	Exterior	T&B	Top and Bottom
Fdn.	Foundation	T&G	Tongue and Groove
FF	Finished Floor	Temp.	Temporary
FJ	Floor Joist	Thk.	Thick(ness)
Flr(g).	Floor (ing)	Thru	Through
FOC	Face of Concrete	TN	Toe-Nail
FOM	Face of Masonry	TP	Top Plate
FOS	Face of Studs	T-O	Top of
FOW	Face of Wall	TOB	Top of Beam
Frmg.	Framing	TOC	Top of Concrete
Ft.	Foot, Feet	TOG	Top of Grade
Ftg.	Footing	TOM	Top of Masonry
Ga.	Gage, Gauge	TOS	Top of Steel
Galv.	Galvanized	TOW	Top of Wall
GB	Grade Beam	TRU	To Remain Unchanged
GC	General Contractor		
Gyp.	Gypsum	Trmr.	Trimmer Stud
Hldn.	Holdown	Typ.	Typical
Hdr.	Header	UNO	Unless Noted Otherwise
Hdw.	Hardware		
Hgr.	Hanger	Vert.	Vertical
Hor(iz).	Horizontal	VIF	Verify in Field
Ht.	Height	VWA	Verify with Arch
ID	Inside Diameter	w/	With
In.	Inch(es)	w/n	Within
Insp.	Inspect(ion)	w/o	Without
Int.	Interior	WS	Wood Screw
Inv.	Invert, Inverted	Wndw.	Window
Jst.	Joist	Wt.	Weight
K	Kips (1,000 pounds)	WWF	Welded Wire Fabric
KLF	Kips per Linear Ft.	Yd.	Yard
King	King Stud		
KP	King Post	@	At
KSF	Kips per Square Ft.	°	Degrees
KSI	Kips per Square In.	>	Greater Than
Lb(s).	Pound(s)	<	Less Than
LL	Live Load	#	Number, Pound(s)
Loc.	Location	/	Per
LW	Light Weight	%	Percent(age)
		±	Plus or Minus

PROJECT INFORMATION

CLIENT:
ABC Recycling
Steven Shinn
661 Cornwall Ave.
Bellingham, WA 98225
(360) 472-2880

ARCHITECT / DESIGNER:
Steel Buildings Northwest, Inc.
North Plains, Oregon
(530) 624-7185

SOILS/GEO. ENGINEER:
N/A

DESIGN PARAMETERS

GENERAL PARAMETERS

Building Code 2018 IBC *

Foundation details are subject to change based on the Mfr.'s supplied reactions (Pacific Building Systems., Job # 22-8800, Dated 10/12/2022).

Use of supplied loads & reactions may not be construed as approval of their accuracy or applicability.

No analyses of the pre-engineered metal building (PEMB) members or systems have been performed.

SOILS VALUES

Bearing Pressure (Total Load) * 2000 psf

* To Be Field Verified By Geotechnical

WIND DESIGN BASIS

Wind force analysis has not been performed.

Structural Calculations are based on the Mfr.'s supplied reactions.

SEISMIC DESIGN BASIS

Seismic force analysis of the PEMB has not been performed.

Structural Calculations are based on the Mfr.'s supplied reactions.

* *The 2018 International Building Code (IBC) is the governing code in the State of Washington.*

SHEET INDEX

ALPINE ENGINEERING, LLC
203 W. Chestnut
Bellingham, WA 98225
(360) 200-8703
CIVIL • STRUCTURAL
www.alpineengineer.com

Engineer of Record:

BRANDON A. HAUSMANN
STATE OF WASHINGTON
44683
REGISTERED PROFESSIONAL ENGINEER

ABC Recycling
Building 1 Office / Shop
741 Marine Drive
Bellingham, Washington

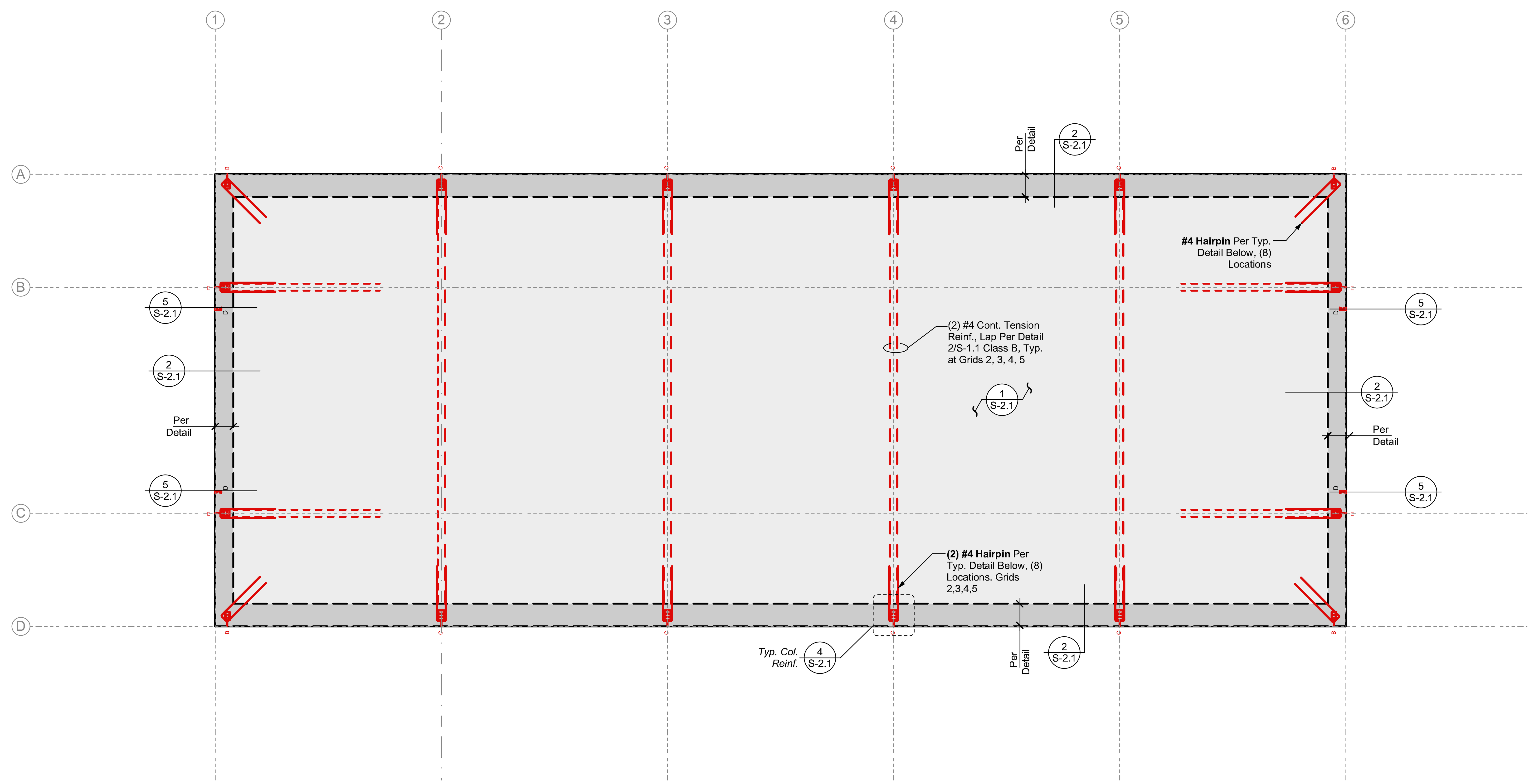
Revision:

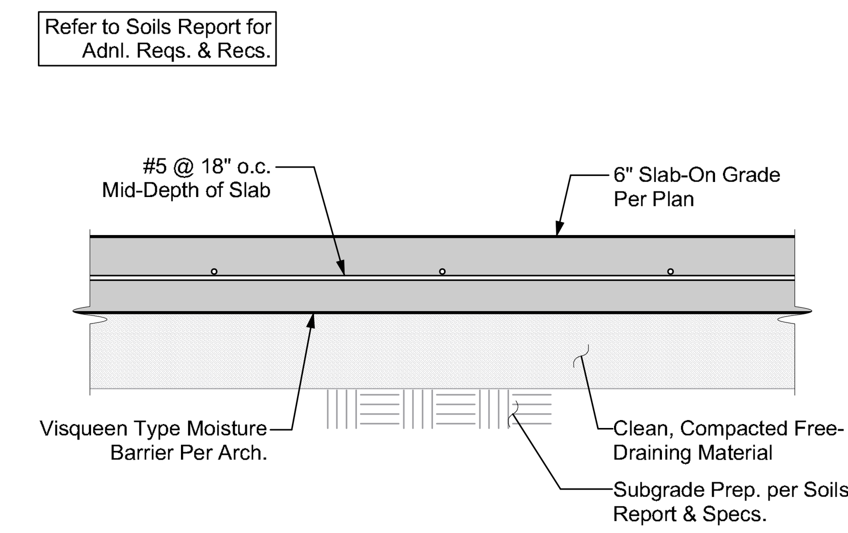
Proj. Engr.:	S. Williamson
Proj. Mngr.:	B. Hausmann
Date: 05 Oct. 2023	Scale: NTS
Alpine Eng. Job No.:	No. 20004

STRUCTURAL TITLE SHEET

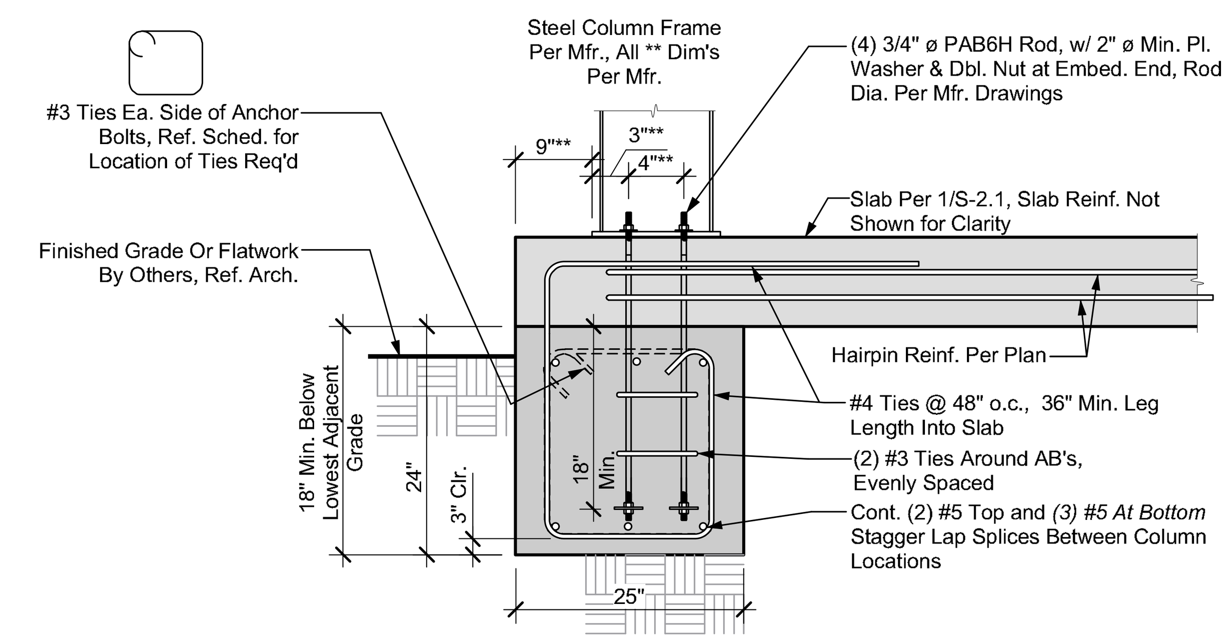
S-1.1

DO NOT SCALE THESE DRAWINGS. Refer to Architectural plans for all dimensions.

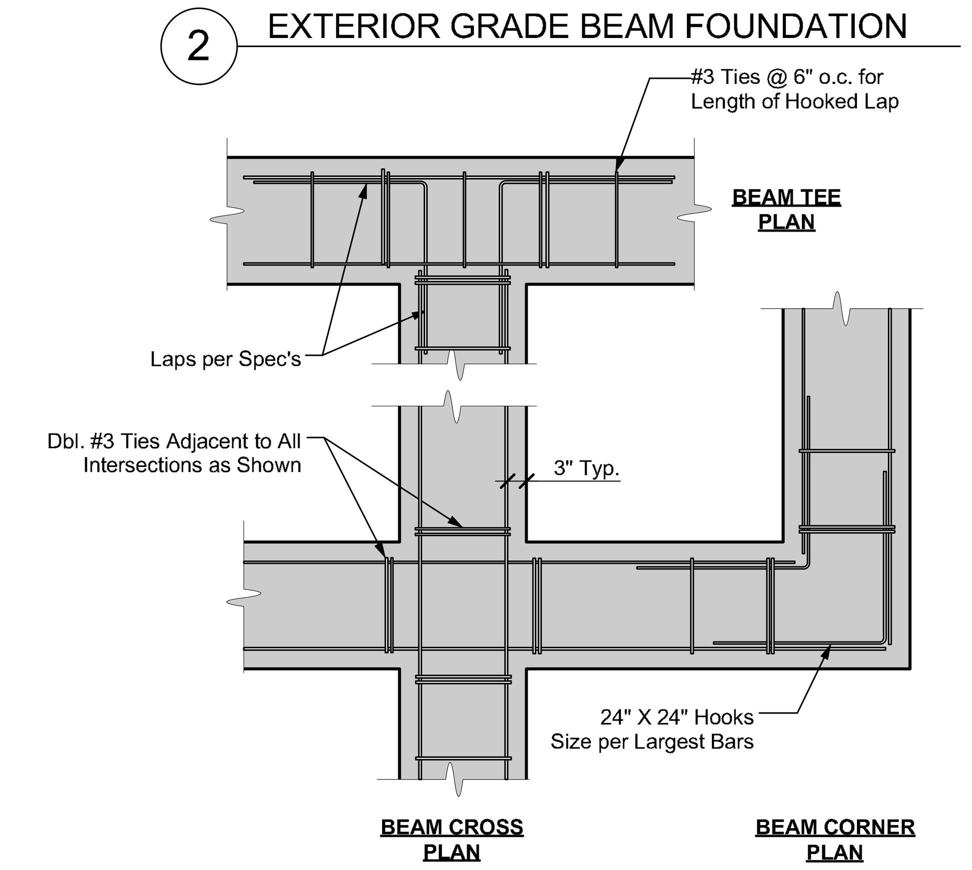




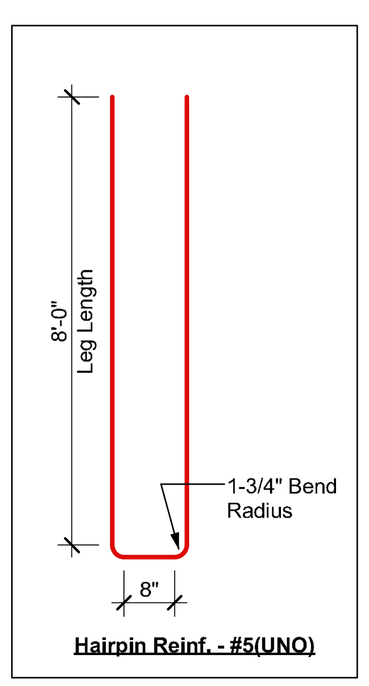
1 TYPICAL SLAB ON GRADE



2 EXTERIOR GRADE BEAM FOUNDATION



3 TYPICAL BEAM TO BEAM CONNECTIONS



SHEAR TIE GRID LOCATIONS

Grid	Tie Spacing & Range
A-2,3,4,5	6" o.c., 2'-0" Ea. Side AB
D-2,3,4,5	6" o.c., 2'-0" Ea. Side AB

Note: All Shear Ties to be #3

GENERAL FOUNDATION NOTES

Please see Geotech Recommendations for additional specifications and recommendations. It is the contractor's responsibility to obtain a copy of all geotech info. from the owner or owners representative.

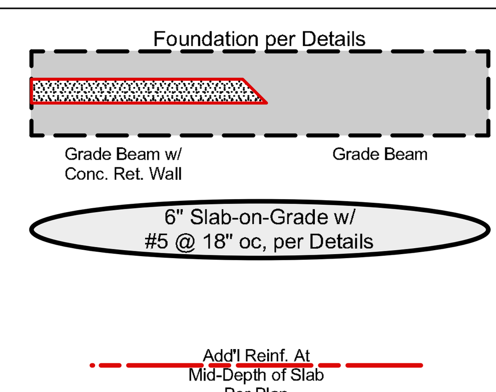
Prior to the contractor requesting a Building Department foundation inspection, the Soils Engineer shall advise the building inspector in writing that:

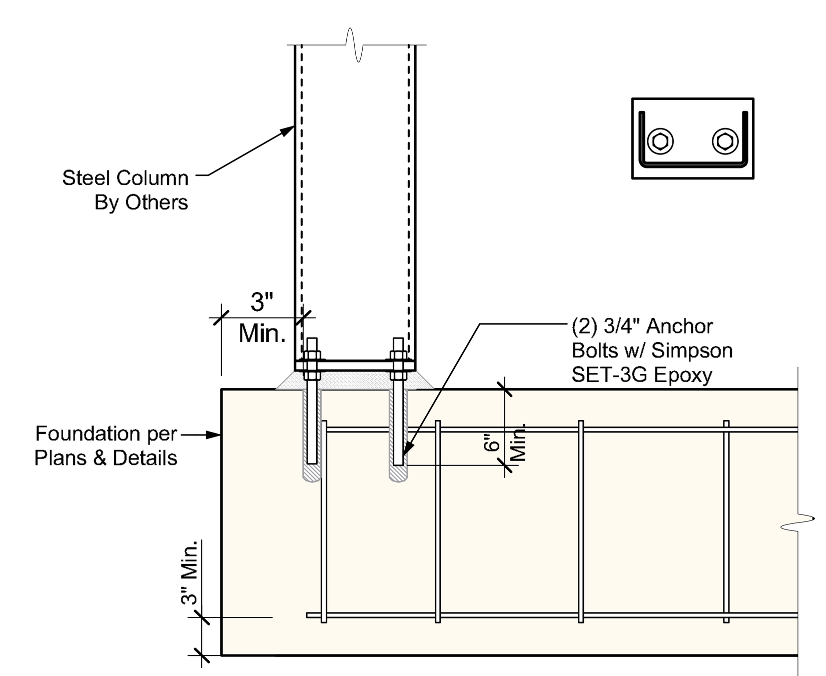
a) Building pad was prepared in accordance with recommdations
b) Utility trenches have been properly backfilled and compacted, and
c) Foundation excavations, the soil's expansive characteristics and bearing capacity conform to the recommendations

See General Notes & Specifications for additional requirements and material specifications.

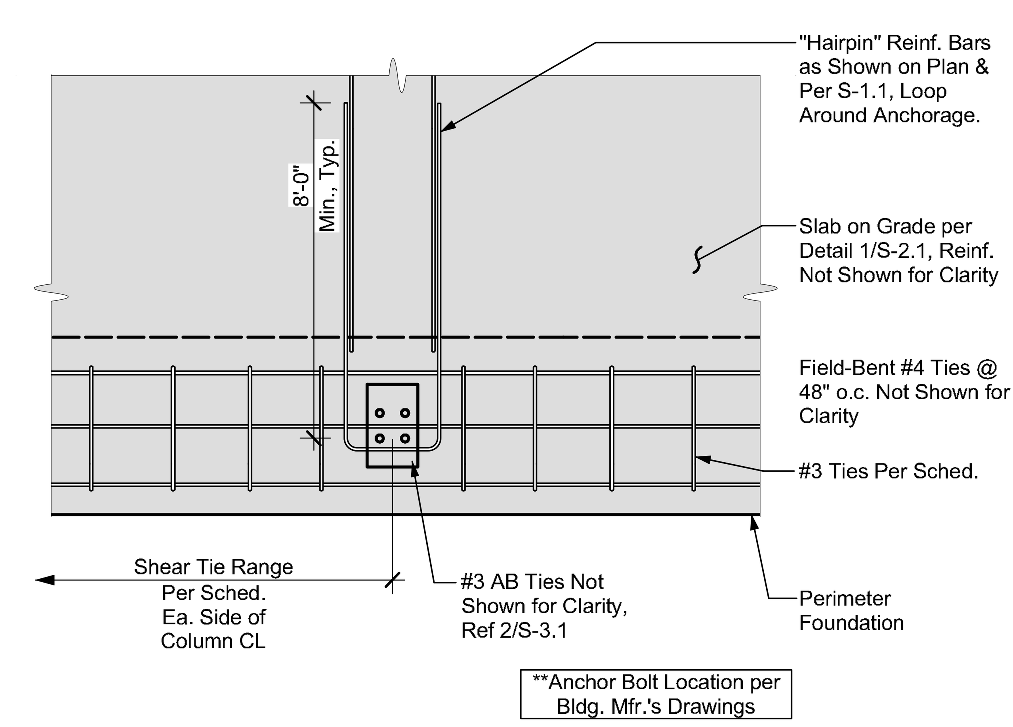
All dimensions per Architectural plans

Contractor to VERIFY all dimensions w/ Architectural plans PRIOR to commencement of construction.





5 DOOR FRAME ANCHOR BOLTS



4 TYPICAL PERIMETER COL. REINF. PLAN

ALPINE ENGINEERING, LLC
203 W. Chestnut
Bellingham, WA 98225
(360) 200-8703
CIVIL • STRUCTURAL
www.alpineengineer.com

Engineer of Record:

BRANDON A. HAUSMANN
STATE OF WASHINGTON
44683
REGISTERED
PROFESSIONAL ENGINEER

ABC Recycling
Building 1 Office / Shop
741 Marine Drive
Bellingham, Washington

Revision:

△	
△	
△	
△	
△	
△	
△	

Proj. Engr.: S. Williamson
Proj. Mngr.: B. Hausmann
Date: 05 Oct. 2023 | Scale: NTS
Alpine Eng. Job No.: No. 20004

STRUCTURAL DETAILS

S-2.1

DO NOT SCALE THESE DRAWINGS. Refer to Architectural plans for all dimensions.

ALPINE
ENGINEERING, LLC

203 W. Chestnut
Bellingham, WA 98225

(360) 200-8703
alpineengineer.com

S T R U C T U R A L   C A L C U L A T I O N S

P R E P A R E D   F O R:

DATE:
October 18, 2023

PROJECT NO.:
20004

PROJECT NAME:
ABC Recycling; Building 1 Office / Shop

PROJECT TYPE:
PEMB Foundation Design

PROJECT ADDRESS:
741 Marine Drive
Bellingham, WA

ARCHITECT:
TRC Architecture
PO Box 1075
Bellingham, WA 98227
(360) 393-3131

PROJECT ENGINEER:
Brandon Hausmann, PE

BRANDON A. HAUSMANN
STATE OF WASHINGTON
44683
REGISTERED
PROFESSIONAL ENGINEER

ALPINE ENGINEERING, LLC

203 W. Chestnut
Bellingham, WA 98225

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ALPINE ENGINEERING, LLC

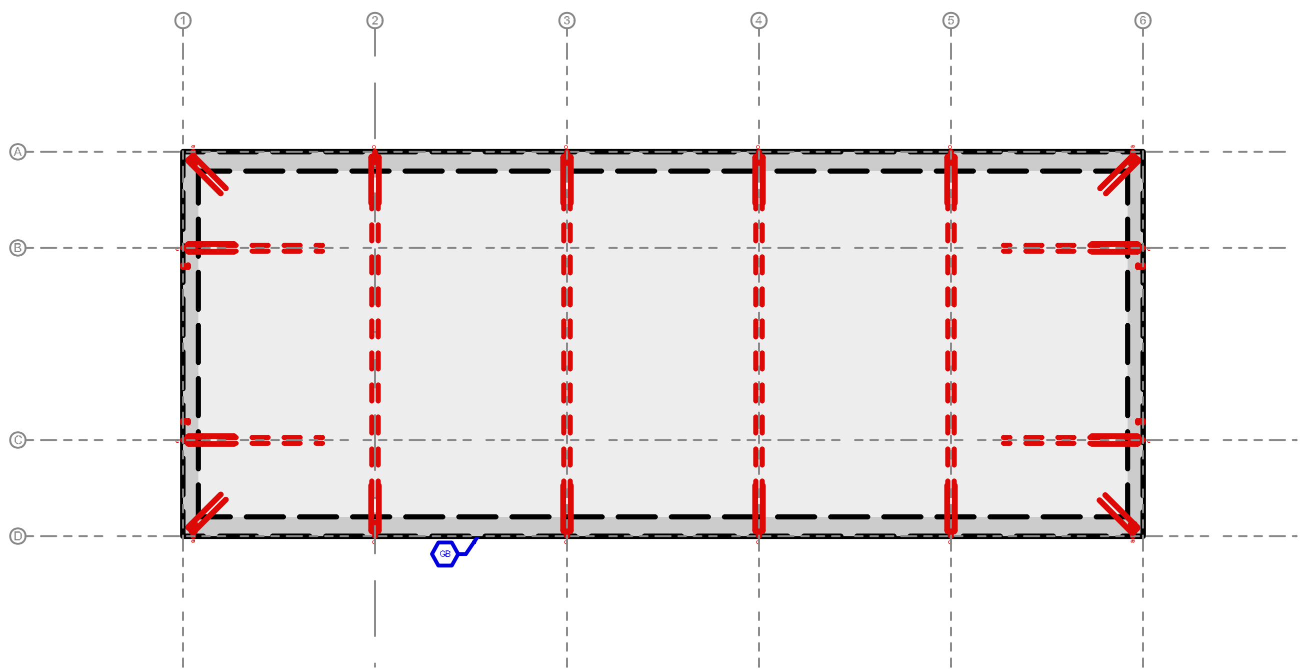
ABC Recycling

Building 1 Office / Shop

741 Marine Drive
Bellingham, Washington

Job No.: No. 20004

Foundation Layout



Project:	Bldg. 1 Office Shop
Location:	Bellingha, WA
Client:	TRC
Engr:	BAH
Job #:	20004
Date:	10/3/2023

ALPINE ENGINEERING, LLC

Structural Design Criteria

Structural abstract / scope of work:

Structural engineering is provided for the ABC Recycling Building No. 1 Office / Shop located in Whatcom County WA. The structure is a 1-story Pre-Engineered Metal Building (PEMB). Foundation is a continuous perimeter concrete grade beam, pad and interior slab-on-grade. Foundation design is based on architectural plans provided by TRC Architects (Project #22-001, dated Sept. 29 2023) and Steel Buildings Northwest Inc. (Quote # FQ74801A, dated 8/25/23.). The structural scope of work is for the foundation only, no analysis of the superstructure or future tenant improvement has been performed; all column reactions are provided by the PEMB manufacturer.

Grade beam calculations at Grid L are shown as 3 separate calculations: composite section, positive bending and negative bending. The positive and negative bending calculations are shown for referencne and are not failing as indicated in the calculations. The modeling limitations cannot show the complete picture, and are used to graph the bending moments at the worst case positive (at the column point loads) and negative (mid way between columns) moments to design for the minimum amount of reinforcement required at those points.

General:

Building department:	Whatcom Co.
Applicable Building Code:	2018 IBC
Importance Category:	II

Gravity Loading: *Per Mfr. Reactions*

Soils Data:

Geotechnical Engineer:	NA	
Allowable Bearing Pressure:	2000 psf	**Field Verified
Min. Frost embedment:	18 "	(Per Whatcom Co.)

PROJECT:	BLDG. I OFFICE SHOP
LOCATION:	BELLINGHA, WA
CLIENT:	TRC
ENGR:	BAH
JOB #:	20004
DATE:	10/3/2023

ALPINE ENGINEERING, LLC

Design Parameters

Code: 2018 IBC

** Please Refer to Structural Specification on S-1.1 for more detailed information*

Foundations:	Contrete	3000 psi
	Rebar (#5 & larger)	60 ksi
	Rebar (#3 & #4)	40 ksi

Note:

The intent of lateral design is to prevent structural failures in the event of seismic activities or high winds, but not to prevent the damage of architectural finishes or systems. The lateral calculations herein conform to the specifications of the current International Building Code (IBC).

Beam on Elastic Foundation

Project File: ABC Bldg 1 Office Shop - [125x50] - Copy.ec6

LIC# : KW-06012917, Build:20.23.08.30 Alpine Engineering, LLC (c) ENERCALC INC 1983-2023

DESCRIPTION: Grid A & D - Composite Section

CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : ASCE 7-16

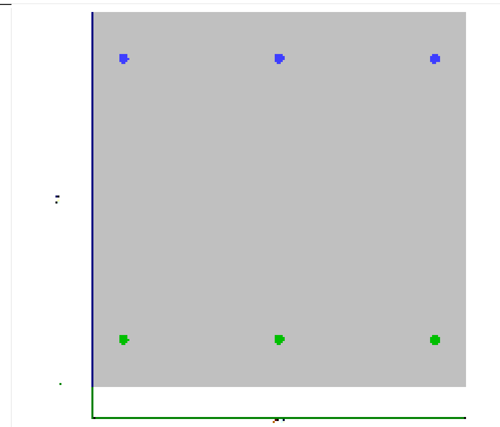
Material Properties

f'c	=	2.50 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50	=	375.0 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.850
λ Lt Wt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi			

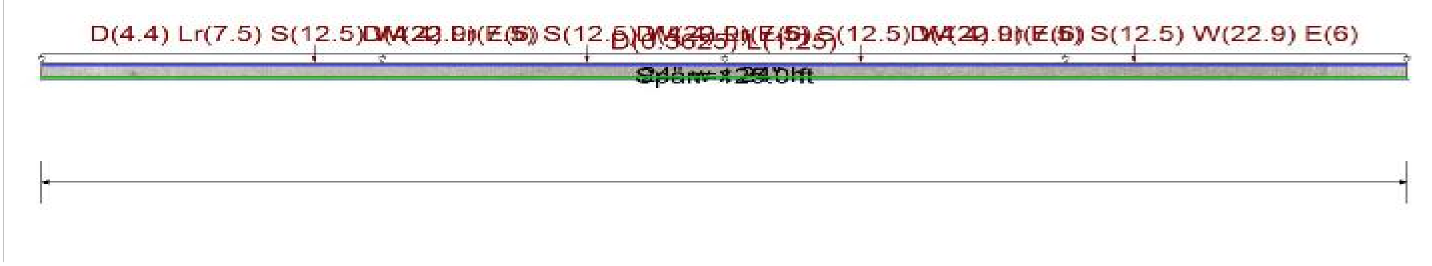
Soil Subgrade Modulus = 250.0 psi / (inch deflection)

Load Combination ASCE 7-16

fy - Main Rebar	=	60.0 ksi	Fy - Stirrups	=	40.0 ksi
E - Main Rebar	=	29,000.0 ksi	E - Stirrups	=	29,000.0 ksi
			Stirrup Bar Size #	=	# 3
			Number of Resisting Legs Per Stirrup		2



Beam is supported on an elastic foundation,



Cross Section & Reinforcing Details

Rectangular Section, Width = 24.0 in, Height = 24.0 in
Span #1 Reinforcing....
3-#5 at 3.0 in from Top, from 0.0 to 125.0 ft in this span 3-#5 at 3.0 in from Bottom, from 0.0 to 125.0 ft in this s

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Point Load : D = 4.40, Lr = 7.50, S = 12.50, W = 22.90, E = 6.0 k @ 25.0 ft
Point Load : D = 4.40, Lr = 7.50, S = 12.50, W = 22.90, E = 6.0 k @ 50.0 ft
Point Load : D = 4.40, Lr = 7.50, S = 12.50, W = 22.90, E = 6.0 k @ 75.0 ft
Point Load : D = 4.40, Lr = 7.50, S = 12.50, W = 22.90, E = 6.0 k @ 100.0 ft
Uniform Load : D = 0.07250, L = 0.250 ksf, Tributary Width = 5.0 ft, (slab)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.720** : 1	Maximum Deflection	
Section used for this span	**Typical Section**	Max Downward L+Lr+S Deflection	0.000 in
Mu : Applied	64.546 k-ft	Max Upward L+Lr+S Deflection	0.000 in
Mn * Phi : Allowable	89.697 k-ft	Max Downward Total Deflection	0.047 in
Load Combination	+1.20D+1.60S+0.50W	Max Upward Total Deflection	0.005 in
Location of maximum on span	##.### ft		
Span # where maximum occurs	Span # 1		

Maximum Soil Pressure = **1.697** ksf at 23.61 ft LdComb: +D+0.750L+0.750S+0.4!
Allowable Soil Pressure = **2.0** ksf **OK**

Shear Stirrup Requirements

Between 0.00 to 23.53 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd, use stirrups spaced at 0.000 in
Between 25.00 to 25.00 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 11.5.6.3, use stirrups spaced at 7.333 in
Between 26.47 to 48.53 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd, use stirrups spaced at 0.000 in
Between 50.00 to 50.00 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 11.5.6.3, use stirrups spaced at 7.333 in
Between 51.47 to 98.53 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd, use stirrups spaced at 0.000 in
Between 100.00 to 100.00 ft, PhiVc/2 < Vu <= PhiVc, Req'd Vs = Min 11.5.6.3, use stirrups spaced at 7.333 in
Between 101.47 to 122.06 ft, Vu < PhiVc/2, Req'd Vs = Not Reqd, use stirrups spaced at 0.000 in

Beam on Elastic Foundation

Project File: ABC Bldg 1 Office Shop - [125x50] - Copy.ec6

LIC# : KW-06012917, Build:20.23.08.30 Alpine Engineering, LLC (c) ENERCALC INC 1983-2023

DESCRIPTION: Grid A & D - Composite Section

Maximum Forces & Stresses for Load Combinatio

Load Combination / Segment Length	Span #	Location (ft) in Span	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum Bending Envelope					
Span # 1	1	##.###	64.55	89.70	0.72
+1.40D					
Span # 1	1	##.###	10.65	89.70	0.12
+1.20D+0.50Lr+1.60L					
Span # 1	1	##.###	15.35	89.70	0.17
+1.20D+1.60L+0.50S					
Span # 1	1	##.###	19.76	89.70	0.22
+1.20D+1.60Lr+L					
Span # 1	1	##.###	30.03	89.70	0.33
+1.20D+1.60Lr+0.50W					
Span # 1	1	##.###	50.45	89.70	0.56
+1.20D+1.60Lr-0.50W					
Span # 1	1	##.###	10.09	89.70	0.11
+1.20D+L+1.60S					
Span # 1	1	##.###	44.13	89.70	0.49
+1.20D+1.60S+0.50W					
Span # 1	1	##.###	64.55	89.70	0.72
+1.20D+1.60S-0.50W					
Span # 1	1	##.###	24.19	89.70	0.27
+1.20D+0.50Lr+L+W					
Span # 1	1	##.###	55.85	89.70	0.62
+1.20D+0.50Lr+L-W					
Span # 1	1	##.###	4.40	89.70	0.05
+1.20D+L+0.50S+W					
Span # 1	1	##.###	60.26	89.70	0.67
+1.20D+L+0.50S-W					
Span # 1	1	##.###	3.54	89.70	0.04
+0.90D+W					
Span # 1	1	##.###	47.17	89.70	0.53
+0.90D-W					
Span # 1	1	##.###	6.36	89.70	0.07
+1.20D+L+0.20S+E					
Span # 1	1	##.###	23.86	89.70	0.27
+1.20D+L+0.20S-E					
Span # 1	1	##.###	2.71	89.70	0.03
+0.90D+E					
Span # 1	1	##.###	17.38	89.70	0.19
+0.90D-E					
Span # 1	1	##.###	0.56	89.70	0.01

Overall Maximum Deflections - Unfactored L

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
Span 1	1	0.0471	23.611		0.0000	0.000

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+0.50Lr+1.60L	1	0.00	21.00	2.15	2.15	0.00	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+1.60L	1	1.47	21.00	2.04	2.04	0.10	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	2.94	21.00	1.97	1.97	0.40	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	4.41	21.00	2.06	2.06	0.85	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	5.88	21.00	2.13	2.13	1.44	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	7.35	21.00	2.15	2.15	2.11	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	8.82	21.00	2.13	2.13	2.83	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	10.29	21.00	2.05	2.05	3.51	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+1.60L	1	11.76	21.00	2.03	2.03	3.32	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60L+0.50S	1	13.24	21.00	2.22	2.22	4.44	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	14.71	21.00	2.69	2.69	12.12	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	16.18	21.00	4.01	4.01	10.62	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	17.65	21.00	5.73	5.73	7.17	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	19.12	21.00	7.88	7.88	1.19	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	20.59	21.00	10.46	10.46	7.95	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	22.06	21.00	13.43	13.43	20.88	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	23.53	21.00	16.77	16.77	40.99	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	25.00	21.00	20.35	20.35	64.55	1.00	39.40	PhiVc/2 < Vu <= PhiVc	Min 11.5.6.3	0.00	7.33
+1.20D+1.60S+0.50W	1	26.47	21.00	-12.94	12.94	39.36	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr: ABC; Building 1 Shop

Beam on Elastic Foundation

Project File: ABC Bldg 1 Office Shop - [125x50] - Copy.ec6

LIC# : KW-06012917, Build:20.23.08.30 Alpine Engineering, LLC

DESCRIPTION: Grid A & D - Composite Section

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+1.60S+0.50W	1	27.94	21.00	-9.83	9.83	19.24	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	29.41	21.00	-7.14	7.14	3.68	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	30.88	21.00	-4.90	4.90	7.92	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	32.35	21.00	3.11	3.11	5.64	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	33.82	21.00	2.54	2.54	7.76	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	35.29	21.00	2.07	2.07	9.05	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60L+0.50S	1	36.76	21.00	2.23	2.23	8.91	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	38.24	21.00	2.76	2.76	25.31	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	39.71	21.00	3.91	3.91	23.70	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	41.18	21.00	5.27	5.27	20.41	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	42.65	21.00	6.93	6.93	15.11	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	44.12	21.00	8.96	8.96	7.36	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	45.59	21.00	11.39	11.39	3.37	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	47.06	21.00	14.19	14.19	17.67	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	48.53	21.00	17.41	17.41	38.76	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	50.00	21.00	20.84	20.84	63.27	1.00	39.40	PhiVc/2 < Vu <= PhiVc	Min 11.5.6.3	0.00	7.33
+1.20D+1.60S+0.50W	1	51.47	21.00	-12.59	12.59	38.81	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	52.94	21.00	-9.59	9.59	19.20	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	54.41	21.00	-7.00	7.00	4.00	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	55.88	21.00	-4.83	4.83	7.39	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	57.35	21.00	3.10	3.10	5.41	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	58.82	21.00	2.55	2.55	7.52	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	60.29	21.00	2.08	2.08	8.81	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+1.60L	1	61.76	21.00	2.22	2.22	6.95	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	63.24	21.00	2.71	2.71	24.83	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	64.71	21.00	3.86	3.86	23.30	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	66.18	21.00	5.22	5.22	20.08	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	67.65	21.00	6.89	6.89	14.85	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	69.12	21.00	8.92	8.92	7.17	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	70.59	21.00	11.36	11.36	3.51	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	72.06	21.00	14.16	14.16	17.76	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	73.53	21.00	17.38	17.38	38.81	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	75.00	21.00	-15.92	15.92	63.27	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	76.47	21.00	-12.62	12.62	38.76	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	77.94	21.00	-9.63	9.63	19.11	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	79.41	21.00	-7.04	7.04	3.85	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	80.88	21.00	-4.87	4.87	7.60	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	82.35	21.00	3.12	3.12	5.51	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	83.82	21.00	2.57	2.57	7.65	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	85.29	21.00	2.10	2.10	8.98	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+1.60L	1	86.76	21.00	2.20	2.20	7.07	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	88.24	21.00	2.67	2.67	25.38	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	89.71	21.00	3.84	3.84	23.90	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	91.18	21.00	5.24	5.24	20.70	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	92.65	21.00	6.96	6.96	15.44	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	94.12	21.00	9.06	9.06	7.66	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	95.59	21.00	11.58	11.58	3.21	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	97.06	21.00	14.49	14.49	17.79	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	98.53	21.00	17.87	17.87	39.36	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	100.00	21.00	21.46	21.46	64.55	1.00	39.40	PhiVc/2 < Vu <= PhiVc	Min 11.5.6.3	0.00	7.33
+1.20D+1.60S+0.50W	1	101.47	21.00	-11.80	11.80	40.99	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	102.94	21.00	-8.64	8.64	22.54	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	104.41	21.00	-5.89	5.89	8.74	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60S+0.50W	1	105.88	21.00	-3.59	3.59	1.01	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	107.35	21.00	2.62	2.62	2.31	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+L-W	1	108.82	21.00	2.09	2.09	3.71	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+0.50Lr+1.60L	1	110.29	21.00	2.22	2.22	3.59	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60L+0.50S	1	111.76	21.00	2.44	2.44	4.44	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	113.24	21.00	2.70	2.70	11.29	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	114.71	21.00	2.92	2.92	9.76	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	116.18	21.00	2.99	2.99	7.91	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	117.65	21.00	2.93	2.93	5.97	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	119.12	21.00	2.78	2.78	4.11	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+L+0.50S+W	1	120.59	21.00	2.55	2.55	2.47	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60L+0.50S	1	122.06	21.00	2.44	2.44	0.45	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00
+1.20D+1.60L+0.50S	1	123.53	21.00	2.30	2.30	0.12	1.00	39.40	Vu < PhiVc/2	Not Reqd	0.00	0.00

PROJECT:	ABC BUILDING I OFFICE
LOCATION:	WHATCOM COUNTY, WA
CLIENT:	TRC
ENGR:	BAH
JOB #:	20004
DATE:	10/3/2023

ALPINE ENGINEERING, LLC

PEMB Column Reactions & Load Combinations

Load Combinations per ASCE 7-10

ASD Load Combinations		LRFD Load Combinations		PEMB Reaction definitions	
1	D	1	1.4D	D + Coll	Total Dead Load
2	D+L	2	1.2D+1.6L+0.5(Lr or S or R)	W+	Wind acting inward
3	D+(Lr or S or R)	3	1.2D+1.6(Lr or S or R)+(L or 0.5W)	W-	Wind acting outward (suction)
4	D+0.75L+0.75(Lr or S or R)	4	1.2D+1.0W+L+0.5(Lr or S or R)	E+	Seismic acting inward
5	D+(0.6W or 0.7E)	5	1.2D+1.0E+L+0.2S	E-	Seismic acting outward
6a	D+0.75L+0.75(0.6W)+0.75(Lr or S or R)	6	0.9D+1.0W	W (max)	Total concurrent Wind Loading, worst case
6b	D+0.75L+0.75(0.6E)+0.75S	7	0.9D+1.0E		
7	0.6D+0.6W				
8	0.6D+0.7E				

		Horiz								Vert								Out-of-plane		ASD load combos		
																				Max	Max	Max
Grid		D	Coll	Snow	L	E	W (max)	RS	LS	D	Coll	Snow	L	E	W (max)	RS	LS	E	W (max)	Horiz	Vert	OOP
1	A	0	0	0	0	0	-4.4	0.2	0.2	0.6	0.1	0.7	0.5	-1.5	-9.3	0.8	2.2	*0*	*0*	2.6	6.5	*0.0*
1	B	0	0	0	0	0	0	0	0	1.4	0.9	5.1	3.5	-1.7	-14	1.2	4.7	*0*	*-7*	0.0	12.4	*4.2*
1	C	0	0	0	0	0	0	0	0	1.4	0.9	5.1	3.5	-1.4	-14	1.4	4.5	*0*	*-8.1*	0.0	12.4	*4.9*
1	D	0	0	0	0	0	0	0	0	0.6	0.1	0.7	0.5	1.5	6.4	1.4	4.7	*0*	*-9.2*	0.0	7.1	*5.5*
2*	A	0.5	2.5	2.8	1.9	-1	-18.1	8.2	8.2	2.5	1.9	10.9	7.5	1.1	-18.1	5.1	17.4	*-5.3*	*8.2*	*17.3*	25.6	*4.9*
2*	D	-0.5	-0.5	-2.8	-1.9	-1	10.9	0	0	2.5	1.9	10.9	7.5	-0.2	-22.9	29.6	29.6	*-5.3*	*8.2*	5.9	36.9	*4.9*

2 Corresponds to Frames at Grids 2,3,4,5*

1 Corresponds to Frames at Grids 1,6*

PROJECT:	ABC BUILDING I OFFICE
LOCATION:	WHATCOM COUNTY, WA
CLIENT:	TRC
ENGR:	BAH
JOB #:	20004
DATE:	10/3/2023

ALPINE ENGINEERING, LLC

Wind & Seismic Uplift Calculations:

		PEMB		UPLIFT	ASD UPLIFT		LRFD UPLIFT				
Grid		D+Coll	E	W	SEIS	WIND	SEIS	WIND		Down +	lateral
1	A	0.7	-1.5	-9.3	20.7	12.9	31.8	24.0	*OK*	12.9	4.4
2*	A	4.4	1.1	-18.1	23.3	6.3	35.5	18.5	*OK*	6.3	25
2*	D	4.4	-0.2	-22.9	24.2	1.5	36.4	13.7	*OK*	1.5	15.4

Conc. Unit Weight	145	lb/cf
Fdn. Trib Length	30	ft
Fdn. Depth	24	in
Fdn. Width	25	in
Slab Trib. Area	250	sf
Slab Thickness	6	in
Total Trib. Fdn. Weight =	36.3	kips

2 Corresponds to Frames at Grids 2,3,4,5*

1 Corresponds to Frames at Grids 1,6*

Hairpin Tension Calculations:

fy hairpin = 60 ksi Area Req'd = 0.463 in^2

Max Horiz. Force 25 kip

USE:

#5 Hairpin OR (2) #4 Hairpins

Anchor Designer™ Software
Version 3.2.2309.2

Company:		Date:	10/4/2023
Engineer:	BAH	Page:	1/5
Project:	ABC Recycling - Bldg 1 Shop		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: AB_H
Diameter (inch): 0.750
Effective Embedment depth, h_{ef} (inch): 18.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 20.25
C_{min} (inch): 1.63
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 24.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Yes
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 10.50 x 6.00 x 0.38

Recommended Anchor
Anchor Name: PAB Pre-Assembled Anchor Bolt - PAB6H (3/4"Ø)

Anchor Designer™
Software
Version 3.2.2309.2

Company:		Date:	10/4/2023
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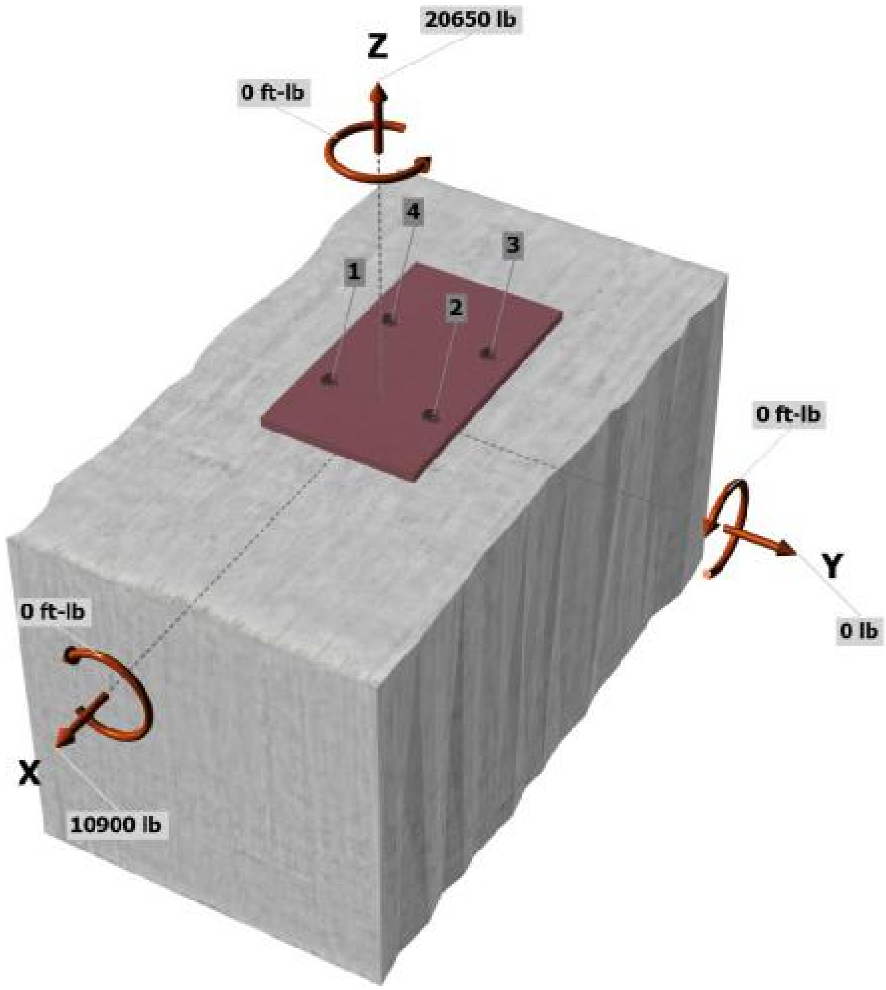
Project:	ABC Recycling - Bldg 1 Shop		
Address:			
Phone:			
E-mail:			

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 20650
V_{uax} [lb]: 10900
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



Anchor Designer™
Software
Version 3.2.2309.2

Company:		Date:	10/4/2023
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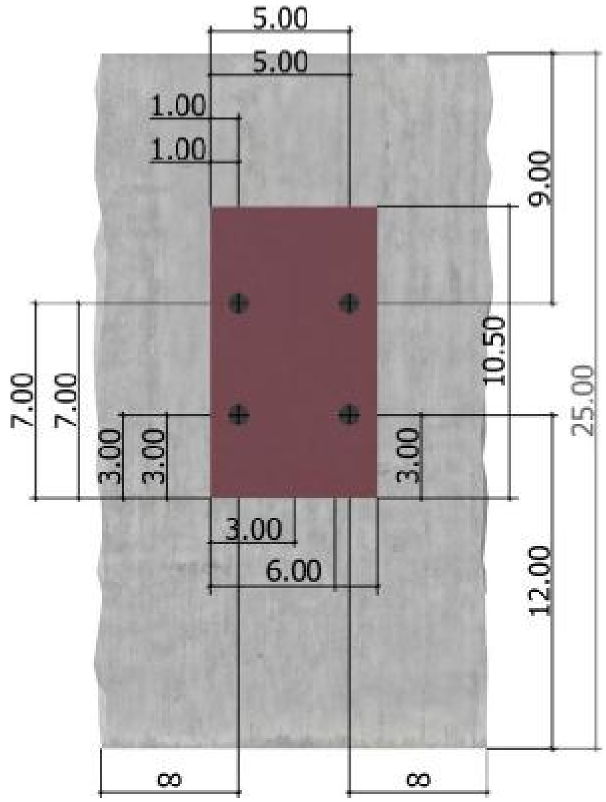
Address:			
Phone:			
E-mail:			

<Figure 2>



Anchor Designer™ Software
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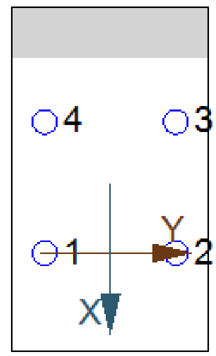
Address:			
Phone:			
E-mail:			

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	9046.7	2725.0	0.0	2725.0
2	9046.7	2725.0	0.0	2725.0
3	2987.6	2725.0	0.0	2725.0
4	2987.6	2725.0	0.0	2725.0
Sum	24068.7	10900.0	0.0	10900.0

Maximum concrete compression strain (‰): 0.17
Maximum concrete compression stress (psi): 746
Resultant tension force (lb): 24069
Resultant compression force (lb): 3419
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 1.01
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
40080	0.75	30060

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = 16\lambda_a\sqrt{f'_c}h_{ef}^{5/3}$ (Eq. 17.4.2.2b)

λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
1.00	3000	18.000	108343

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1b)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
1506.25	2916.00	9.00	0.964	0.800	1.00	1.000	108343	0.70	30213

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$\phi N_{pn} = \phi\Psi_{c,P}N_p = \phi\Psi_{c,P}8A_{brg}f'_c$ (Sec. 17.3.1, Eq. 17.4.3.1 & 17.4.3.4)

$\Psi_{c,P}$	A_{brg} (in^2)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.0	3.53	3000	0.70	59371

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 3.2.2309.2

Company:		Date:	10/4/2023
Engineer:	BAH	Page:	5/5
Project:	ABC Recycling - Bldg 1 Shop		
Address:			
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
24050	1.0	0.65	15633

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	0.750	1.00	3000	16.00	31549

$\phi V_{cbgx} = \phi\ (A_{Vc}/A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
1248.00	1152.00	1.000	1.000	1.000	1.000	31549	0.70	23925

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi k_{cp}N_{cbg} = \phi k_{cp}(A_{Nc}/A_{Nco})\,\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpg} (lb)
2.0	1506.25	2916.00	1.000	0.800	1.000	1.000	108343	0.70	62680

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	9047	30060	0.30	Pass
Concrete breakout	**24069**	**30213**	**0.80**	**Pass (Governs)**
Pullout	9047	59371	0.15	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	2725	15633	0.17	Pass
T Concrete breakout x+	**10900**	**23925**	**0.46**	**Pass (Governs)**
Pryout	10900	62680	0.17	Pass

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Combined Ratio	Permissible	Status
Sec. R17.6	0.68	0.27	95.4%	1.0	Pass

PAB6H (3/4"Ø) with hef = 18.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Designer must exercise own judgement to determine if this design is suitable.

2050103719
Page: 1 of 4
1/25/2005 11:16 AM
NINT $22.00
Whatcom County, WA
Request of: BELLINGHAM CITY OF

AFTER RECORDING RETURN DOCUMENT TO:

City of Bellingham - Public Works, Engineering
210 Lottie Street
Bellingham, WA 98225

↑ *Reserved for Recording Purposes Only* ↑

DOCUMENT TITLE: *Statement of Intent to Collect Connection Fee*

REFERENCE NUMBER OF RELATED DOCUMENT:

GRANTOR(S): *City of Bellingham*

ADDITIONAL GRANTORS ON PAGE ____ OF DOCUMENT.

GRANTEE(S): *City of Bellingham*

ADDITIONAL GRANTEES ON PAGE ____ OF DOCUMENT.

ABBREVIATED LEGAL DESCRIPTION: *Located in a portion of the Southeast 1/4 of section 15, the Northwest 1/4 of Section 23, and the Northeast 1/4 of Section 22, Township 38 North, Range 2 East*

ADDITIONAL LEGAL DESCRIPTION ON PAGE(S) ____ OF DOCUMENT.

ASSESSOR'S TAX/PARCEL NUMBER(S): *380223195333, 380223191352, 380215533063, 380215494049, 380215520100, 380215471064, 380215457041, 380215468032, 380215478022, 380223124302*

STATEMENT OF INTENT TO COLLECT CONNECTION FEE LCS 50-04

1. This document imposes a deferred assessment on property owners to compensate the City of Bellingham for construction of certain public facilities.

2. The public facility involved here is described as: Installation of 4,193 linear feet of 18" sewer main and appurtenances along Marine Drive from the intersection of Bennett Drive Northwesterly to Williamson Way.

3. NOTICE IS HEREBY GIVEN that, pursuant to RCW 35.92 and Bellingham Municipal Code Section 15.08.230 (water) or 15.12.170 (sewer), the City of Bellingham will

charge and collect a minimum of $84.7532 per linear foot of property frontage for each service hereinafter connected to the above described improvement. Parcels of property which may be subject to these charges are indicated on the attached page of this document by legal description and/or a map thereof.

4. If payment of the above charge is made within 90 days of the date of recordation of this document, then no interest shall be charged. For payments subsequent to that time, interest will be charged on the amount in paragraph 3, computed in accordance with applicable Bellingham Municipal Code Section 15.08.230(A) (water)/15.12.175 (sewer).

5. Information regarding this document or the amount to be charged may be obtained from the City Department of Public Works.

DATED this 19th day of January, 2005 for the CITY OF **BELLINGHAM.**

Approved as to Form:

Office of the City Attorney

Mayor

Attest:

Finance Director

Department Head

0598.lcm.doc (2)

STATE OF WASHINGTON
COUNTY OF WHATCOM } ss

I CERTIFY that I know or have satisfactory evidence that **MARK ASMUNDSON** is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the **Mayor** of the **CITY OF BELLINGHAM** to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

RENIE B. HILL COMMISSION EXPIRES NOTARY PUBLIC 9-10-07 STATE OF WASHINGTON

JAN 19 2005
DATED

Renie B. Hill
SIGNATURE OF NOTARY PUBLIC

RENIE B. HILL
NAME PRINTED

Notary Public
TITLE

10 Sept 2007
MY APPOINTMENT EXPIRES

STATE OF WASHINGTON
COUNTY OF WHATCOM } ss

I CERTIFY that I know or have satisfactory evidence that **THERESE HOLM** is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the **Finance Director** of the **CITY OF BELLINGHAM** to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

MARTHA L. HAGEN COMMISSION EXPIRES NOTARY PUBLIC 4-29-07 STATE OF WASHINGTON

19 January, 2005
DATED

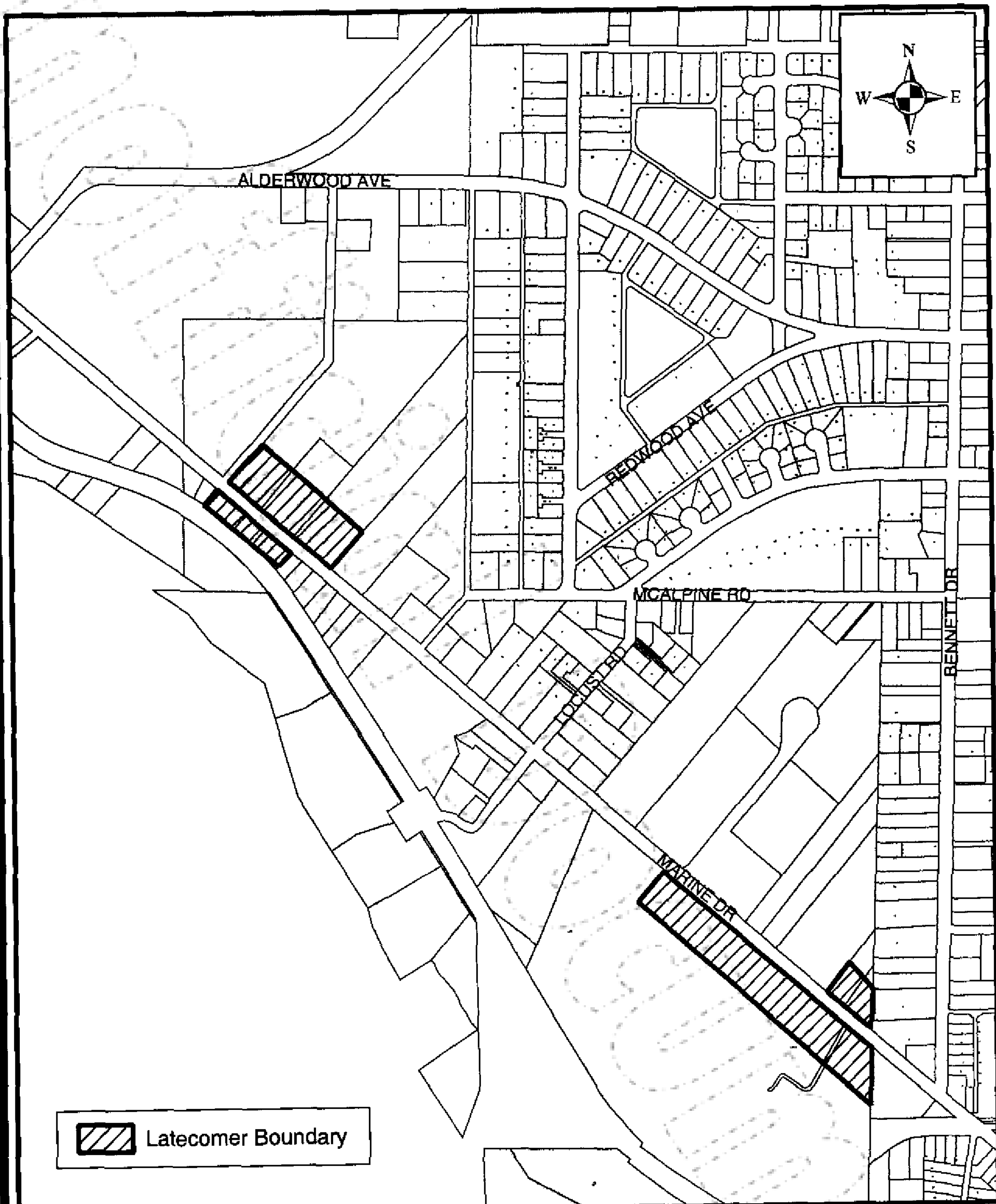
Martha L Hagen
SIGNATURE OF NOTARY PUBLIC

MARTHA L HAGEN
NAME PRINTED

Notary Public
TITLE

29 April 2007
MY APPOINTMENT EXPIRES

0598.lcm.doc (3)



City of Bellingham
BELLINGHAM, WASHINGTON

LCS 50-04

Director of Public Works

Richard E. McKinley

Whatcom County Water Dist. #2

Phone: 360-733-5770
Fax : 360-671-4912

1615 Bayon Rd
Bellingham, WA 98225

19 October 2023

ABC Recycling
8081 Meadow Avenue
Burnaby, BC V3N 2V9

Subject: Water Availability at 741 Marine Dr.

Dear Steve,

Whatcom County Water District #2 can provide water to the above property subject to confirmation of potable water and fire flow requirements subject to water availability.

Currently a new ¾ inch potable service connection including 1 equivalent residential unit (ERU) per parcel is:

General Facilities Fee $4,500.00
Connection Fee (minimum) $2,000.00
All connection costs over $2,000.00 will be paid by the customer.
All Permit Fess will be paid by the customer.

Whatcom County Water Dist. #2 will install the meter at the property line and requires the property owner to install a shut off valve "One Foot" beyond the meter box before service is turned on.

The current minimum charge to install a fire hydrant if requested is $8,500.00.

All connection costs over the $8,500.00 will be paid by the customer,
All Permit Fess will be paid by the customer.
Any engineering and design required by the district or permitting will be paid by the customer, in addition to the above costs.

If you have any further questions, please call me.

Sincerely Yours,

Lorrie Whitfield

Office Manager

From:	Steve Holan
To:	Scott Goodall; Brandon Hausmann
Cc:	Andy Anthony; Viral Patel; Steve.Shinn
Subject:	FW: Water Availability - 741 Marine Dr.
Date:	Thursday, October 19, 2023 10:47:11 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png WD2 water availability letter to ABC.doc

Good morning,

Please see the updated letter dated today for the Water Availability to the site.

Thank you,

Steven Holan, CRSP
Director, Health, Safety, and Environment
T: 604-522-9727 **C:** 604-219-0040

From: Lorrie Whitfield <wcwd2@qwestoffice.net>
Sent: Thursday, October 19, 2023 10:41 AM
To: Steve Holan <steve.holan@abcrecycling.com>
Cc: Dave Olson <dave@watersystemservices.net>
Subject: RE: Water Availability - 741 Marine Dr.

Good Morning Steve,
Attached you will find an updated letter per your request.
The letter is *District* information only and will not meet county building & codes requirements.
Sincerely,

Lorrie Whitfield

Office Manager
Whatcom County Water #2
360-733-5770

From: Steve Holan <steve.holan@abcrecycling.com>
Sent: Wednesday, October 18, 2023 4:14 PM

To: wcwd2@qwestoffice.net
Cc: Andy Anthony <andy.anthony@abcrecycling.com>; Brandon Hausmann <brandon@alpineengineer.com>; Steve.Shinn <Steve.Shinn@abcrecycling.com>; Scott Goodall <scott@bold-impact.com>
Subject: RE: Water Availability - 741 Marine Dr.

Good afternoon,

In late 2020 we received the attached letter regarding water availability at 741 Marine Dr. As the document is a few years old, would it be possible to confirm the previous details in this letter, update the letter for 2023 and have it signed?

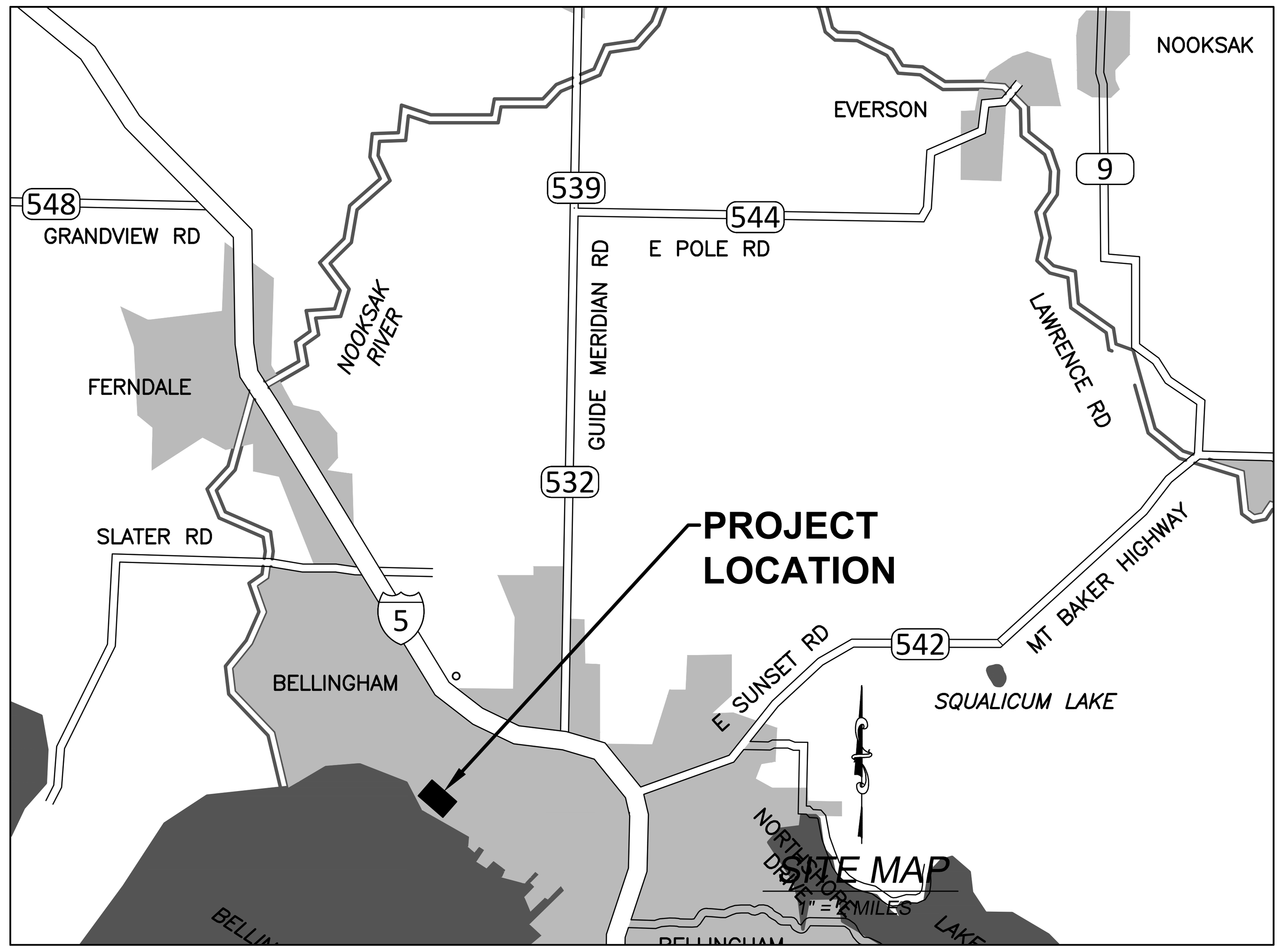
Please let me know any additional details that we could provide, or information required so we can obtain an updated water availability letter for 741 Marine Dr.

Thank you,

Steven Holan, CRSP
Director, Health, Safety, and Environment
T: 604-522-9727 **C:** 604-219-0040

8081 Meadow Avenue, Burnaby, BC V3N 2V9
"We exist to preserve the world's resources,
building thriving communities by accelerating metal recycling"

VICINITY MAP



SHEET INDEX

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2	TOPOGRAPHIC SURVEY PAGE 1
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8	OVERALL SITE PLAN - 100 SCALE
9	PLAN & PROFILE STORM 2
10	PLAN & PROFILE - A1B-A1B'
11	PLAN & PROFILE - A2-A2' & A3-A3'
12	PLAN & PROFILE - A4-A4' & A5-A5'
13	PLAN & PROFILE WATER-1
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20	STORMWATER POLUTION PROTECTION PLAN
21	STORM DRAIN DETAILS-1
22	STORM DRAIN DETAILS-2
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24	WATER DETAILS-1
25	WATER DETAILS-2
26	STORM & WATERMAIN STRUCTURES & PIPES
27	BASIN MAP

ABBREVIATIONS

FOR SURVEY ABBREVIATIONS SEE TOPOGRAPHIC SURVEY PAGE 2

1'/1"	ONE FOOT/ONE INCH
AC	ACRE
AF#	AUDITORS FILE NUMBER
APPROX	APPROXIMATE
ASB/AB	AS-BUILT
ASPH	ASPHALT
BLDG	BUILDING
BMP	BEST MANAGEMENT PRACTICE
BNDRY	BOUNDARY
BVCS	BEGINNING OF VERTICAL CURVE STATION
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
C	COMPACT PARKING STALL
CC	CURB CUT
CB	CATCH BASIN
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CNTRL	CONTROL
CO	CLEANOUT
COR	CORNER
CPP	CORRUGATED POLYETHYLENE PIPE
CONC	CONCRETE
CSTC	CRUSHED SURFACING TOP COURSE
CULV	CULVERT
ø	DIAMETER
DEMO	DEMOLITION
DI	DUCTILE IRON
DWGS	DRAWINGS
E	EAST
EA	EACH
EL/ELEV	ELEVATION
ENC	REVOCABLE ENCROACHMENT PERMIT
EP/EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EVCS	END OF VERTICAL CURVE STATION
EVCE	END OF VERTICAL CURVE ELEVATION
EX/EXIST	EXISTING
FDC	FIRE DEPARTMENT CONNECTION
FFE/FF	FINISH FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HYDRANT
FND	FOUND
GND	GROUND
GUTT	GUTTER
HP	HIGH POINT
INV	INVERT
IE/I.E.	INVERT ELEVATION
IRRIG	IRRIGATION
LF	LINEAR FOOT
L.S.	LAND SURVEYOR
MAX	MAXIMUM
MIN	MINIMUM
MON	MONUMENT
NIC	NOT IN CONTRACT
N	NORTH
No./#	NUMBER
O.C.	ON CENTER
PC	POINT OF CURVATURE
PCL	PARCEL
PERF	PERFORATED
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
POB	POINT OF BEGINNING
PP	POWER POLE
PROP	PROPERTY
K	LENGTH OF VERTICAL CURVE PER PERCENT GRADE DIFFERENCE
PT/POT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INFLECTION
PWR	POWER
R	RADIUS
R/C	REBAR WITH CAP
RCP	REINFORCED CONCRETE PIPE
RET	RETAINING
RIM	RIM
R/W	RIGHT-OF-WAY (R.O.W.)
RPP	REDUCED PRESSURE PRINCIPAL
S	SOUTH
SAN	SANITARY
SCH	SCHEDULE
SD	STORM DRAIN
SDCB	STORM DRAIN CATCH BASIN
SDCO	STORM DRAIN CLEANOUT
SDMH	STORM DRAIN MAN HOLE
SERV	SERVICE
STND/STD	STANDARD
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
ST	STREET
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TEL/TELE	TELEPHONE
TESC	TEMPORARY EROSION & SEDIMENTATION CONTROL
TP	TOP OF PAVEMENT
TS	TOP OF SIDEWALK
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
VC	VERTICAL CURVE
VEG	VEGETATION
W	WEST
WA	WATER
W/IN	WITHIN
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WHATCOM COUNTY GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT WSDOT/APWA STANDARD SPECIFICATIONS, WHATCOM COUNTY DEVELOPMENT STANDARDS (WCDS), AND SHALL BE SUBJECT TO APPROVAL BY WHATCOM COUNTY PUBLIC WORKS DEPARTMENT – ENGINEERING DIVISION – PUBLIC WORKS ENGINEERING SERVICES (PWES).
2. DEVELOPER/CONTRACTOR/CONSULTING ENGINEER SHALL SCHEDULE A PRE-CONSTRUCTION CONFERENCE WITH THE PUBLIC WORKS ENGINEERING SERVICES PROJECT MANAGER A MINIMUM OF 3 WORKING DAYS PRIOR TO BEGINNING ANY WORK.
3. NORMAL WORKING HOURS ARE 8:00 AM. TO 6:00 PM., MONDAY THROUGH FRIDAY. WORK DURING HOLIDAYS, WEEKENDS, AND OUTSIDE THE NORMAL WORK HOURS REQUIRES PRIOR ARRANGEMENTS AND APPROVAL.
4. SIGHT DISTANCE REQUIRED AT ALL INTERSECTIONS PER WCDS CHAPTER 5.
5. A REVOCABLE ENCROACHMENT PERMIT SHALL BE OBTAINED PRIOR TO COMMENCING ANY WORK WITHIN COUNTY MAINTAINED ROAD RIGHTS-OF-WAY.
6. THE CONTRACTOR SHALL CONTACT UTILITY LOCATION SERVICE 48 HOURS PRIOR TO STARTING WORK AT (800)424-5555 OR 811.
7. A COPY OF THE COUNTY-APPROVED DRAWINGS MUST BE ON THE JOB SITE WHENEVER WORK IS IN PROCESS.
8. WHATCOM COUNTY RESERVES THE RIGHT TO INSPECT ALL WORK. THE CONTRACTOR SHALL CALL THE CONSULTING ENGINEER AND THE PUBLIC WORKS ENGINEERING SERVICES PROJECT MANAGER AT (360)778-6220 AT LEAST 24 HOURS IN ADVANCE OF THE FOLLOWING WORK ITEMS:
   A. PLACEMENT OF TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES.
   B. PLACEMENT OF WATER, SANITARY SEWER, AND STORM DRAINAGE LINES AND BACKFILLING OF THESE LINES WITHIN COUNTY MAINTAINED ROAD RIGHTS-OF-WAY.
   C. PLACEMENT OF UNDERGROUND UTILITIES AND BACKFILLING WITHIN COUNTY MAINTAINED ROAD RIGHTS-OF-WAY.
   D. ROADWAY GRADING AT THE COMPLETION OF THE SUBGRADE, BALLAST, AND OF CRUSHED SURFACING.
   E. POURING OF CURB/GUTTER AND SIDEWALK.
   F. ASPHALT PAVING, AT THE BEGINNING OF PAVING.
   G. PRIOR TO PAVEMENT MARKING.
   H. OVERALL INSPECTION OF FINISHED SHOULDERS, DITCHES, PERMANENT SEEDING, ROAD SIGNAGE, MONUMENT PLACEMENT, CLEANING OF DRAINAGE SYSTEM AND CONSTRUCTION DEBRIS.
   I. ALL WORK REQUIRED TO RELEASE OF ANY POSTED SECURITY.
9. ALL TESTING REQUIRED FOR THE WORK SHALL BE THE RESPONSIBILITY OF THE OWNER AND SHALL BE IN CONFORMANCE WITH WCDS WITH RESPECT TO THE CONSULTING ENGINEER.
10. THE CONTRACTOR SHALL RIP RAP ALL CULVERT INLETS AND OUTLETS.
11. THE CONTRACTOR SHALL RESTORE ALL PRIVATE AND PUBLIC PROPERTY DISTURBED BY THE WORK IMMEDIATELY AFTER CONSTRUCTION. THE CONTRACTOR SHALL NOT LEAVE ANY PART OF THE ROAD USED BY OTHERS UN-PASSABLE WITHOUT NOTIFICATIONS AND AGREEMENT OF OTHER USERS.
12. ALL CUT AND FILL SLOPES SHALL BE MULCHED AND SEEDED FOR EROSION CONTROL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SLOPE EROSION UNTIL VEGETATION IS FIRMLY ESTABLISHED.
13. CONTRACTOR SHALL SWEEP AND REMOVE ALL DEBRIS TRACKED ONTO EXISTING ROADS DURING ALL PHASES OF CONSTRUCTION.
14. ANY TREE, WHERE 1/3 OF THE ROOT SYSTEM IS DAMAGED BY WORK, SHALL BE REMOVED.
15. THE CONTRACTOR SHALL INFORM THE CONSULTING ENGINEER AND OBTAIN APPROVAL FROM WHATCOM COUNTY ENGINEERING DIVISION OF ANY PROPOSED CHANGES IN PLANS PRIOR TO IMPLEMENTATION OF THE CHANGE. THE CONTRACTOR SHALL KEEP RECORDS OF DEVIATIONS AND FORWARD TO THE ENGINEER OF RECORD AND WHATCOM COUNTY ENGINEERING DIVISION.
16. TRAFFIC CONTROL IS TO BE MAINTAINED IN ACCORDANCE WITH WSDOT/APWA STANDARD SPECIFICATIONS.
17. THE DEVELOPER/CONTRACTOR SHALL POST A WARRANTY SECURITY AS REQUIRED BY THE WHATCOM COUNTY DEVELOPMENT STANDARDS.
18. AN ENGINEER SHALL PROVIDE RECORD DRAWINGS PER WCDS 507.D.

PROPOSED PLANS LEGEND

- EXISTING WETLANDS
- PROPOSED STORM PIPE
- PROPOSED WATER EASEMENT
- PROPOSED WATER LINE
- POND BOTTOM ELEVATION 74.0'
- POND FILL TO DAYLIGHT
- PROPOSED PARKING
- PROPOSED GRAVEL
- EXISTING PROPERTY LINE
- EXISTING RIGHT OF WAY
- EXISTING RIGHT OF WAY
- EXISTING RAILROAD
- EXISTING ASPHALT
- EXISTING WATER LINE
- EXISTING CURB
- EXISTING STORM LINE
- EXISTING EASEMENT
- PROPOSED BUILDINGS
- PROPOSED CONCRETE
- AQ Delineated Extent Fill
- PROPOSED VEGETATION PLANTINGS
- 50' & 100' SETBACKS
- FIRELANE
- PROPOSED PAVEMENT
- AQ Wetland Delineation Buffers

SURVEY LEGEND

SEE TOPOGRAPHIC SURVEY PAGE 2
SIZE & SCALE MAY VARY

- = RIGHT-OF-WAY
- = RIGHT-OF-WAY CENTERLINE
- = PROPERTY BOUNDARY
- = EASEMENT
- = EXISTING GRAVEL EDGE
- = EXISTING ASPHALT EDGE
- = EXISTING CONCRETE EDGE
- = EXISTING BUILDING
- = EXISTING BUILDING OVERHANG
- = EXISTING CULVERT
- = EXISTING FENCE
- = EXISTING BURIED POWER LINE
- = EXISTING AERIAL POWER LINE
- = EXISTING STORM DRAIN
- = EXISTING SANITARY SEWER
- = EXISTING BURIED FIBER OPTIC/COMM
- = EXISTING GAS LINE
- = EXISTING WATER LINE
- = EXISTING DITCH CENTERLINE
- = EXISTING TREE OR SHRUB LINE
- = FOUND PROPERTY CORNER
- = FOUND BRASS DISK
- = TEMPORARY BENCH MARK
- = TRAVERSE POINT
- = EXISTING POWER VAULT
- = EXISTING UTILITY POLE
- = EXISTING POWER JUNCTION BOX
- = EXISTING TELE/COMM JUNCTION BOX
- = EXISTING WATER VALVE
- = EXISTING WATER METER
- = EXISTING FIRE HYDRANT
- = EXISTING SIGN
- = EXISTING BOULDER
- = EXISTING STORM DRAIN CATCH BASIN
- = EXISTING SANITARY SEWER MANHOLE
- = EXISTING CONIFEROUS TREE
- = EXISTING DECIDUOUS TREE

CONTROL NOTES

SEE TOPOGRAPHIC SURVEY PAGE 2

HORIZONTAL DATUM:
WASHINGTON STATE PLANE, NORTH ZONE NAD83/98

BASIS OF COORDINATES: COORDINATION AND MENSURATION ARE LOCAL GROUND VALUES, BASED UPON HOLDING THE PUBLISHED NAD83/98 POSITION FOR THE BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF TIMPSON WAY AND THE NORTH MARGIN OF MARINE DRIVE , PUBLISHED AS CITY OF BELLINGHAM CONTROL POINT #2998. SAID MONUMENT HAS THE FOLLOWING PUBLISHED POSITION:

NORTHING = 649,056.361 USFT
EASTING = 1,234,329.448 USFT

BASIS OF BEARINGS: BEARINGS ARE NAD83/98, BASED UPON HOLDING THE PUBLISHED POSITIONS MONUMENTED BY CITY OF BELLINGHAM CONTROL POINTS #2998 AND #2995, BEING A BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF LOCUST AVENUE AND THE NORTH MARGIN OF MARINE DRIVE.

THE DERIVED INVERSE BETWEEN SAID MONUMENTS #2998 AND #2995 IS **NORTH 48° 45' 36" WEST**, AT A DISTANCE OF **3,467.47 USFT**. THE PUBLISHED POSITION FOR MONUMENT #2995 IS:

NORTHING = 651,342.168 USFT
EASTING = 1,231,722.071 USFT

VERTICAL DATUM:
NAVD88

BASIS OF ELEVATIONS: ELEVATIONS ARE NAVD88 VALUES, BASED UPON HOLDING THE PUBLISHED ELEVATION FOR CITY OF BELLINGHAM BENCHMARK #5848, BEING A BRASS DISK MONUMENT AT THE TOP OF THE HEADWALL AT THE NORTHWEST END OF THE ELDRIDGE AVENUE BRIDGE OVER LITTLE SQUALICUM CREEK. SAID MONUMENT HAS THE FOLLOWING PUBLISHED NAVD88 ELEVATION:
ELEVATION = 67.42 FEET

SURVEY NOTES

SEE TOPOGRAPHIC SURVEY PAGE 2

1. THIS TOPOGRAPHIC SURVEY WAS PERFORMED FOR A.B.C. RECYCLING REALTY CORP. IN APRIL OF 2021.

2. BASIS OF BEARINGS IS NAD83/98 PER TIES TO CITY OF BELLINGHAM CONTROL NETWORK, PER THAT RECORD OF SURVEY RECORDED UNDER WHATCOM COUNTY AFN 2071002449.

3. MONUMENTATION SHOWN HEREON WAS RECOVERED DURING THE COURSE OF THIS SURVEY, UNLESS OTHERWISE NOTED.

4. ANGULAR AND LINEAR MEASUREMENTS WERE COLLECTED USING A COMBINATION OF GPS AND CONVENTIONAL METHODOLOGIES. PRIMARY CONTROL WAS COLLECTED USING A TRIMBLE R10 SURVEY-GRADE GPS RECEIVER OPERATING IN NETWORKED RTK MODE. FROM GPS CONTROL, A TRIMBLE S-6 ROBOTIC TOTAL STATION WAS USED TO THE SECONDARY CONTROL POINTS AND COLLECT TOPOGRAPHIC DATA. ORTHO-RECTIFIED PHOTOGRAPHY CAPTURED WITH AN UNMANNED AERIAL VEHICLE WAS USED TO DELINEATE CERTAIN FEATURES, INCLUDING THE EXTENTS OF STOCKPILES ON-SITE.

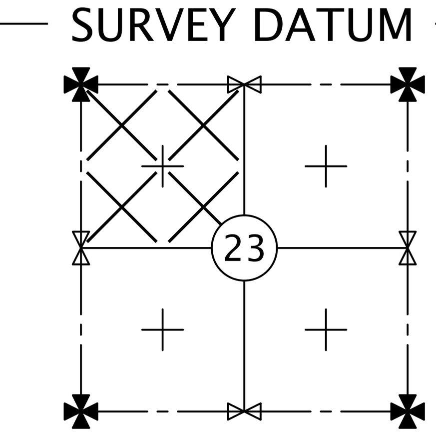
5. LOCATIONS OF UNDERGROUND UTILITIES DEPICTED HEREON ARE ACCORDING TO SURFACE MARKS PROVIDED BY OTHERS. WILSON CANNOT GUARANTEE THE CORRESPONDENCE BETWEEN THE MARKS AND THE EXTANT UTILITIES.

6. BARGAIN & SALE DEED NO. 2021-0404007: THIS DOCUMENT CONTAINS USE RESTRICTIONS AND AN ENVIRONMENTAL RELEASE NOT DISCLOSED PER TITLE COMMITMENT NO. NCS-1028029.

LEGAL DESCRIPTION:

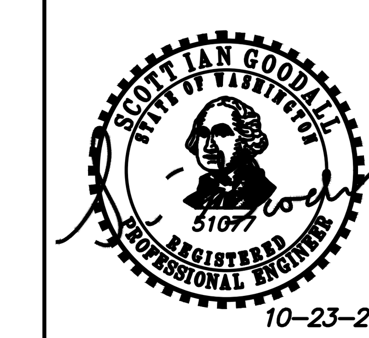
SEE TOPOGRAPHIC SURVEY PAGE 2

SURVEY DATUM



NW 1/4, SECTION 23
T. 38 N., R. 2 E. OF W.M.

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-399-8138 WWW.BOLD-IMPACT.COM



ABC RECYCLING
COVER SHEET
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

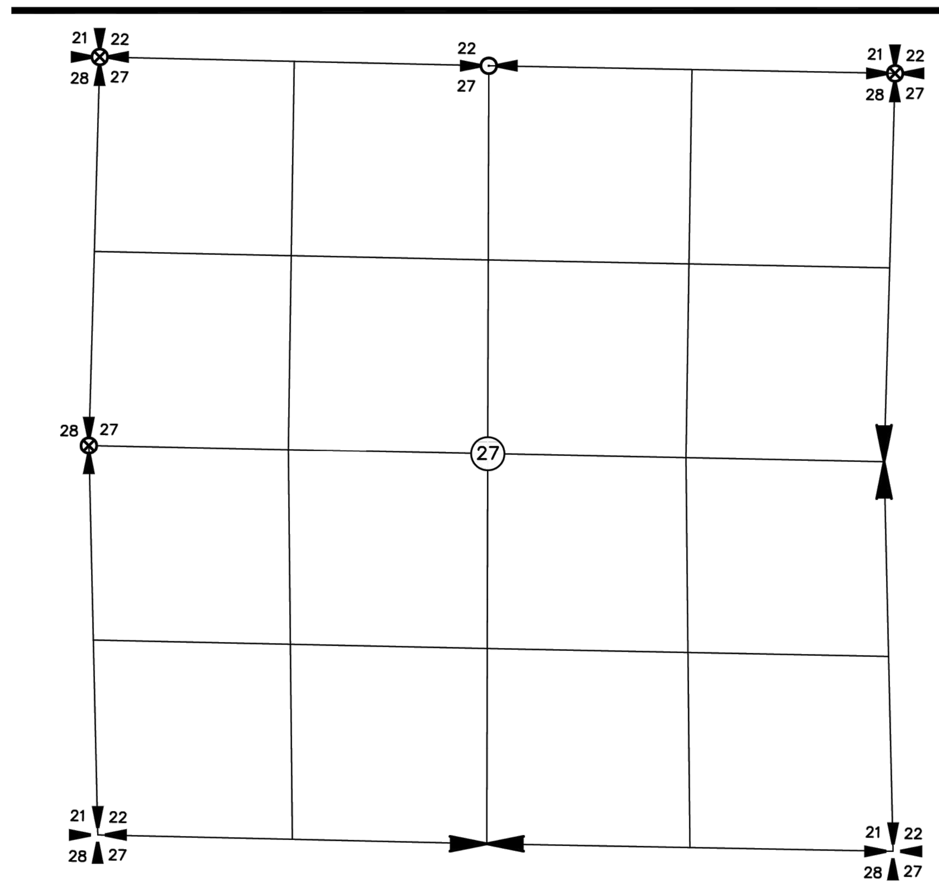
REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

ABC RECYCLING

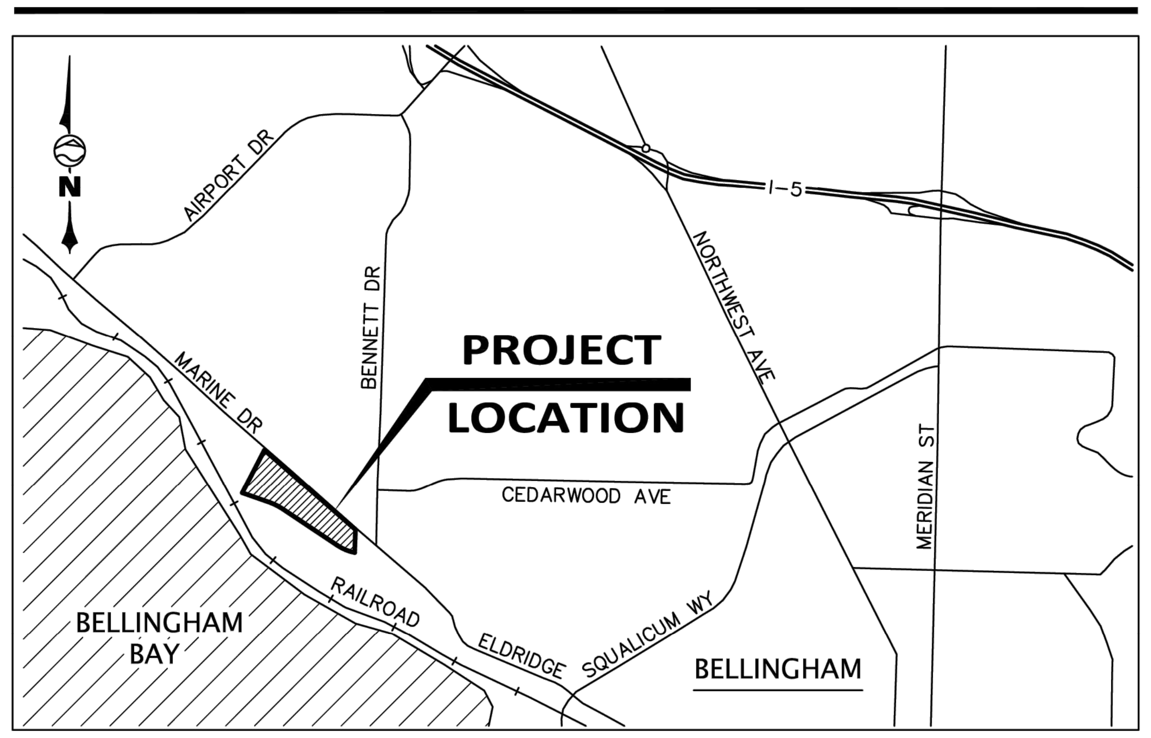
MARINE DRIVE PLANT
W.A.C. 332-130 COMPLIANCE SHEET

SECTIONAL INDEX DATA
NW 1/4, SEC. 23, T38N., R2E., W.M.



XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.
XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.
XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.

VICINITY MAP - NOT TO SCALE



INDEX TO DRAWINGS

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT I AM A LICENSED LAND SURVEYOR IN THE STATE OF WASHINGTON, THAT THIS MAP IS BASED ON AN ACTUAL FIELD SURVEY DONE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL DATA SHOWN HEREON ACTUALLY EXISTS IN THE LOCATIONS SHOWN AT THE TIME OF THIS SURVEY. THIS TOPOGRAPHIC MAP WAS DONE AT THE REQUEST OF ABC RECYCLING IN 2021.

JOHN THOMAS BREWSTER, P.L.S. NO. 44335 DATE 5-7-2021

LEGAL DESCRIPTION

A TRACT OF LAND LYING WITHIN THE COMPTON DONATION LAND CLAIM, SECTION 23, TOWNSHIP 38 NORTH,RANGE 2 EAST OF WILLAMETTE MERIDIAN IN WHATCOM COUNTY, STATE OF WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE BRASS SURFACE MONUMENT MARKING THE INTERSECTION OF LOCUST AVENUE WITH THE NORTH MARGIN OF MARINE DRIVE, SAID MONUMENT BEING THAT CADASTRAL SURVEY MONUMENT DESIGNATED NO. 2995, PER THAT RECORD OF SURVEY OF THE CITY OF BELLINGHAM 2005 HORIZONTAL CONTROL NETWORK, PER THE MAP THEREOF RECORDED UNDER WHATCOM COUNTY AUDITOR'S FILE NO. 2071002449; THENCE SOUTH 48°45'40" EAST, NOMINALLY ALONG SAID NORTH MARGIN OF MARINE DRIVE, 3467.57 FEET, TO THE BRASS-DISK MONUMENT MARKING THE INTERSECTION OF THE CENTERLINE OF WEST ILLINOIS STREET WITH THE NORTH MARGIN OF MARINE DRIVE, SAID MONUMENT BEING THAT CITY OF BELLINGHAM CADASTRAL SURVEY MONUMENT DESIGNATED NO. 2998, PER THE AFOREMENTIONED CONTROL NETWORK RECORD OF SURVEY; THENCE NORTH 48°44'10" WEST, ALONG SAID NORTH MARGIN AS CALCULATED IN RELIANCE UPON THAT CITY OF BELLINGHAM RECORD OF SURVEY OF MARINE DRIVE SEWER AND IMPROVEMENTS RECORDED AS RS-3308 IN THE RECORDS OF THE CITY OF BELLINGHAM, DATED MARCH 15, 2012, A DISTANCE OF 926.92 FEET; THENCE NORTH 48°44'11" WEST, CONTINUING ALONG THE NORTH MARGIN OF MARINE DRIVE PER SAID CITY OF BELLINGHAM RECORD OF SURVEY, 408.32 FEET; THENCE NORTH 48°46'35" WEST, CONTINUING ALONG THE NORTH MARGIN OF MARINE DRIVE PER SAID CITY OF BELLINGHAM RECORD OF SURVEY, 25.45 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE EAST BOUNDARY OF THE COMPTON DONATION LAND CLAIM, AND THE HERE COINCIDENT WEST BOUNDARY OF THE ELDRIDGE DONATION LAND CLAIM, PER SAID SURVEY;

THENCE SOUTH 01°47'30" WEST, ALONG SAID COINCIDENT COMPTON DONATION LAND CLAIM AND ELDRIDGE DONATION LAND CLAIM BOUNDARY, 77.70 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE SOUTH MARGIN OF MARINE DRIVE, SAID POINT BEING THE NORTH-MOST CORNER COMMON TO THE PARCEL ORIGINALLY CONVEYED ACCORDING TO STATUTORY WARRANTY DEED NO. 148000 AND TO THE PARCEL CONVEYED ACCORDING TO THAT QUIT CLAIM DEED RECORDED UNDER WHATCOM COUNTY AUDITOR'S FILE NO. 2111103174, SAID POINT BEING THE **TRUE POINT OF BEGINNING**;

THENCE SOUTH 01°47'30" WEST, CONTINUING ALONG SAID COINCIDENT COMPTON DONATION LAND CLAIM AND ELDRIDGE DONATION LAND CLAIM BOUNDARY, 336.98 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH AN OFFSET LINE PARALLEL AND/OR CONCENTRIC WITH, THE CENTERLINE OF AN EXTANT BURLINGTON-NORTHERN SANTA-FE (BNSF) SPUR-LINE RAILROAD TRACK, AS CONSTRUCTED, AND SAID POINT OF INTERSECTION BEING AT THE BEGINNING OF A NON-TANGENT CURVE, CONCAVE TO THE NORTH, HAVING A RADIUS OF 700.00 FEET, AND FROM SAID POINT OF INTERSECTION THE CURVE'S INITIAL RADIAL BEARS NORTH 10°41'48" EAST;

THENCE SOUTH AND WEST, ALONG SAID OFFSET LINE AND NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 22°59'14", AN ARC LENGTH OF 280.84, TO A POINT ON SAID OFFSET LINE FROM WHICH THE CURVE'S CLOSING RADIAL BEARS NORTH 33°41'02" EAST; THENCE NORTH 56°18'58" WEST, ALONG SAID OFFSET LINE, 972.62 FEET, TO A POINT AT THE BEGINNING OF A NONTANGENT CURVE, CONCAVE TO THE SOUTH, HAVING A RADIUS OF 810.00 FEET, AND FROM SAID POINT OF BEGINNING THE CURVE'S INITIAL RADIAL BEARS SOUTH 33°42'04" WEST;

THENCE WEST AND SOUTH, ALONG SAID OFFSET LINE AND NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 14°23'56", AN ARC LENGTH OF 203.56 FEET, TO A POINT FROM WHICH THE CURVE'S CLOSING RADIAL BEARS SOUTH 19°18'07" WEST;

THENCE NORTH 70°42'09" WEST, ALONG SAID OFFSET LINE, 431.39 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE BOUNDARY LINE COMMON TO THAT PORTION OF THE COMPTON DONATION LAND CLAIM ORIGINALLY CONVEYED AS THE RICKERSON AND BOOKER TRACT, PER WHATCOM COUNTY AUDITOR'S FILE NO. 56428, AND TO THAT PORTION OF SAID DONATION LAND CLAIM ORIGINALLY CONVEYED AS THE CHAMPION MCDONALD TRACT (JULY 20, 1909), AND SAID POINT OF INTERSECTION BEARS SOUTH 05°14'11" WEST, 928.84 FEET DISTANT, FROM THE CITY OF BELLINGHAM CADASTRAL CONTROL MONUMENT NO. 2995;

THENCE NORTH 27°16'09" EAST, ALONG SAID COMMON BOUNDARY, 712.59 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE SOUTH MARGIN OF MARINE DRIVE;

THENCE SOUTH 48°46'35" EAST ALONG SAID SOUTH MARGIN, 1782.27 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE BOUNDARY COMMON TO THE COMPTON DONATION LAND CLAIM AND THE ELDRIDGE DONATION LAND CLAIM, SAID POINT BEING THE **TRUE POINT OF BEGINNING** AND **TERMINUS** OF THIS DESCRIBED ADJUSTED PARCEL OF LAND.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

SURVEYOR'S NOTES

1. THIS TOPOGRAPHIC SURVEY WAS PERFORMED FOR A.B.C. RECYCLING REALTY CORP. IN APRIL OF 2021.

2. BASIS OF BEARINGS IS NAD83/98 PER TIES TO CITY OF BELLINGHAM CONTROL NETWORK, PER THAT RECORD OF SURVEY RECORDED UNDER WHATCOM COUNTY AFN 2071002449.

3. MONUMENTATION SHOWN HEREON WAS RECOVERED DURING THE COURSE OF THIS SURVEY, UNLESS OTHERWISE NOTED.

4. ANGULAR AND LINEAR MEASUREMENTS WERE COLLECTED USING A COMBINATION OF GPS AND CONVENTIONAL METHODOLOGIES. PRIMARY CONTROL WAS COLLECTED USING A TRIMBLE R10 SURVEY-GRADE GPS RECEIVER OPERATING IN NETWORKED RTK MODE. FROM GPS CONTROL, A TRIMBLE S-6 ROBOTIC TOTAL STATION WAS USED TO TIE SECONDARY CONTROL POINTS AND COLLECT TOPOGRAPHIC DATA. ORTHO-RECTIFIED PHOTOGRAPHY CAPTURED WITH AN UNMANNED AERIAL VEHICLE WAS USED TO DELINEATE CERTAIN FEATURES, INCLUDING THE EXTENTS OF STOCKPILES ON-SITE.

5. LOCATIONS OF UNDERGROUND UTILITIES DEPICTED HEREON ARE ACCORDING TO SURFACE MARKS PROVIDED BY OTHERS. WILSON CANNOT GUARANTEE THE CORRESPONDENCE BETWEEN THE MARKS AND THE EXTANT UTILITIES.

6. BARGAIN & SALE DEED NO. 2021-0404007: THIS DOCUMENT CONTAINS USE RESTRICTIONS AND AN ENVIRONMENTAL RELEASE NOT DISCLOSED PER TITLE COMMITMENT NO. NCS-1028029.

NAVD88 DATUM

811 Call 811 two business days before you dig

CONTROL NOTES

HORIZONTAL DATUM:
WASHINGTON STATE PLANE, NORTH ZONE NAD83/98

BASIS OF COORDINATES: COORDINATION AND MENSURATION ARE LOCAL GROUND VALUES, BASED UPON HOLDING THE PUBLISHED NAD83/98 POSITION FOR THE BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF TIMPSON WAY AND THE NORTH MARGIN OF MARINE DRIVE , PUBLISHED AS CITY OF BELLINGHAM CONTROL POINT #2998. SAID MONUMENT HAS THE FOLLOWING PUBLISHED POSITION:

NORTHING = 649,056.361 USFT
EASTING = 1,234,329.448 USFT

BASIS OF BEARINGS: BEARINGS ARE NAD83/98, BASED UPON HOLDING THE PUBLISHED POSITIONS MONUMENTED BY CITY OF BELLINGHAM CONTROL POINTS #2998 AND #2995, BEING A BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF LOCUST AVENUE AND THE NORTH MARGIN OF MARINE DRIVE.

THE DERIVED INVERSE BETWEEN SAID MONUMENTS #2998 AND #2995 IS **NORTH 48° 45' 36" WEST**, AT A DISTANCE OF **3,467.47 USFT**. THE PUBLISHED POSITION FOR MONUMENT #2995 IS:

NORTHING = 651,342.168 USFT
EASTING = 1,231,722.071 USFT

VERTICAL DATUM:
NAVD88

BASIS OF ELEVATIONS: ELEVATIONS ARE NAVD88 VALUES, BASED UPON HOLDING THE PUBLISHED ELEVATION FOR CITY OF BELLINGHAM BENCHMARK #5848, BEING A BRASS DISK MONUMENT AT THE TOP OF THE HEADWALL AT THE NORTHWEST END OF THE ELDRIDGE AVENUE BRIDGE OVER LITTLE SQUALICUM CREEK. SAID MONUMENT HAS THE FOLLOWING PUBLISHED NAVD88 ELEVATION:
ELEVATION = 67.42 FEET

W.A.C. 332-130-145 REQUIRED DATA

1.E: THIS SURVEY WAS PREPARED UNDER THE DIRECT SUPERVISION OF:

J. THOMAS BREWSTER, WA PLS #44335
SURVEY MANAGER / PRINCIPAL
WILSON ENGINEERING LLC
805 DUPONT STREET, SUITE 7
BELLINGHAM, WA 98225
360-733-6100 (EXT. 231)
tbrewster@wilsonengineering.com

2.A: BASIS OF ELEVATIONS: ELEVATION VALUES AND CONTOURS DEPICTED ON THIS SURVEY ARE BASED UPON HOLDING AS FIXED THE NAVD88 DATUM, PER WSDOT BENCHMARK BM 29020-22, AS PUBLISHED BY THE WSDOT SURVEY MONUMENT ON-LINE DATABASE.

2.B: PURPOSE OF SURVEY: WILSON ENGINEERING PERFORMED THIS SURVEY DURING APRIL OF 2021, AT THE REQUEST OF ALPINE ENGINEERING AND ABC RECYCLING PURSUANT TO SITE IMPROVEMNT DESIGN. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT, AND THE DEPICTED PARCEL BOUNDARIES SHOULD NOT BE CONSIDERED TO BE COMPREHENSIVE.

2.C: SOURCE OF CONTOURS: THE CONTOURS DEPICTED ON THIS SURVEY WERE DERIVED BASED ON DIRECT FIELD OBSERVATIONS.

2.D: CONTOUR INTERVAL LABELING: MAJOR CONTOURS AT 5-FOOT INTERVALS HAVE BEEN EXPLICITLY LABELED.

2.E: DESCRIPTION OF BENCHMARKS SET PURSUANT TO THIS SURVEY: REFER TO THE ACCOMPANYING "CONTROL TABLE" FOR COORDINATES, ELEVATION, AND DESCRIPTION OF ON-SITE CONTROL SET PURSUANT TO THIS SURVEY.

2.F: ELEVATION AND/OR CONTOUR ACCURACY: IF CONTOURS HAVE BEEN DEPICTED ON THE FACE OF THIS SURVEY, IT IS ANTICIPATED THAT 90% OF ANY MEASURED ELEVATION VALUE, IF OBSERVED RELATIVE TO THE CONTROL POINTS SPECIFICALLY ENUMERATED IN THE ACCOMPANYING CONTROL TABLE, WILL BE, IN FACT, WITHIN ONE-HALF OF THE MINOR-CONTOUR INTERVAL DEPICTED HEREON. SPECIFIC ELEVATIONS DEPICTED HEREON, IF ANY, ARE EXPECTED TO BE WITHIN ONE INTEGRAL VALUE OF THE FINAL DEPICTED SIGNIFICANT FIGURE. THAT IS, 90% OF ELEVATIONS EXPRESSED TO THE TENTH-FOOT, SHOULD BE WITHIN 0.1 FEET OF THAT VALUE, IF OBSERVED RELATIVE TO THE SURVEY CONTROL SPECIFICALLY ENUMERATED IN THE ACCOMPANYING CONTROL TABLE. IF OFF-SITE CONTROL IS EMPLOYED, EVEN CONTROL PURPORTING TO BE ON THE SAME DATUM OR BASED ON THE SAME OFF-SITE BENCHMARK, THEN NO ABSOLUTE STATEMENT REGARDING THE ACCURACY OF THE DEPICTED POINTS CAN BE MADE, AND VALUES SO OBSERVED ARE OUTSIDE OF THIS SURVEY'S AUTHORITY OR INTEREST.

2.G: SOURCE OF CONTROLLING BOUNDARY INFORMATION: THE OWNERSHIP BOUNDARIES DEPICTED ON THIS SURVEY ARE BASED UPON SOME, OR ALL, OF THE DOCUMENTS ENUMERATED IN THE ACCOMPANYING "REFERENCE DOCUMENTS" AS THEREIN CHARACTERIZED. BEARINGS HAVE BEEN TRANSLATED AND/OR ROTATED FROM THE RECORD VALUES TO FIT MONUMENTATION FOUND DURING THE COURSE OF THIS SURVEY.

3.A: SOURCE OF DEPICTED UTILITY INFORMATION: UTILITY LINES DEPICTED ON THIS SURVEY ARE BASED UPON PAINT MARKS SET BY UTILITY-LOCATE PROFESSIONALS DISPATCHED BY THE WASHINGTON "ONE-CALL" UTILITY LOCATE CENTER.

3.B: ACCURACY OF DEPICTED UTILITY INFORMATION: WILSON ENGINEERING DOES NOT PROVIDE FOR-HIRE UTILITY LOCATION AND/OR MARKING SERVICES, AND CAN NOT INDEPENDENTLY ASCERTAIN THE ACCURACY OF ANY DEPICTED UTILITY THAT WAS NOT DIRECTLY OBSERVED IN THE COURSE OF THIS SURVEY.

3.C: STATEMENT OF LIMITATIONS REGARDING UTILITY-DEPICTION ACCURACY: ALPINE ENGINEERING AND ABC RECYCLING HAVE BEEN NOTIFIED THAT WILSON CAN NOT, AND DOES NOT, GUARANTEE THE ACCURACY, AT ANY LEVEL, OF DEPICTED UTILITIES BASED ON THIRD-PARTY PAINT MARKS OR RECORD INFORMATION.

ABBREVIATIONS USED

AF	= AUDITOR'S FILE
AFN	= AUDITOR'S FILE NUMBER
ASM	= ALUMINUM SURFACE MONUMENT
℄	= CENTERLINE
CONC	= CONCRETE
CPP	= CORRUGATED POLYETHYLENE PIPE
DLC	= DONATION LAND CLAIM
E	= EAST
ELEV	= ELEVATION
FND	= FOUND
INT	= INTERSECTION
INV	= INVERT
L	= LENGTH
MON	= MONUMENT
N	= NORTH
NE	= NORTHEAST
NW	= NORTHWEST
R	= RADIUS
R/W	= RIGHT-OF-WAY
S	= SOUTH
SE	= SOUTHEAST
SW	= SOUTHWEST
TYP	= TYPICAL
W	= WEST
WAC	= WASHINGTON CODE
WSE	= WILSON SURVEY/ENGINEERING

LEGEND - SIZE & SCALE MAY VARY

= RIGHT-OF-WAY
= RIGHT-OF-WAY CENTERLINE
= PROPERTY BOUNDARY
= EASEMENT
= EXISTING GRAVEL EDGE
= EXISTING ASPHALT EDGE
= EXISTING CONCRETE EDGE
= EXISTING BUILDING
= EXISTING BUILDING OVERHANG
= EXISTING CULVERT
X X = EXISTING FENCE
P P = EXISTING BURIED POWER LINE
OHP = EXISTING AERIAL POWER LINE
SD = EXISTING STORM DRAIN
S S = EXISTING SANITARY SEWER
FO = EXISTING BURIED FIBER OPTIC/COMM
G G = EXISTING GAS LINE
W W = EXISTING WATER LINE
= EXISTING DITCH CENTERLINE
= EXISTING TREE OR SHRUB LINE
= FOUND PROPERTY CORNER
= FOUND BRASS DISK
= TEMPORARY BENCH MARK
= TRAVERSE POINT
P = EXISTING POWER VAULT
= EXISTING UTILITY POLE
= EXISTING POWER JUNCTION BOX
= EXISTING TELE/COMM JUNCTION BOX
= EXISTING WATER VALVE
= EXISTING WATER METER
= EXISTING FIRE HYDRANT
= EXISTING SIGN
= EXISTING BOULDER
= EXISTING STORM DRAIN CATCH BASIN
= EXISTING SANITARY SEWER MANHOLE
2" = EXISTING 2" (ETC) CONIFEROUS TREE
2" = EXISTING 2" (ETC) DECIDUOUS TREE

WILSON ENGINEERING
WILSONENGINEERING.COM

JOHN THOMAS BREWSTER, STATE OF WASHINGTON, REGISTERED PROFESSIONAL LAND SURVEYOR, 44335 — 5-7-2021

ABC RECYCLING
MARINE DRIVE PLANT
W.A.C. 332.130.145 COMPLIANCE EXHIBIT

BELLINGHAM	WASHINGTON
DRAWN BY	CLM/JGS
CHECKED BY	JTB
DATE	5-7-21
SCALE	AS SHOWN
JOB NUMBER	2021-043
SHEET	1
PAGE	1 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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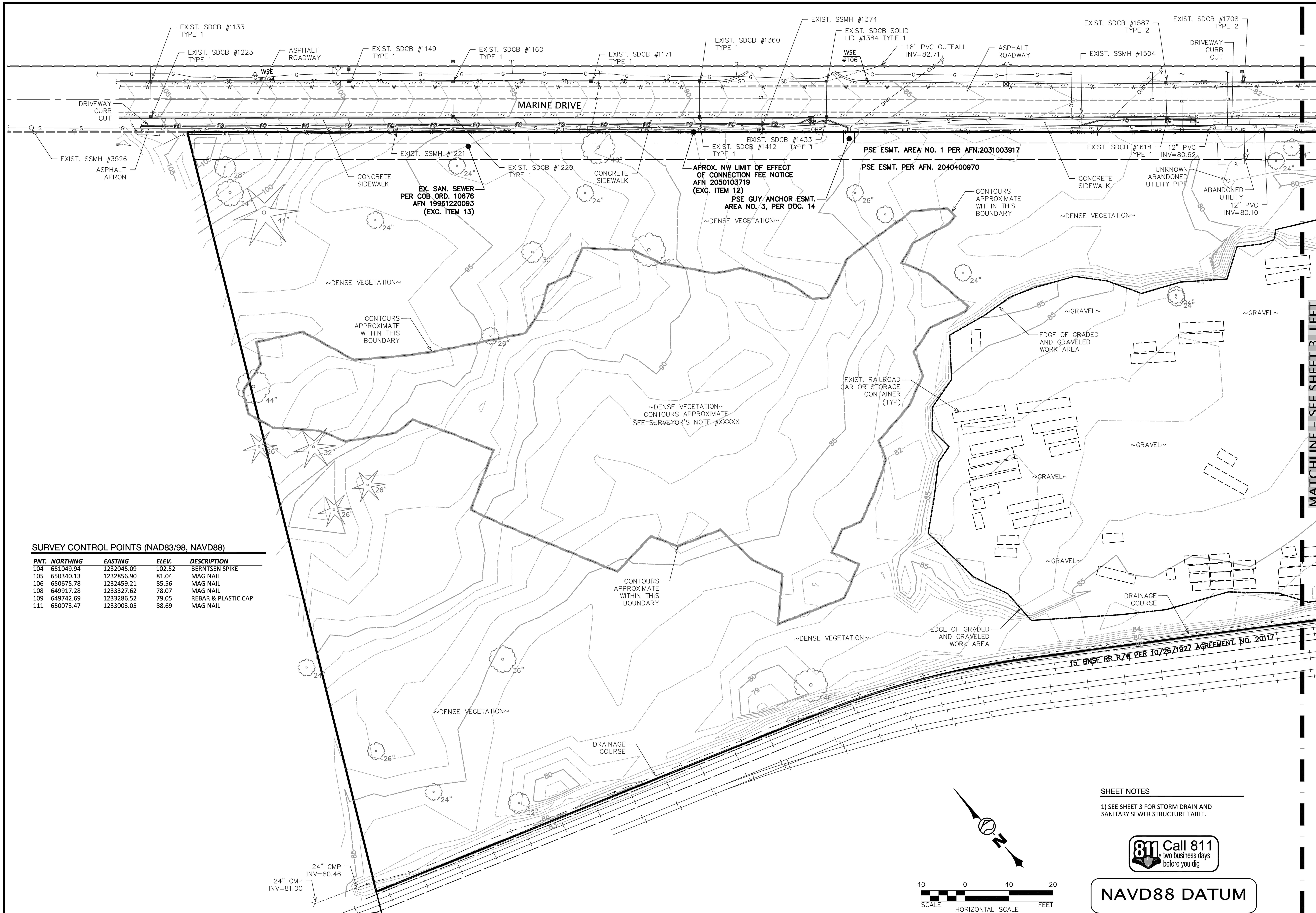

SURVEY CONTROL POINTS (NAD83/98, NAVD88)

PNT.	*NORTHING*	*EASTING*	*ELEV.*	*DESCRIPTION*
104	651049.94	1232045.09	102.52	BERNTSEN SPIKE
105	650340.13	1232856.90	81.04	MAG NAIL
106	650675.78	1232459.21	85.56	MAG NAIL
108	649917.28	1233327.62	78.07	MAG NAIL
109	649742.69	1233286.52	79.05	REBAR & PLASTIC CAP
111	650073.47	1233003.05	88.69	MAG NAIL

SHEET NOTES

1) SEE SHEET 3 FOR STORM DRAIN AND SANITARY SEWER STRUCTURE TABLE.

Call 811 two business days before you dig

NAVD88 DATUM

WILSON ENGINEERING
WILSONENGINEERING.COM

JOHN THOMAS BREWSTER
STATE OF WASHINGTON
PROFESSIONAL LAND SURVEYOR
5-7-2021

ABC RECYCLING

MARINE DRIVE PLANT

TOPOGRAPHIC SURVEY

BELLINGHAM WASHINGTON

DRAWN BY CLM/JCJS

CHECKED BY JTB

DATE 5-7-2021

SCALE AS SHOWN

JOB NUMBER 2021-043

SHEET 2

PAGE 2 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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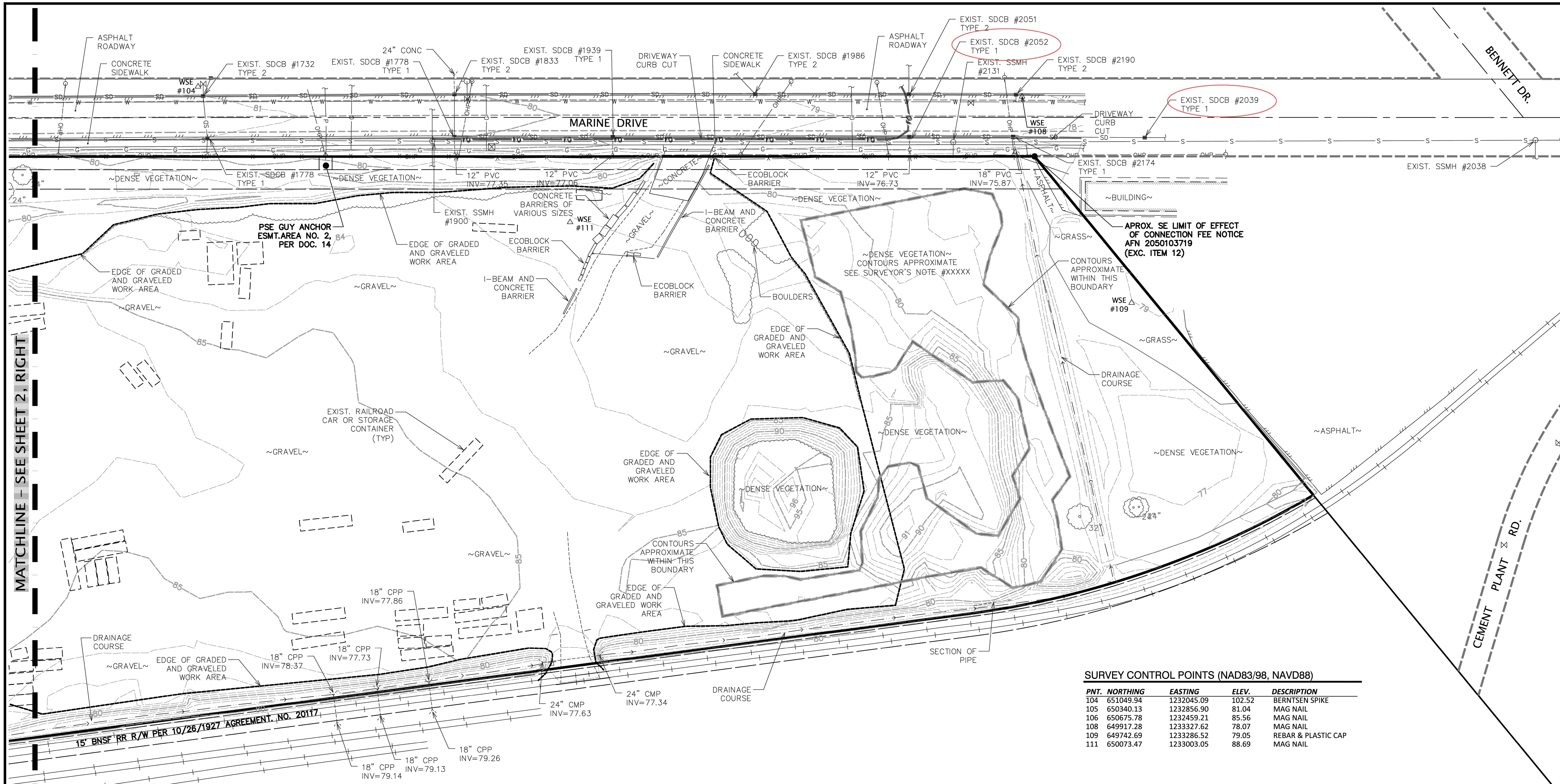

SURVEY CONTROL POINTS (NAD83/98, NAVD88)

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109	649742.69	1233286.52	79.05	REBAR & PLASTIC CAP
111	650073.47	1233003.05	88.69	MAG NAIL

EXISTING STORM DRAIN AND SANITARY SEWER STRUCTURE TABLE

STORM DRAIN DIPS

EXIST. SDCB #1133
TYPE 1
RIM=105.22
NW 18" PVC INV=102.2
NE 6" PVC INV=102.6
SE 18" PVC INV=102.2
SW 12" PVC INV=102.2
SUMP=101.2

EXIST. SDCB #1149
TYPE 1
RIM=99.48
NW 18" PVC INV=96.0
NE 12" PVC INV=96.6
SE 18" PVC INV=96.0
SUMP=94.7

EXIST. SDCB #1160
TYPE 1
RIM=96.49
NW 18" PVC INV=92.2
NE 12" PVC INV=92.9
SE 18" PVC INV=92.2
SW 12" PVC INV=93.1
SUMP=91.6

EXIST. SDCB #1171
TYPE 1
RIM=92.49
NW 18" PVC INV=87.4
SE 18" PVC INV=86.9
SUMP=86.2

EXIST. SDCB #1220
TYPE 1
RIM=96.52
NE 12" PVC INV=93.5
SUMP=93.3

EXIST. SDCB #1223
TYPE 1
RIM=105.20
NE 12" PVC INV=102.7
SUMP=102.6

EXIST. SDCB #1360
TYPE 1
RIM=89.44
NW 18" PVC INV=85.1
SE 18" PVC INV=85.1
SW 12" PVC INV=85.6
SUMP=84.4

EXIST. SDCB #1384
TYPE SOLID RIM
RIM=86.32
NW 18" PVC INV=83.1
SE 18" PVC INV=83.1
SW 12" PVC INV=83.6
SUMP=81.7

EXIST. SDCB #1412
TYPE 1
RIM=89.33
NW 12" PVC INV=86.7
SUMP=86.6

EXIST. SDCB #1433
TYPE 1
RIM=86.24
NE 12" PVC INV=83.9
SUMP=82.6

EXIST. SDCB #1587
TYPE 2
RIM=82.11
NW. 30" CONC INV=76.9
SE 30" CONC INV=76.9
SW 12" PVC INV=78.2
SUMP=75.0

EXIST. SDCB #1618
TYPE 1
RIM=82.02
NE 12" PVC INV=79.3
SUMP=77.5

EXIST. SDCB #1708
TYPE 2
RIM=81.89
NW 30" CONC INV=76.5
NE 12" PVC INV=77.9
SE 30" CONC INV=76.5
SUMP=74.8

EXIST. SDCB #1732
TYPE 2
RIM=80.97
NW 30" CONC INV=76.0
NE 12" PVC INV=77.3
SE 30" CONC INV=76.0
SUMP=74.1

EXIST SDCB #1778
TYPE 1
RIM=80.82
SW 12" PVC INV=77.9
SUMP=76.2

EXIST. SDCB #1833
TYPE 2
RIM=80.02
NW 24" CONC INV=75.6
NE 12" CONC INV=75.6
SE 24" CONC INV=75.5
SW 18" PVC INV=77.0

EXIST. SDCB #1901
TYPE 1
RIM=79.92
NE 18" PVC INV=75.9
SE 18" PVC INV=75.8
SW 12" PVC INV=76.9
SUMP=75.0

EXIST. SDCB #1939
TYPE 1
RIM=79.43
NW INV=74.3
SE INV=74.3
SW 12" PVC INV=75.4
SUMP=75.5

EXIST. SDCB #1986
TYPE 2
RIM=78.97
NW 24" CONC INV=74.0
N 12" PVC INV=75.1
SE 24" CONC INV=74.0
SUMP=72.4

EXIST. SDCB #2051
TYPE 2
RIM=78.37
NW 24" CONC INV=74.2
NE 12" PVC INV=75.1
SE 24" CONC INV=74.1
SUMP=72.1

EXIST. SDCB #2052
TYPE 1
RIM=78.36
NW 18" PVC INV=74.0
SE 18" PVC INV=73.9
SW 12" PVC INV=74.4
SUMP=73.0

EXIST. SDCB #2174
TYPE 1
RIM=77.98
NW 18" PVC INV=73.7
SE 18" PVC INV=73.7
SW 18" PVC INV=73.7
SUMP=72.4

EXIST. SDCB #2190
TYPE 2
RIM=78.04
NW 24" CONC INV=73.7
SE 24" CONC INV=73.6
SW 12" INV=74.2

EXIST. SDCB #2039
TYPE 1
RIM=77.63
NW 18" PVC INV=73.4
SE 18" PVC INV=73.3
SUMP=70.9

SANITARY SEWER DIPS

EXIST. SSMH #1221
RIM=97.89
NW 18" PVC INV=90.6
SE 12" PVC INV=90.3

EXIST. SSMH #1374
RIM=87.88
NW 12" PVC INV=81.6
SE 18" PVC INV=81.3

EXIST. SSMH #1504
RIM=82.66
NW 18" PVC INV=75.5
SE 18" PVC INV=75.4
SW 8" PVC INV=75.5

EXIST. SSMH #1900
RIM=80.62
NW 18" PVC INV=71.8
NE 6" PVC INV=71.8
SE 18" PVC INV=71.7
SW 8" PVC INV=71.2

EXIST. SSMH #2038
RIM=78.87
NW 18" PVC INV=65.7
SE 18" PVC INV=65.7

EXIST. SSMH #2131
RIM=78.74
NW 18" PVC INV=68.6
SE 18" PVC INV=68.5
SW 8" PVC INV=68.6

EXIST. SSMH #3526
RIM=107.67
NW 18" PVC INV=94.2
SE 18" PVC INV=94.1

N

40 0 40 20
SCALE HORIZONTAL SCALE FEET

811 Call 811 two business days before you dig

NAVD88 DATUM

WILSON ENGINEERING
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ABC RECYCLING
MARINE DRIVE PLANT
TOPOGRAPHIC SURVEY

BELLINGHAM
WASHINGTON

DRAWN BY CLM/JCS
CHECKED BY JTB
DATE 5-7-2021
SCALE AS SHOWN
JOB NUMBER 2021-043
SHEET 3
PAGE 3 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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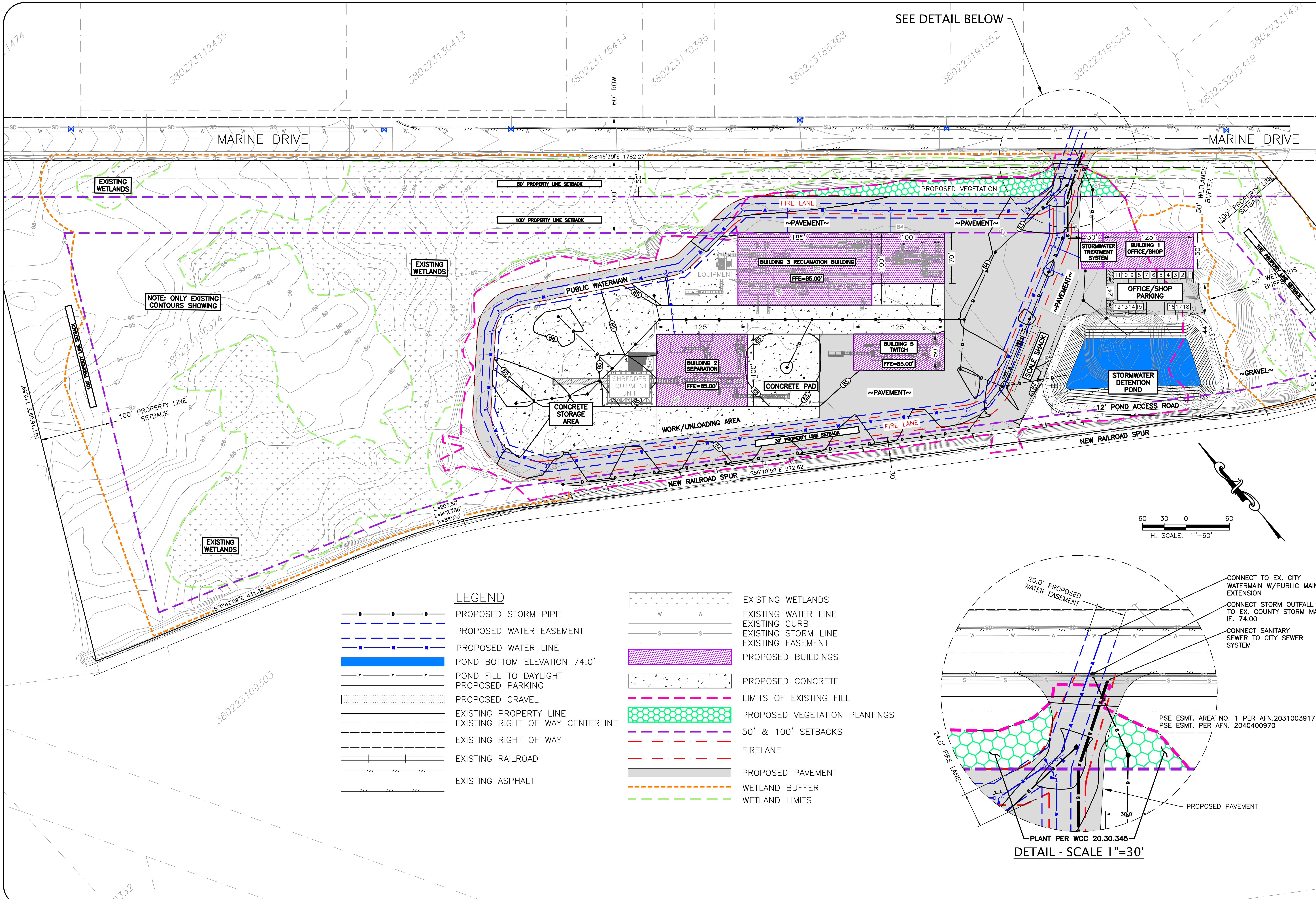


IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

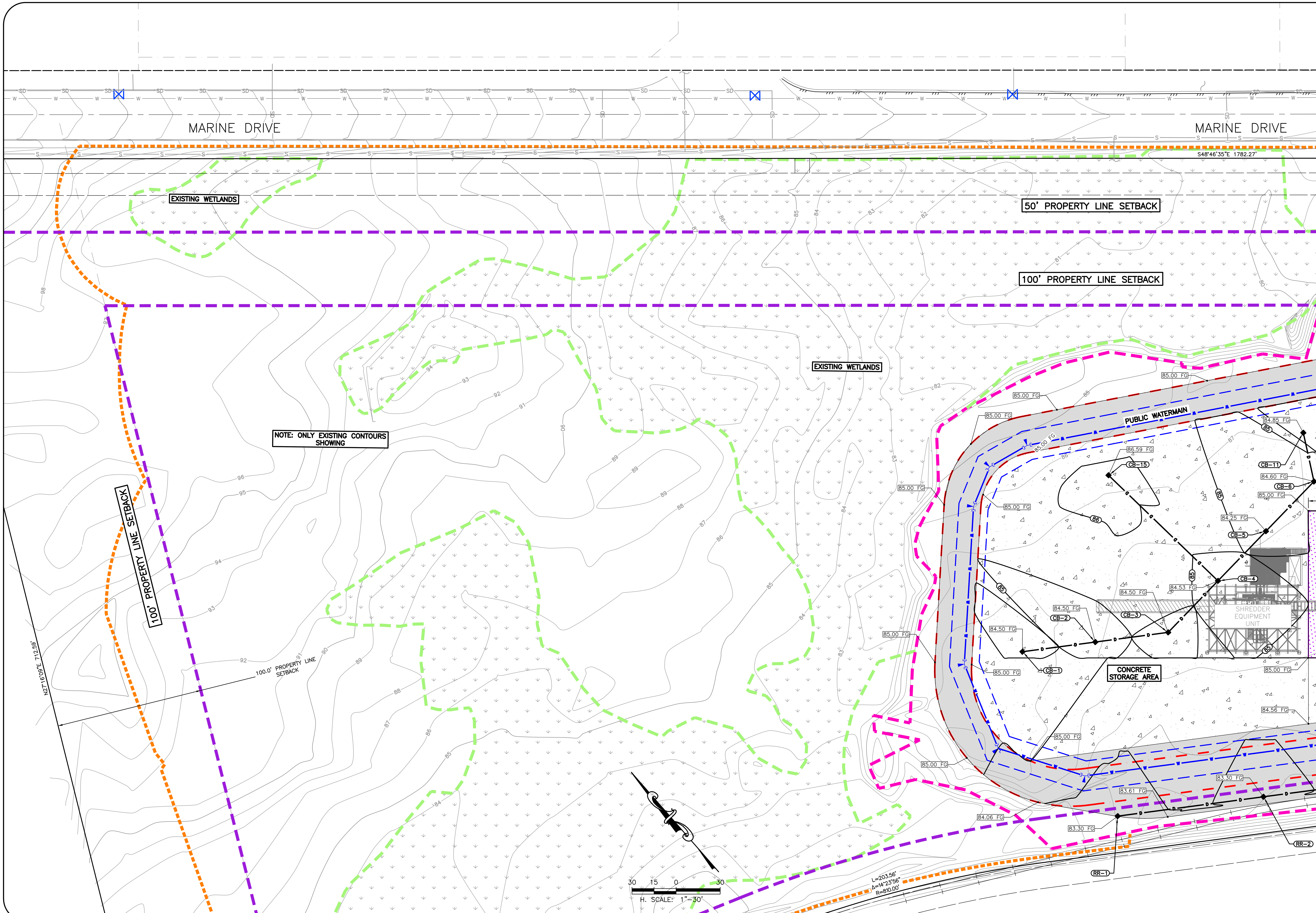
SCOTT IAN GOODALL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 60 SCALE
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

5
OF: 27



IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 30 SCALE-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

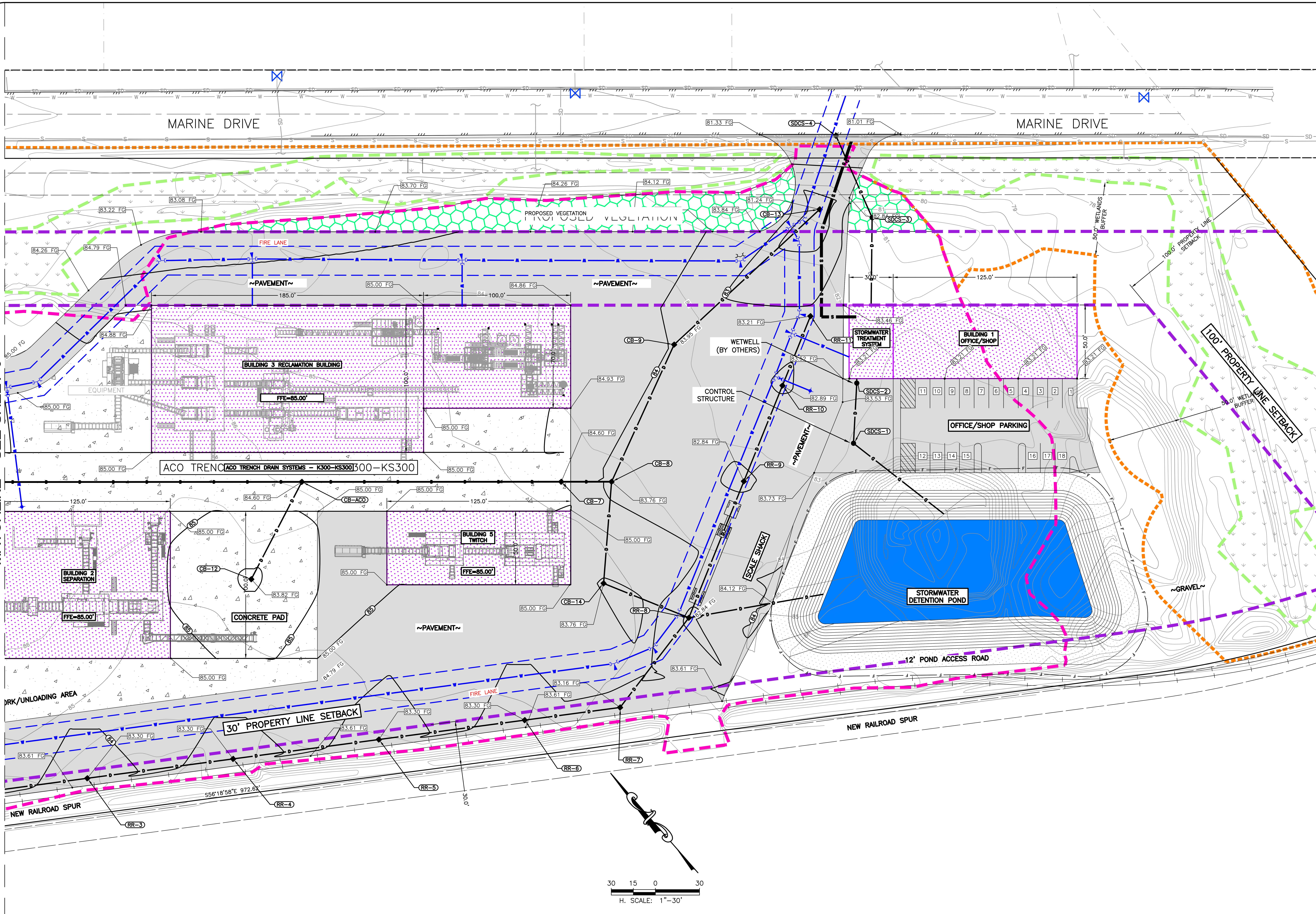
PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

6 OF: 27



IMPACT DESIGN

5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 30 SCALE-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

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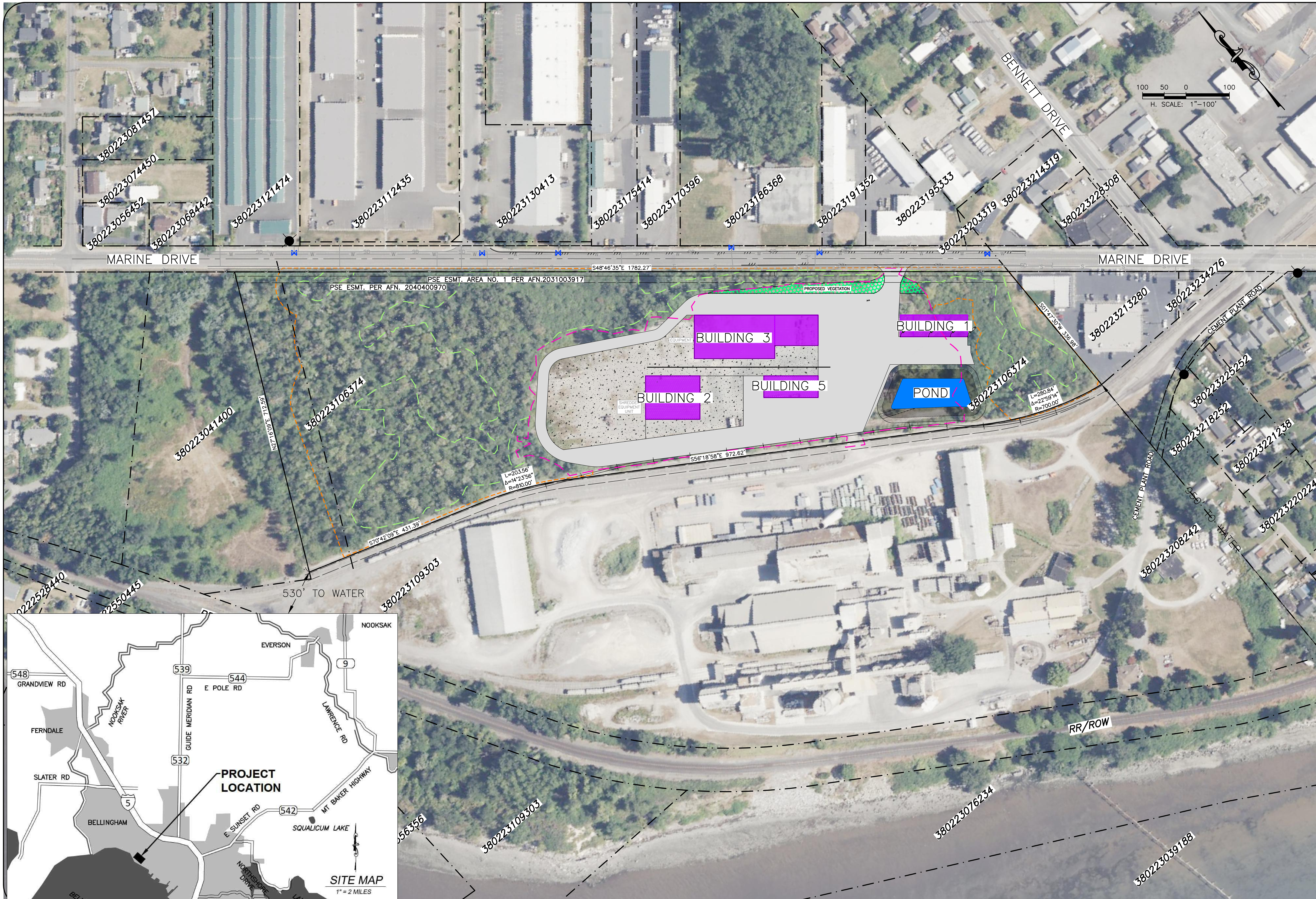


IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 100 SCALE
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

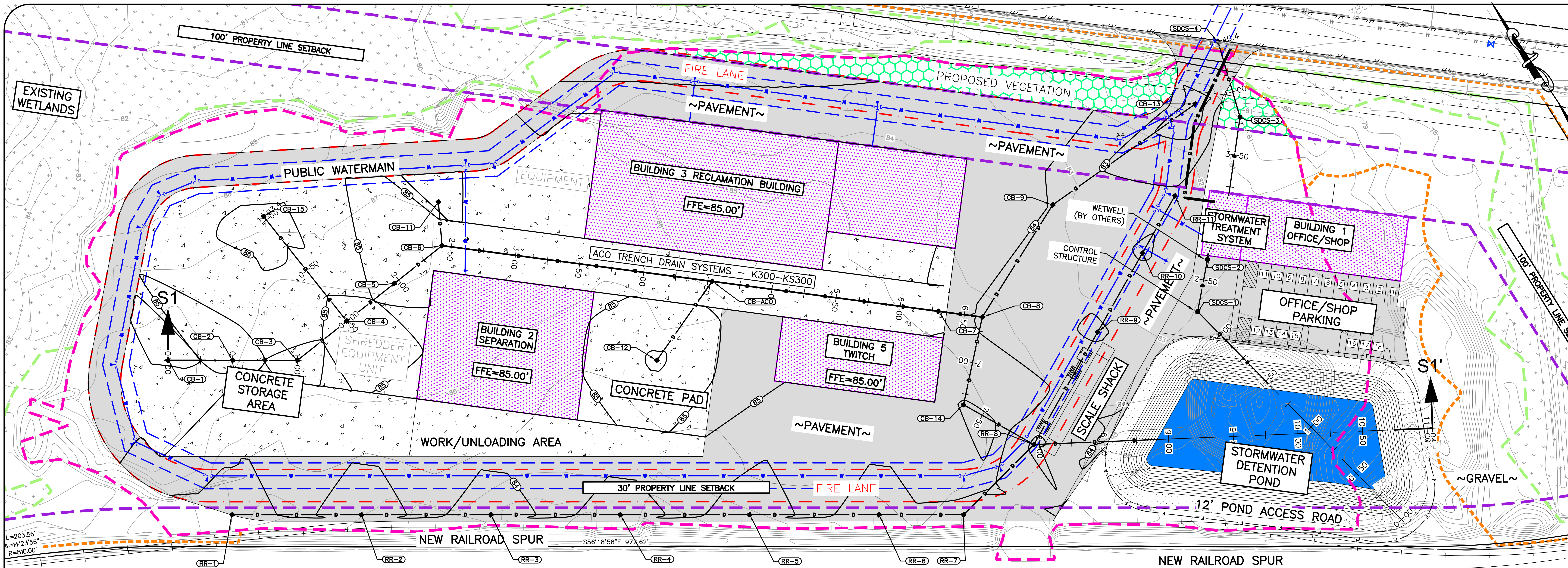
PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

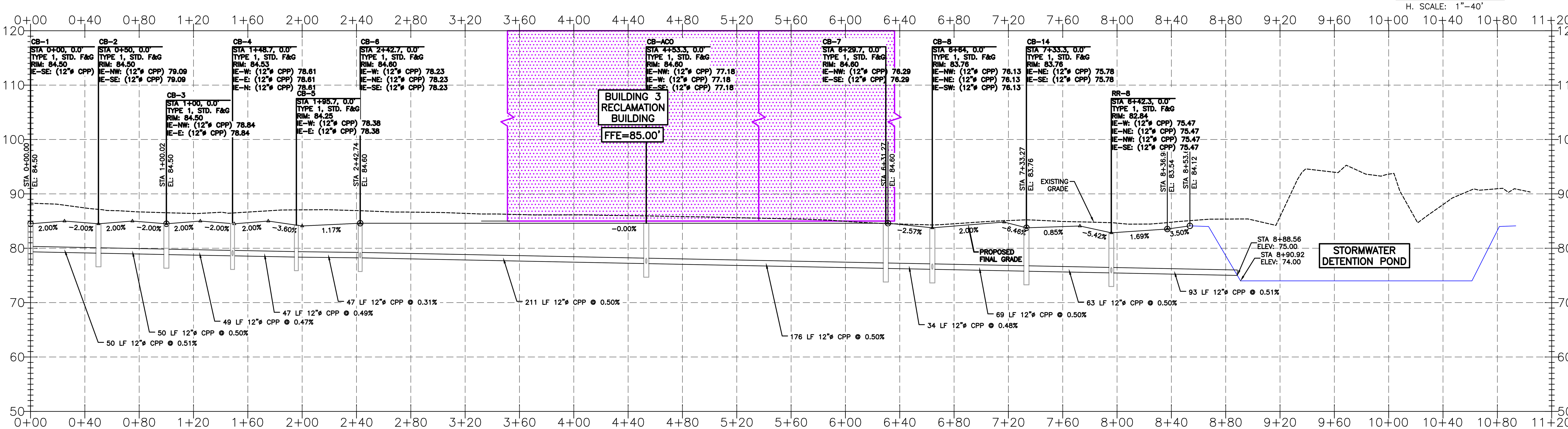
ISSUE DATE: 10-23-2023

8 OF: 27



40 20 0 40

H. SCALE: 1"=40'



S1–S1' PROPOSED STORM 2 PROFILE

40 20 0 40

H. SCALE: 1"=40'
V. SCALE: 1"=10'

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SCOTT IAN GOODALL
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REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE STORM 2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

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ISSUE DATE: 10-23-2023

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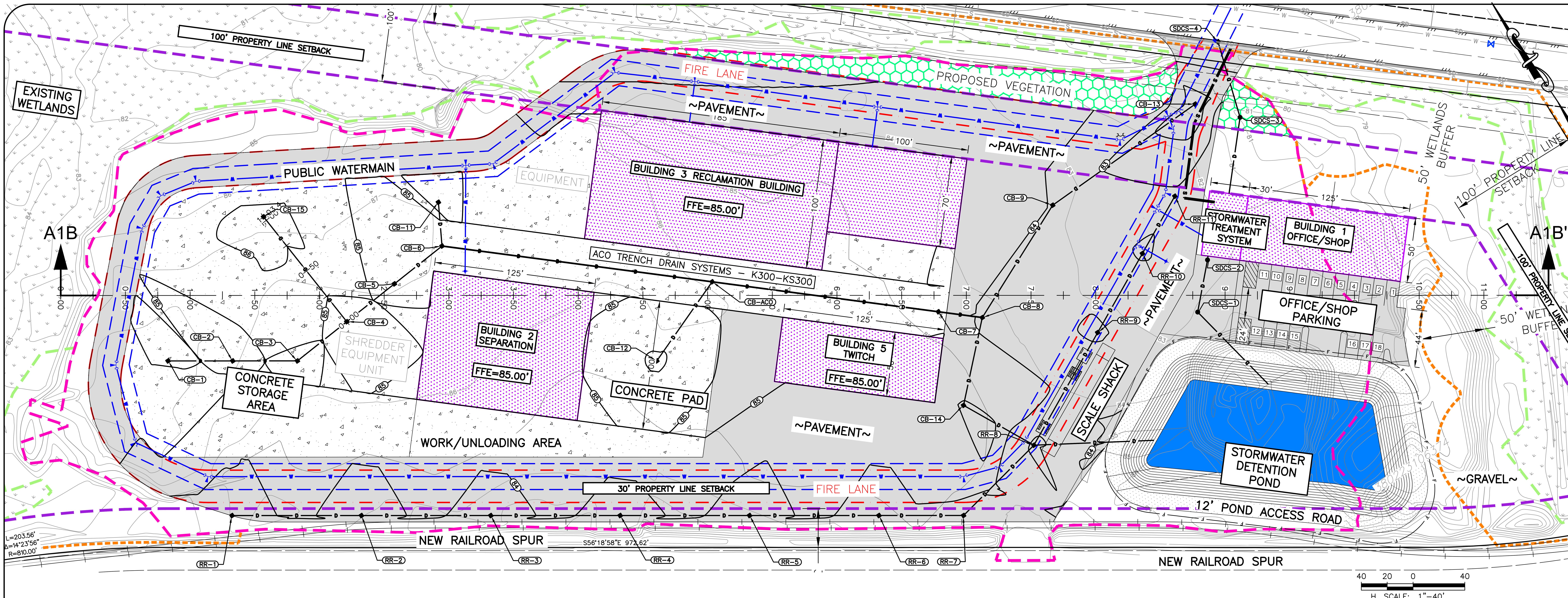

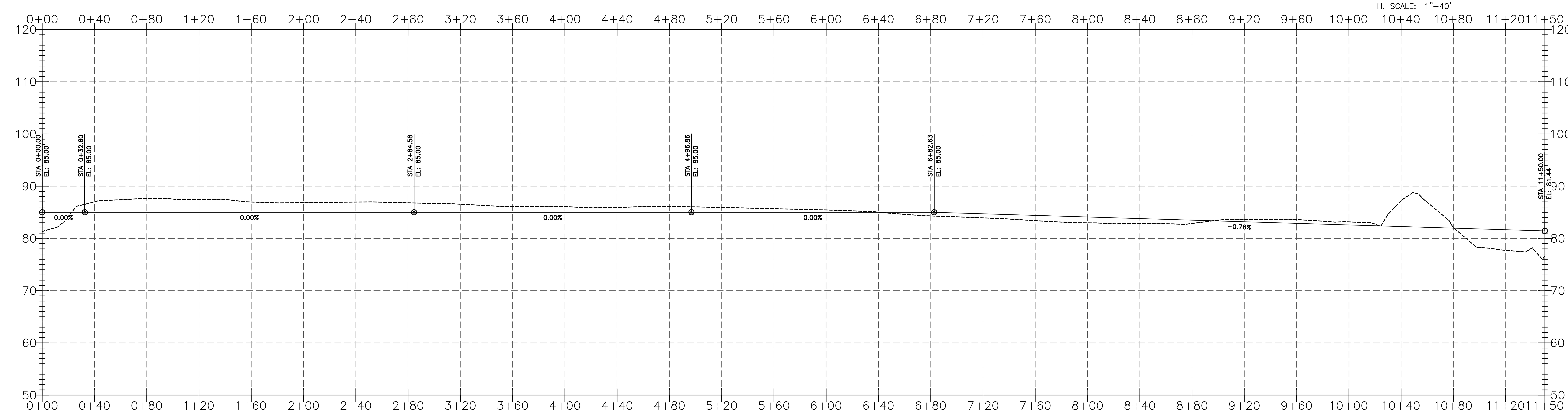

A1B–A1B' PROFILE

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ABC RECYCLING
PLAN & PROFILE - A1B-A1B'
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

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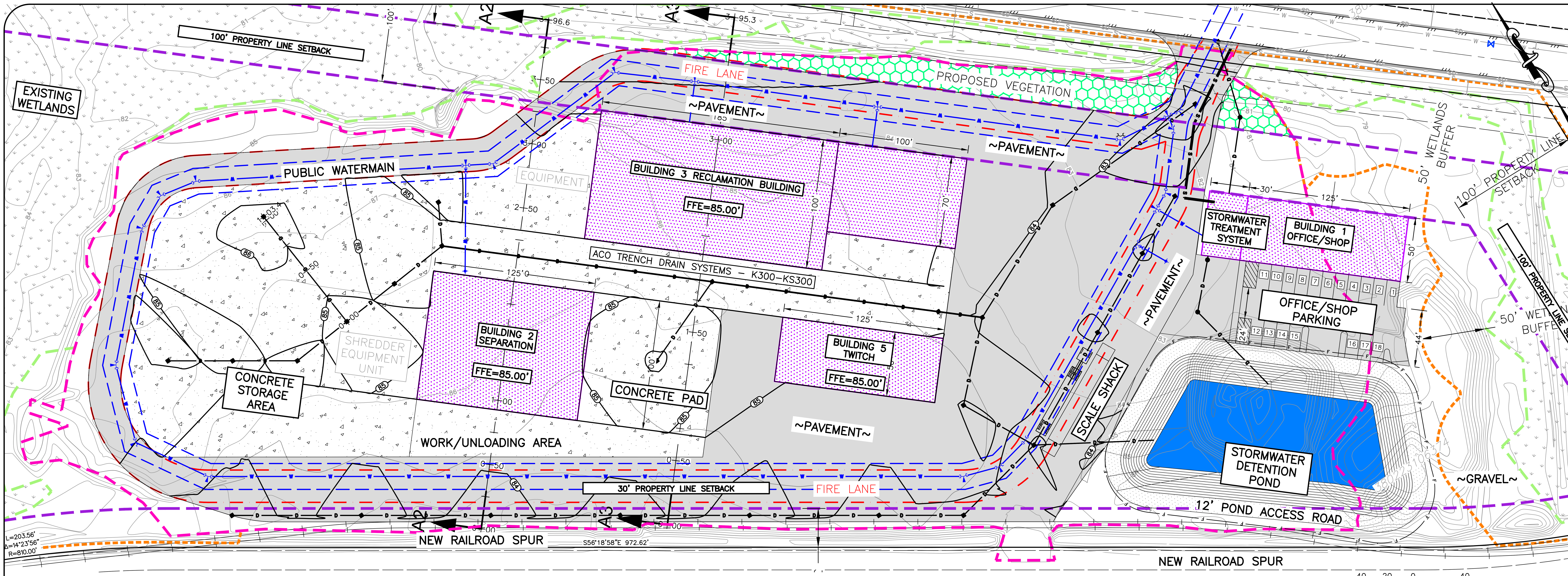
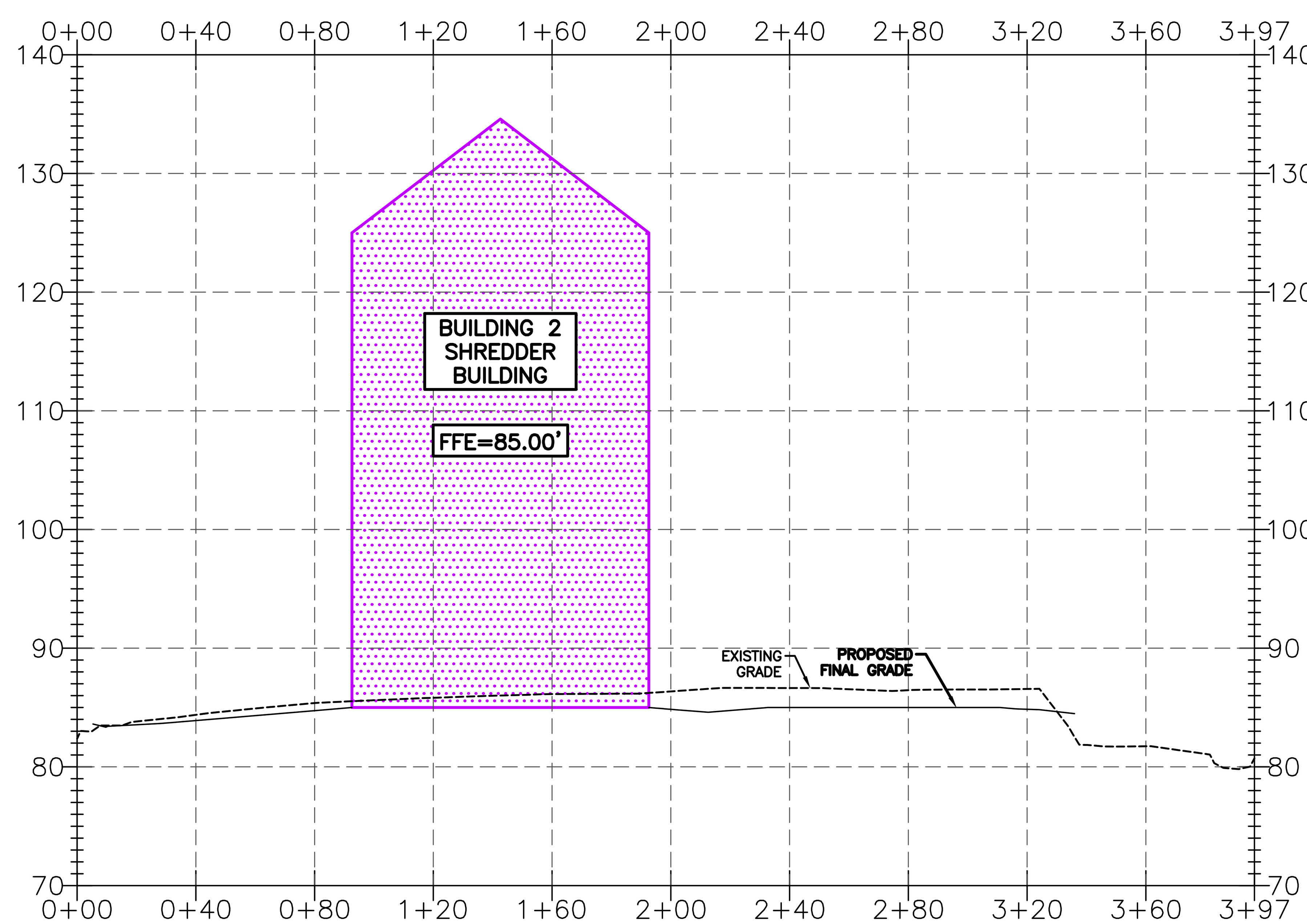
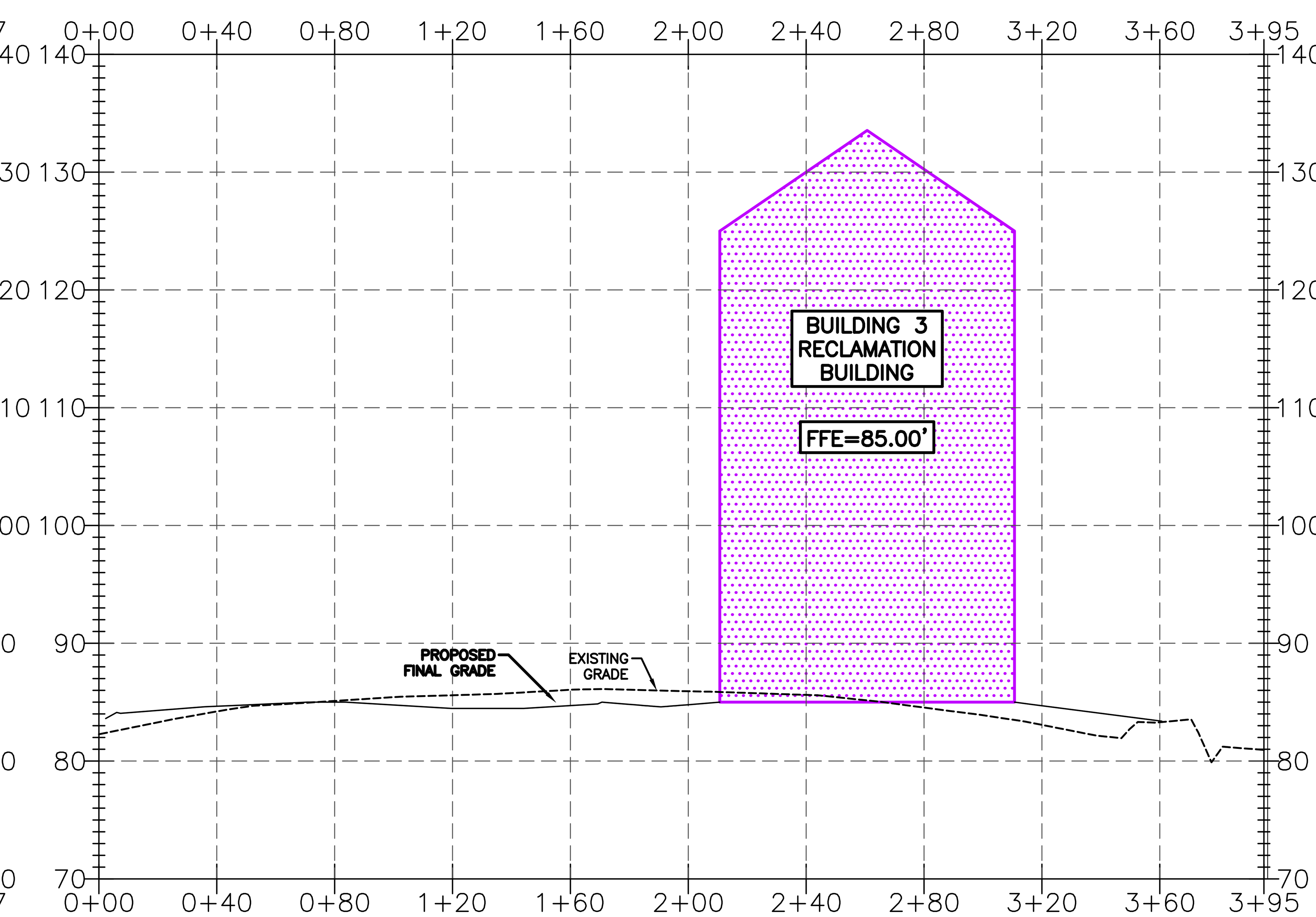




A2–A2' PROFILE



A3–A3' PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

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ABC RECYCLING
PLAN & PROFILE - A2-A2' & A3-A3'
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
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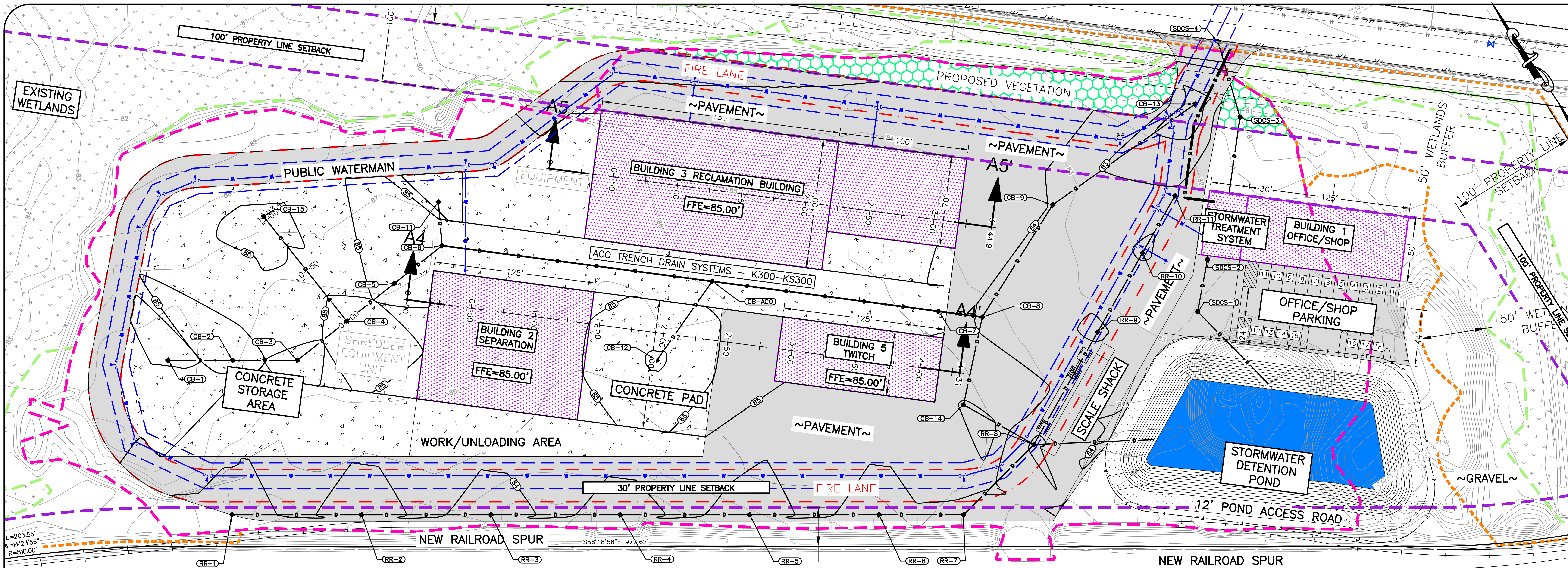
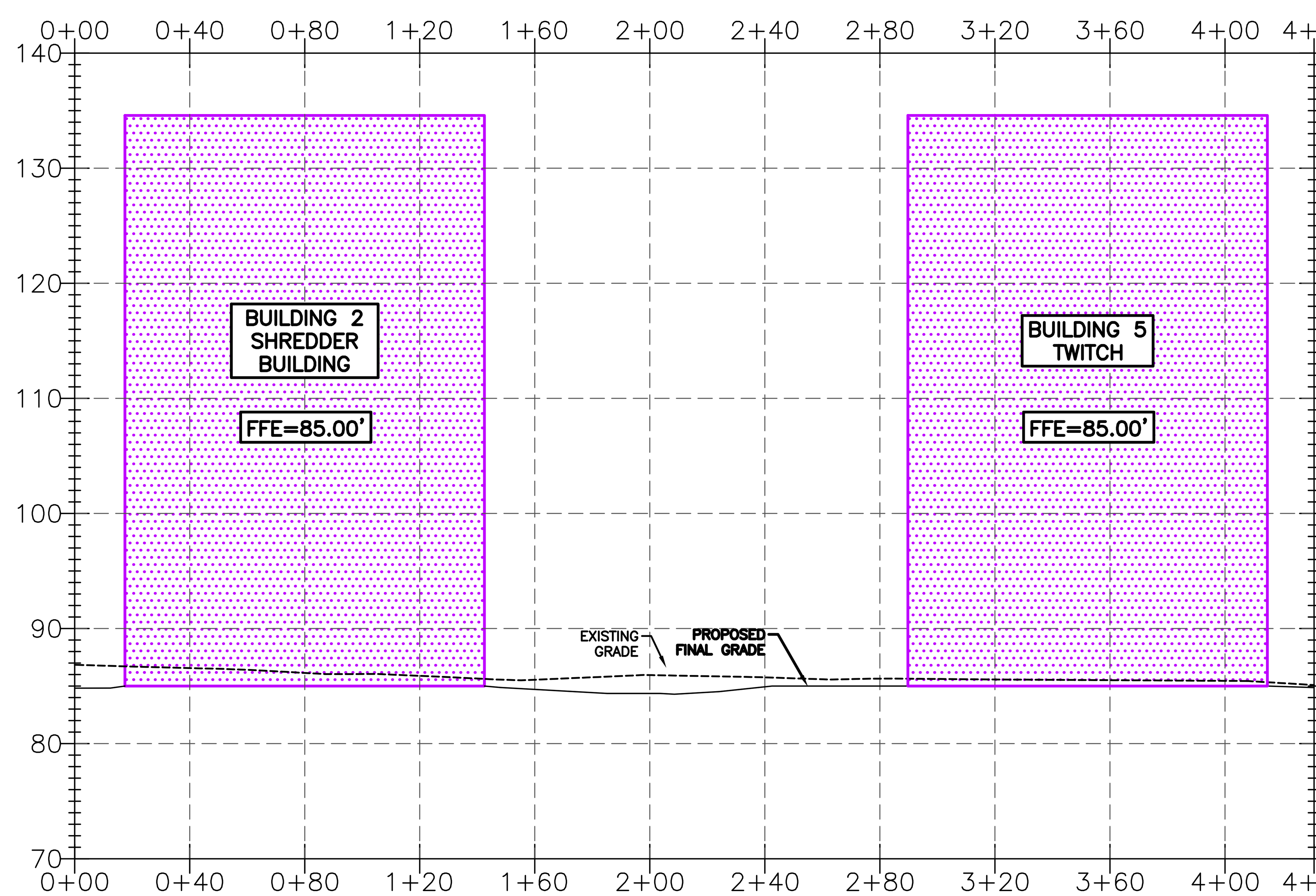
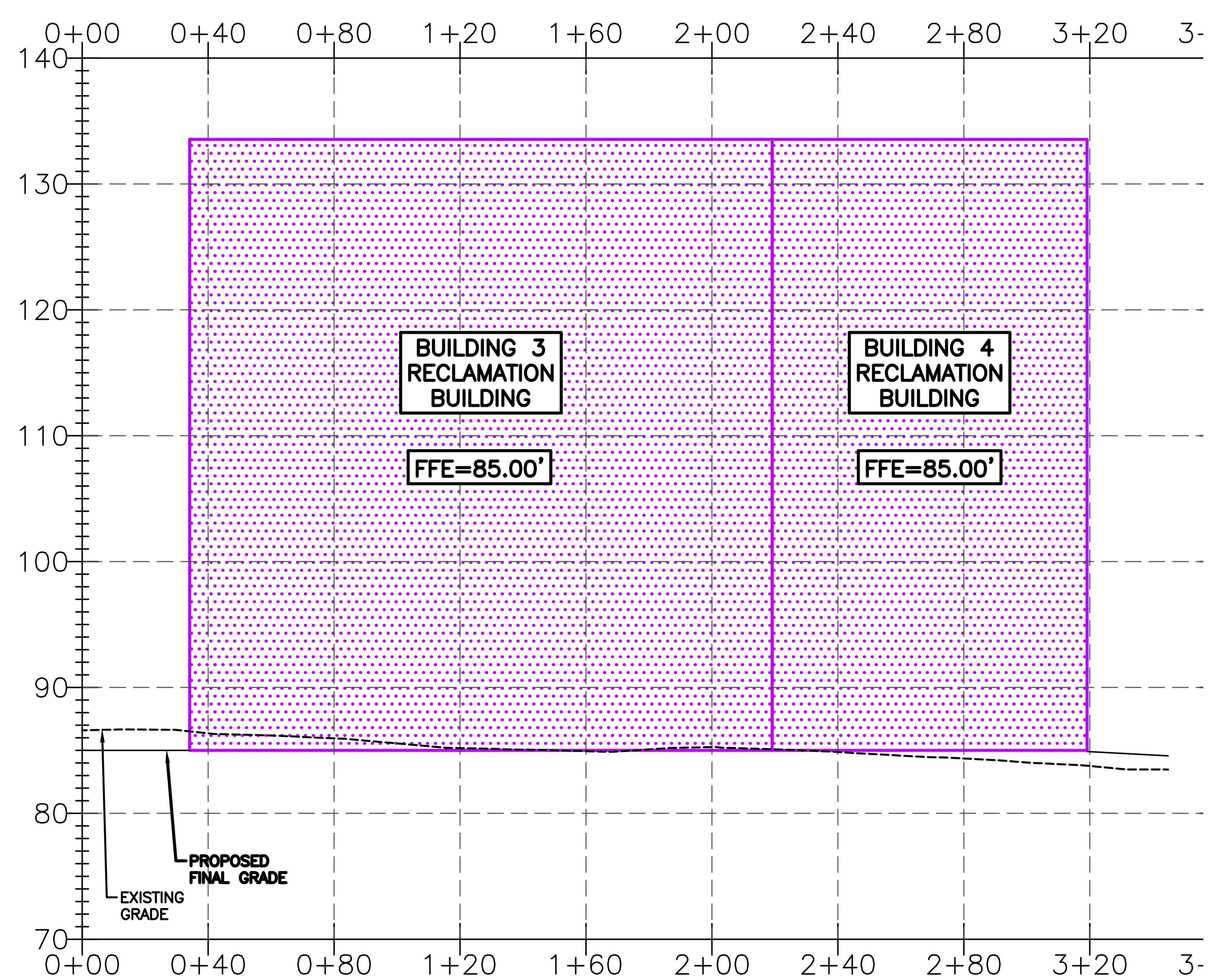




A4–A4' PROFILE



A5–A5' PROFILE

40 20 0 40
H. SCALE: 1"=40'
V. SCALE: 1"=10'

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ABC RECYCLING
PLAN & PROFILE - A4-A4' & A5-A5'
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
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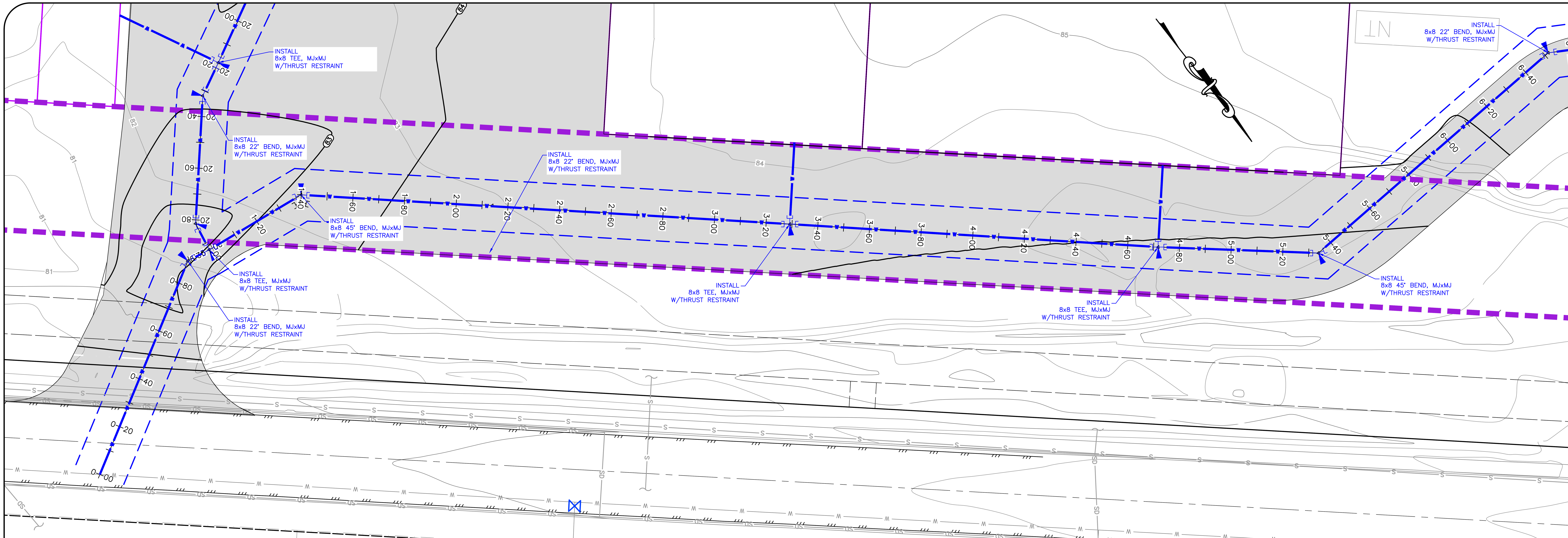

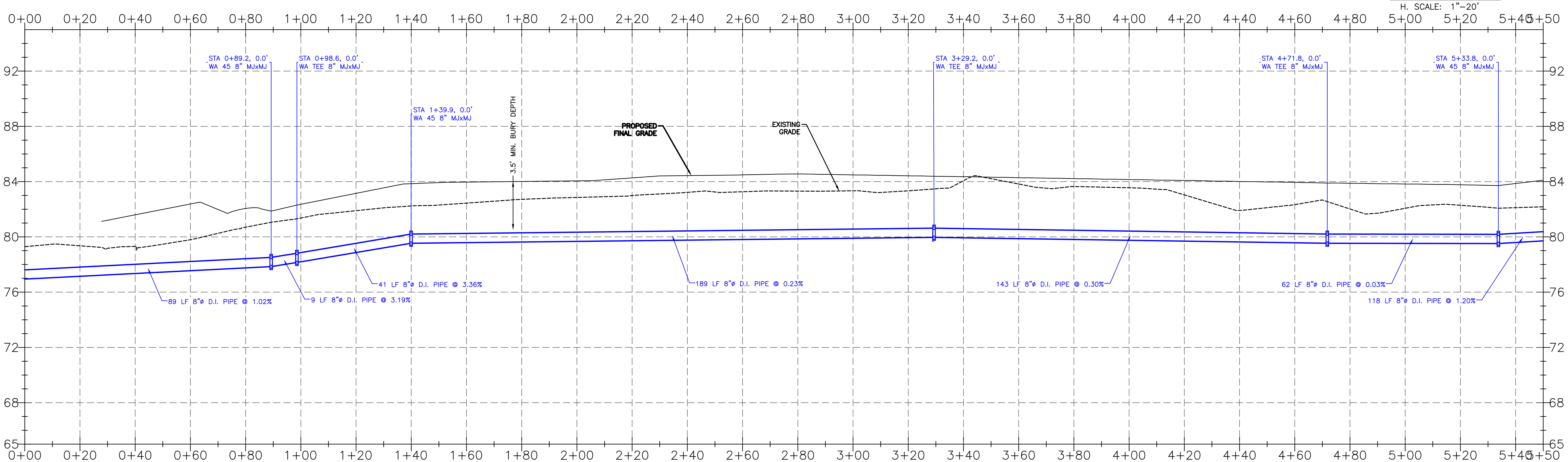

PROPOSED WATERMAIN PROFILE

H. SCALE: 1"=20'
V. SCALE: 1"=4'

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10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-1

PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

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ISSUE DATE: 10-23-2023

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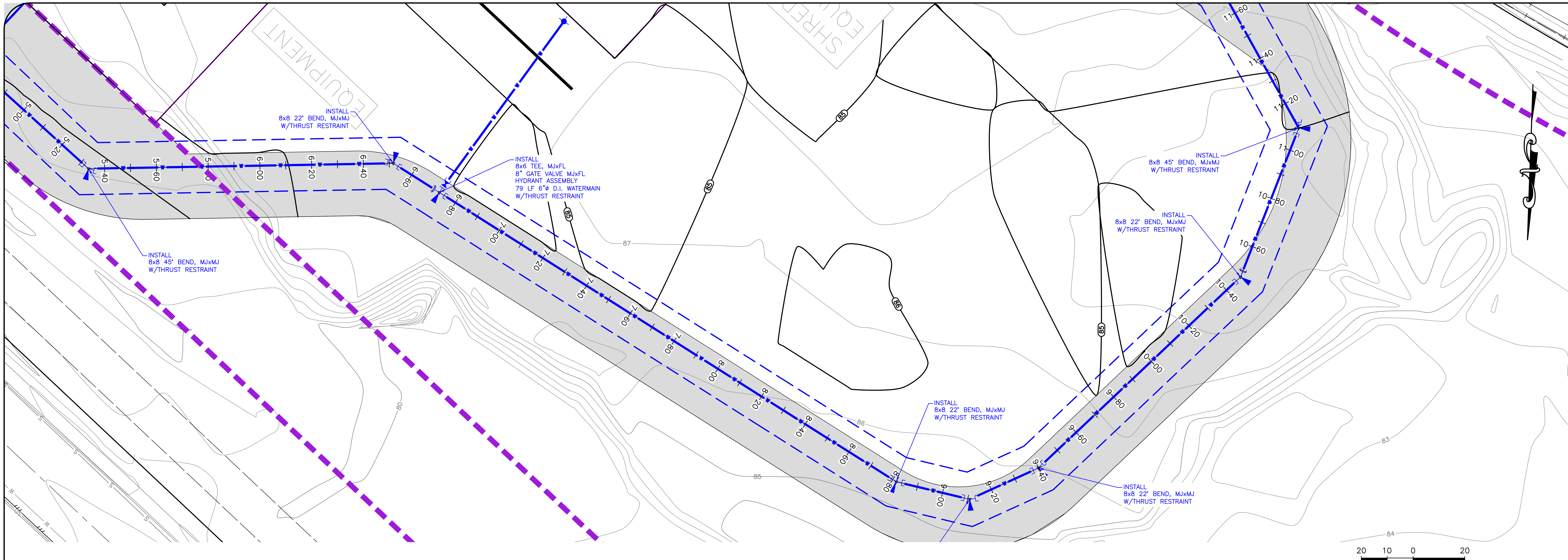

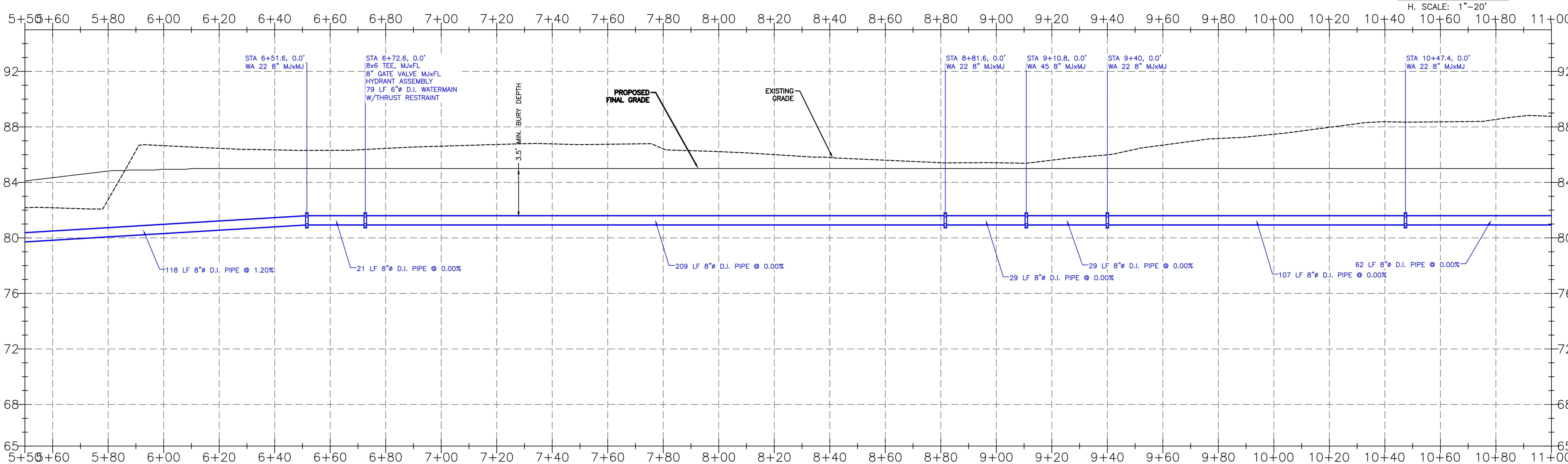

PROPOSED WATERMAIN PROFILE

20 10 0 20
H. SCALE: 1"=20'
V. SCALE: 1"=4'

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10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
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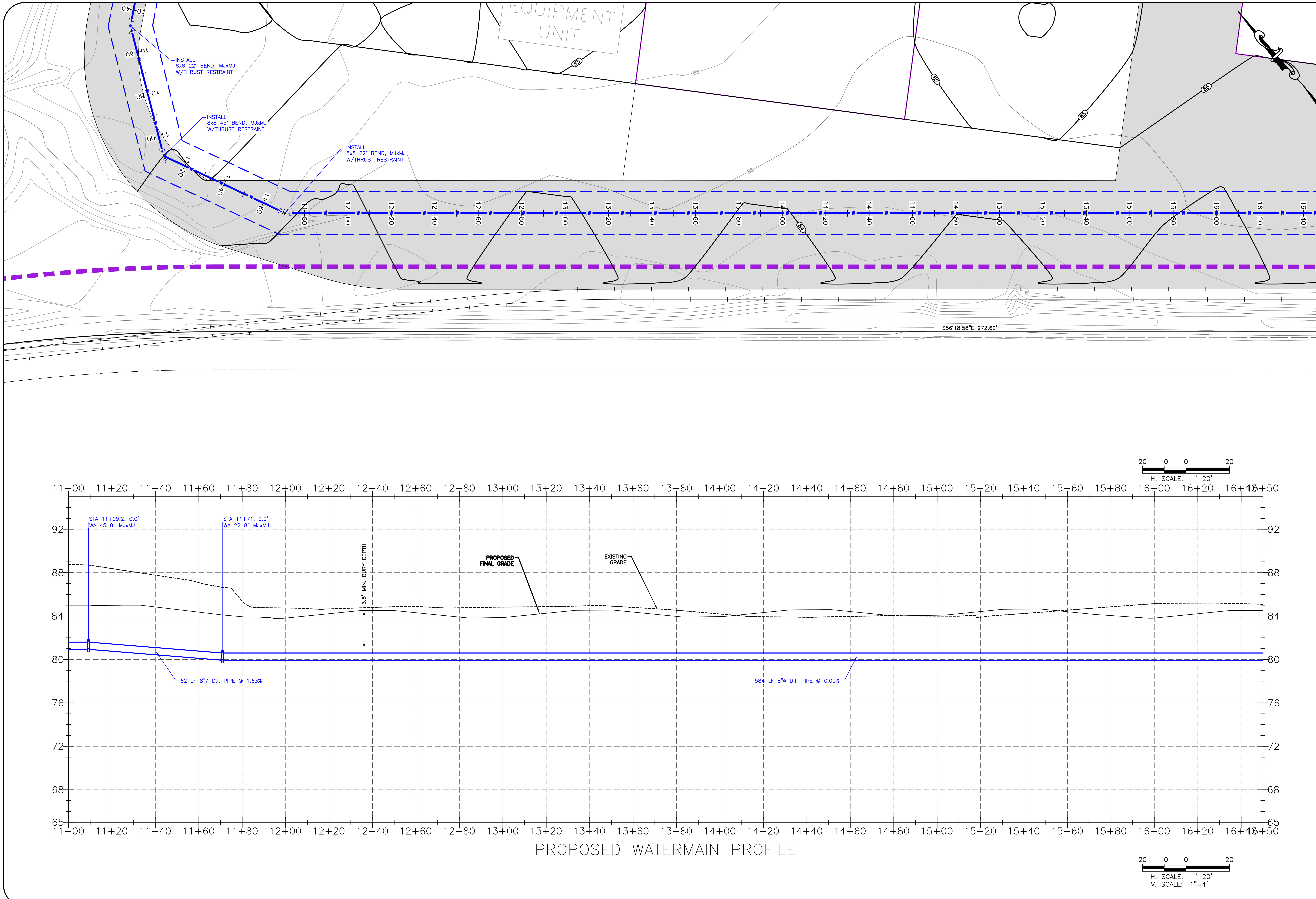

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51077
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10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-3
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

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ISSUE DATE: 10-23-2023

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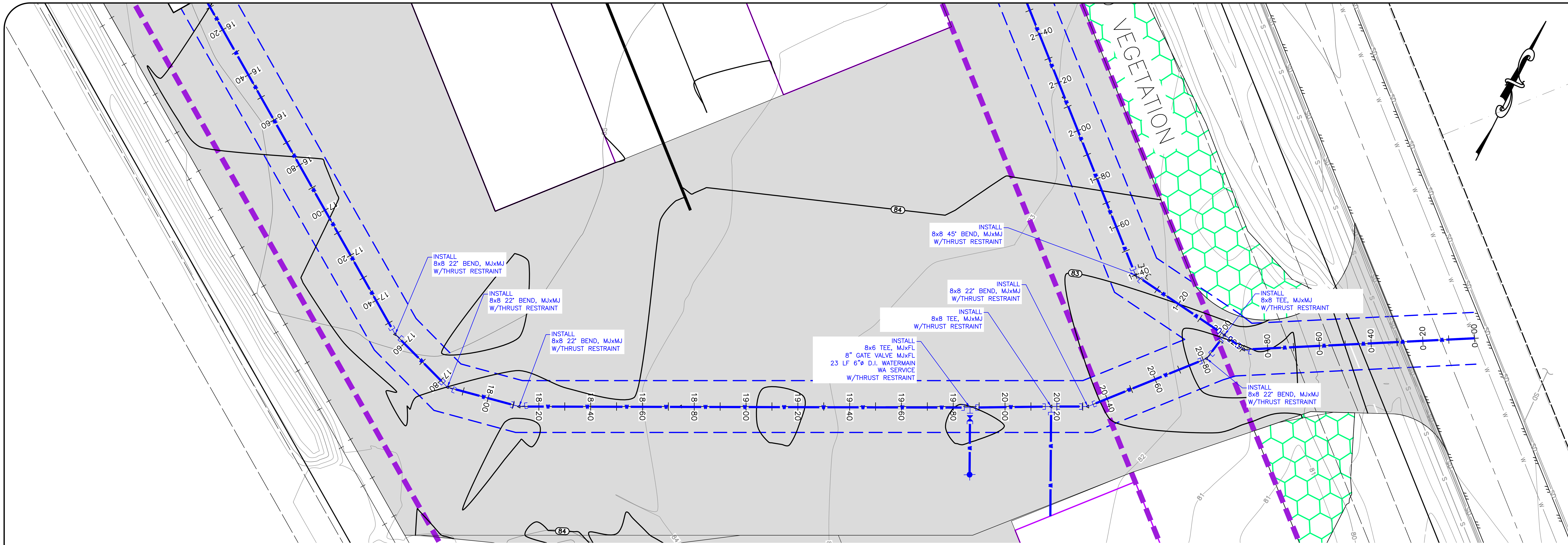

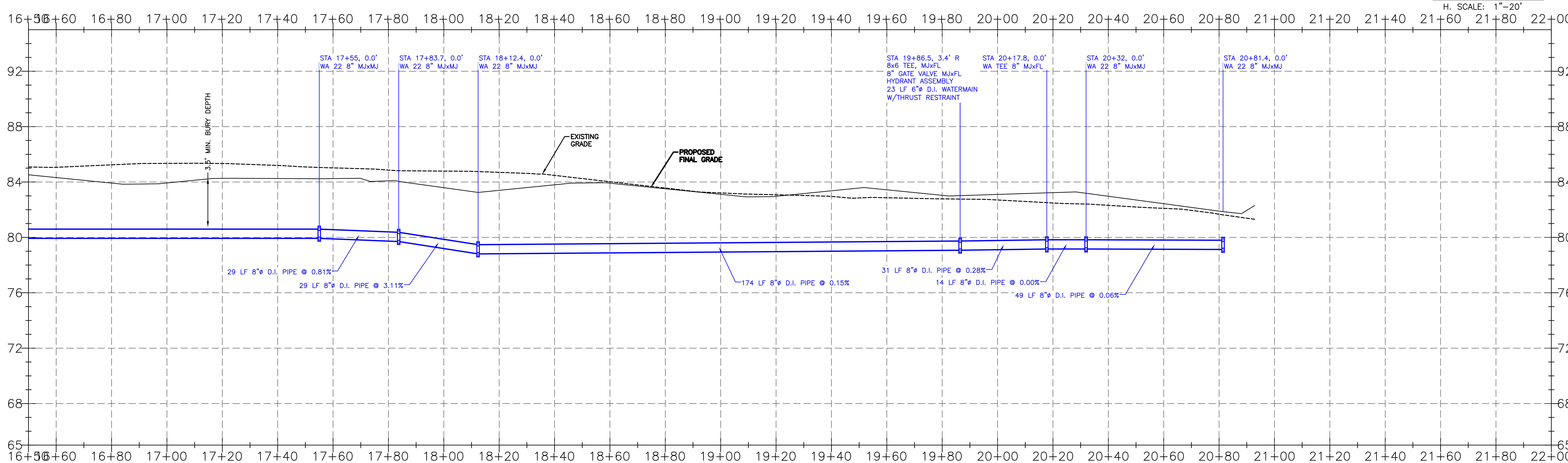

PROPOSED WATERMAIN PROFILE

20 10 0 20
H. SCALE: 1"=20'
V. SCALE: 1"=4'

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10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-4
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
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ISSUE DATE: 10-23-2023

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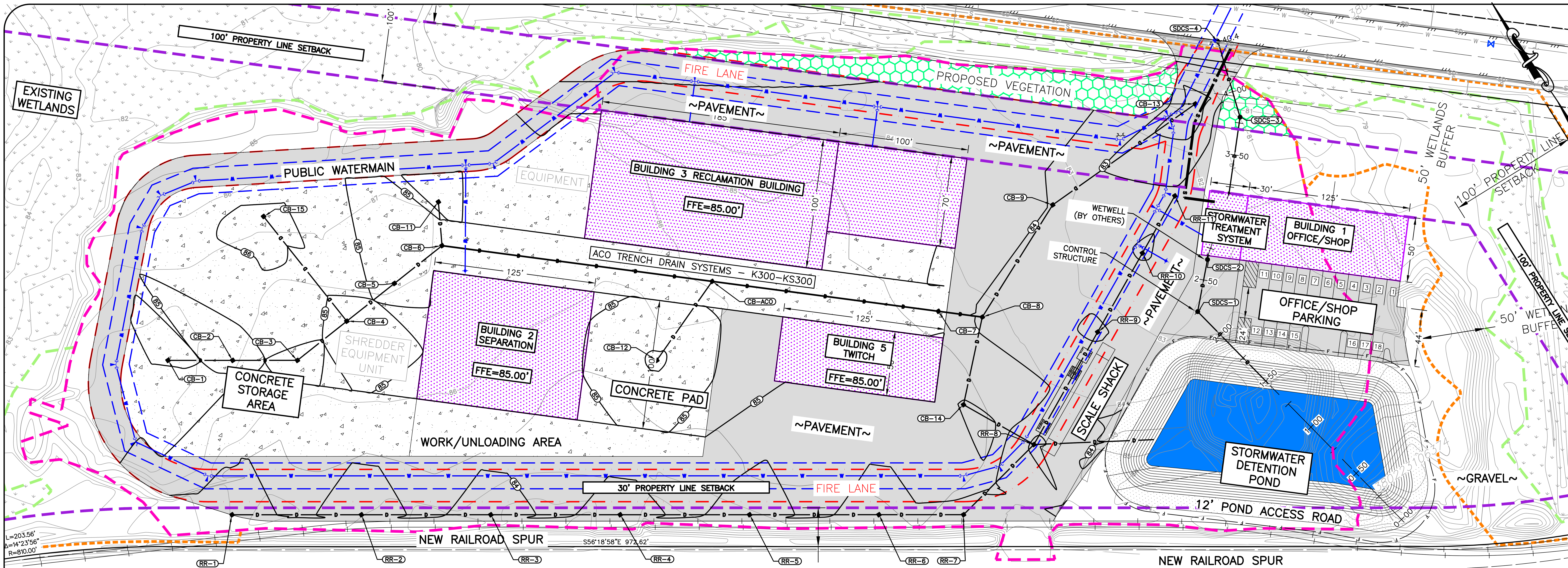

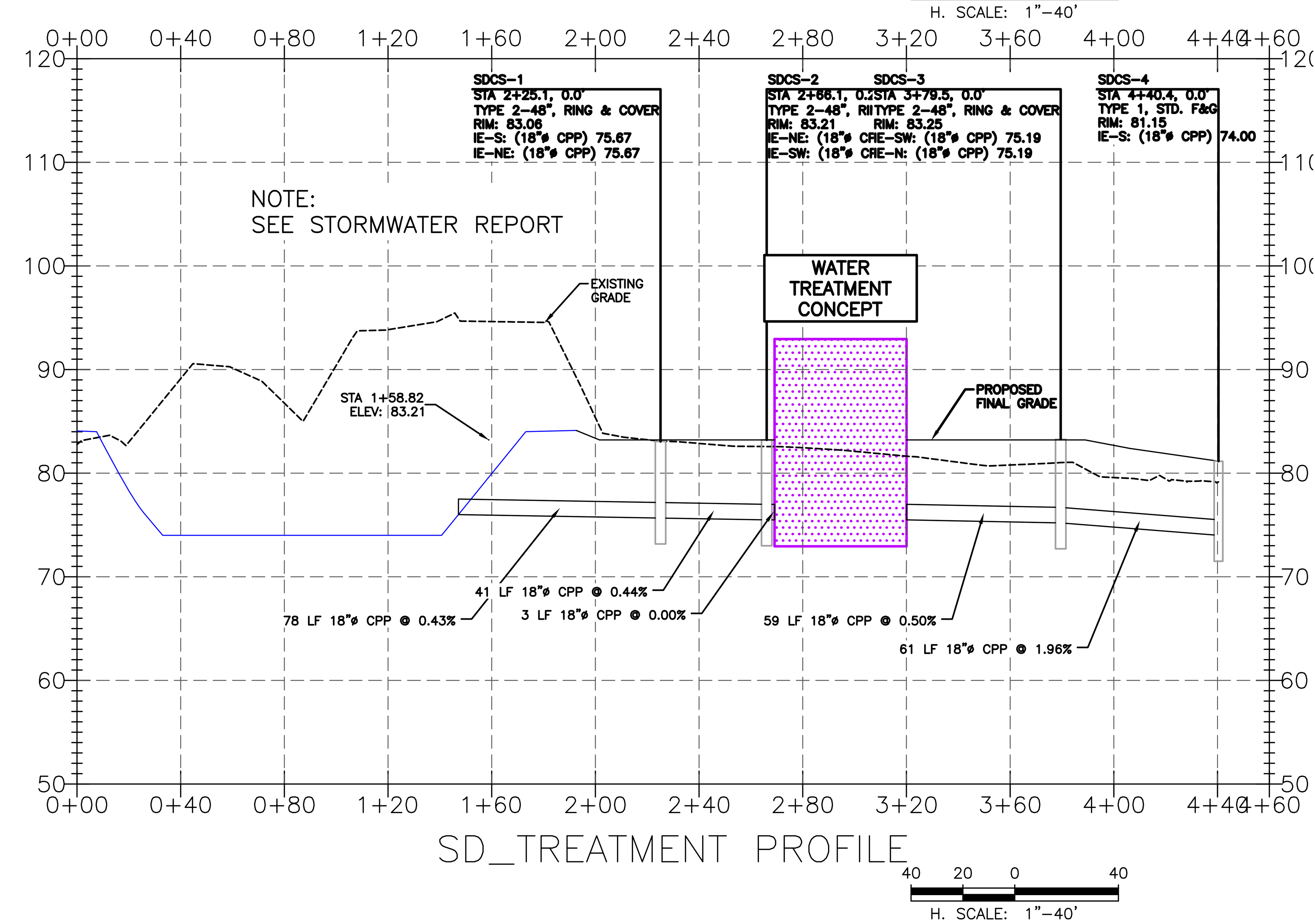

SD_TREATMENT PROFILE

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STATE OF WASHINGTON
51077
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10-23-2023

ABC RECYCLING
PROPOSED STORM BLDG 1 & CONTROL STRUCTURES
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
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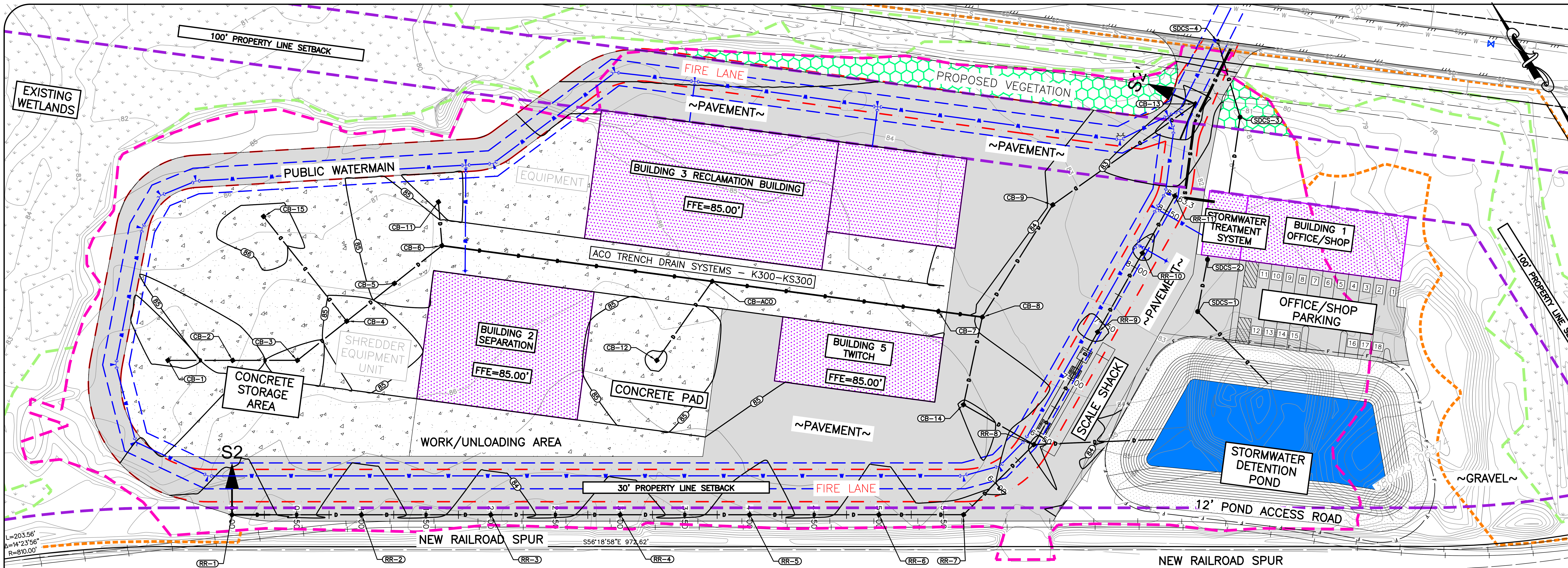

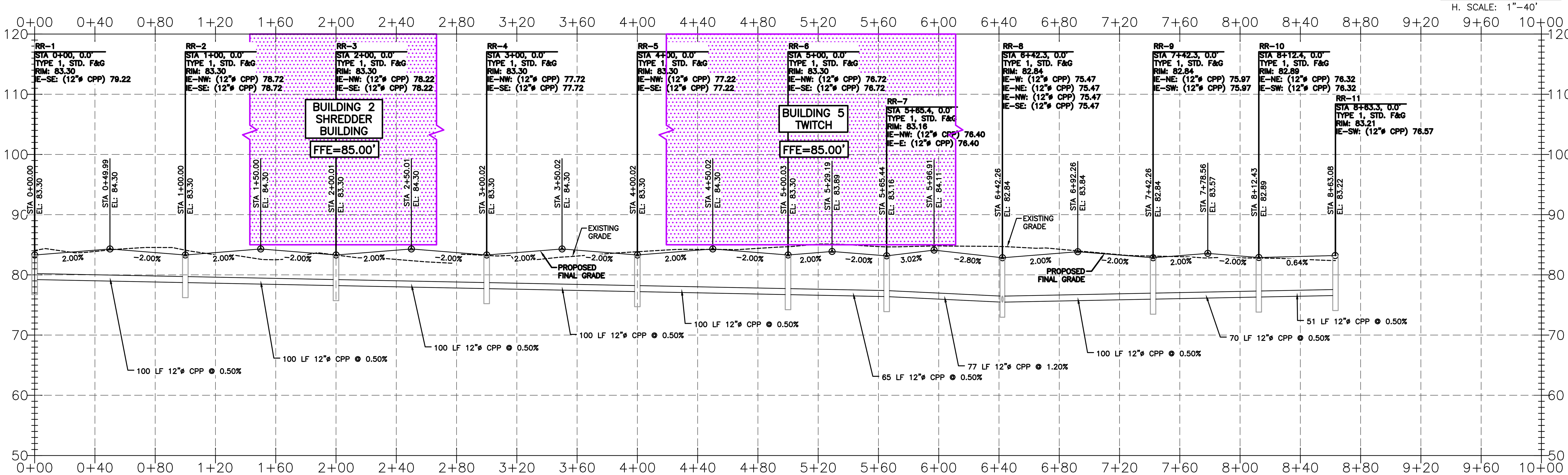

S2-S2' PROPOSED STORM RR PROFILE

NOTE: CB-9 IS NOT ON THE FIRE LANE, BUT CB-13 IS ON THE FIRE LANE. SHOWN HERE FOR CLARIFICATION. DRAINAGE IS FROM CB-13 TO CB-9

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10-23-2023

ABC RECYCLING
PLAN & PROFILE RAIL TO CONN PT
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

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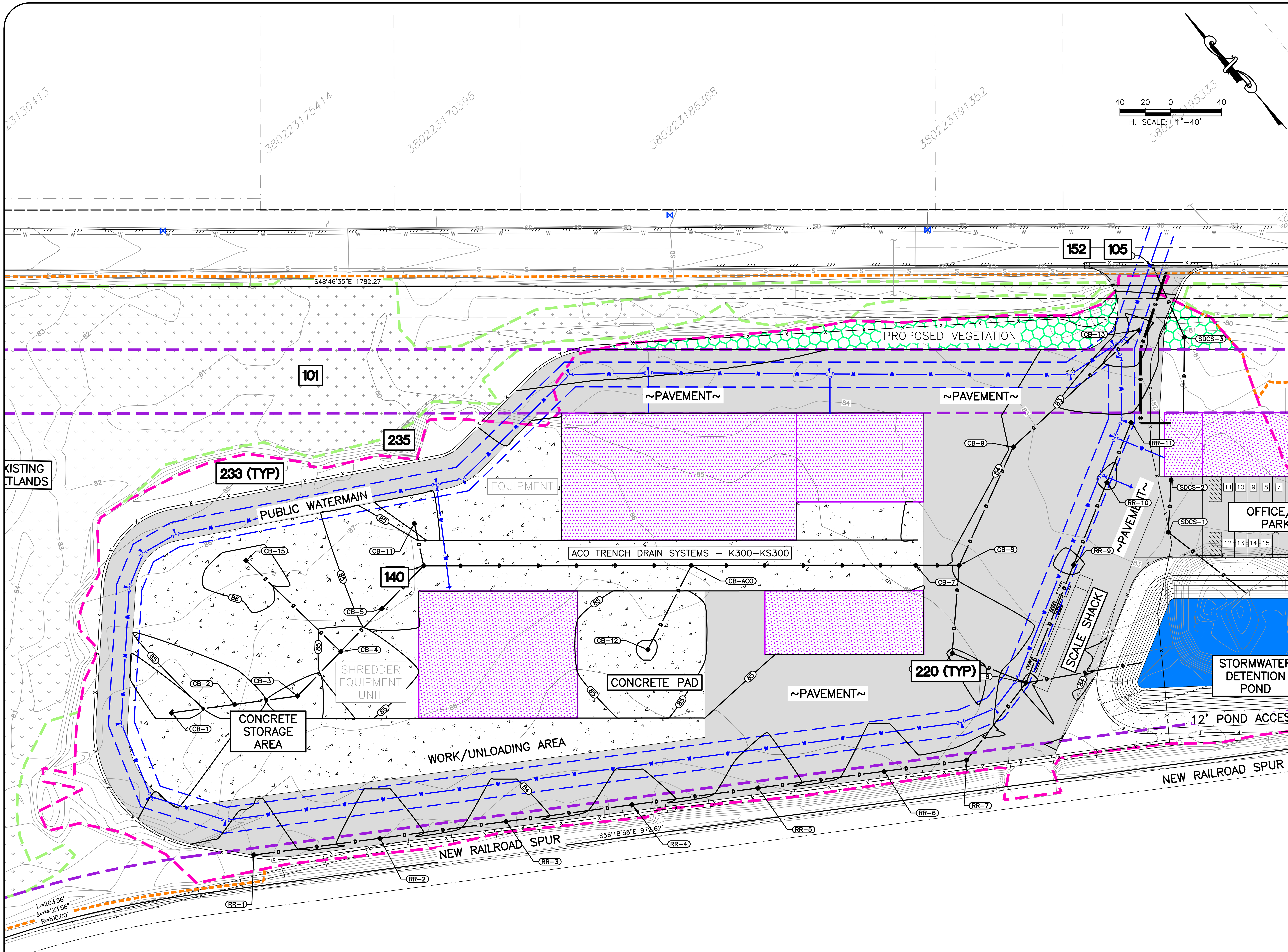

LEGEND

ELEMENT #1 – MARK CLEARING LIMITS

101	BMP C101 PRESERVE VEGETATION

ELEMENT #2 – ESTABLISH CONSTRUCTION ACCESS

105	BMP C105 STABILIZED CONSTRUCTION ENTRANCE (ONLY INSTALLED IF NECESSARY)

ELEMENT #3 – CONTROL FLOW RATES

220	BMP C220 STORM DRAIN INLET PROTECTION

ELEMENT #4 – INSTALL SEDIMENT CONTROLS

220	BMP C220 STORM DRAIN INLET PROTECTION
233	BMP 233 SILT FENCE
235	BMP 235 STRAW WATTLES

ELEMENT #5 – STABILIZE SOILS

120	BMP C120 TEMPORARY AND PERMANENT SEEDING
121	BMP C121 MULCHING
140	BMP C140 DUST CONTROL

ELEMENT #6 – PROTECT SLOPES

120	BMP C120 TEMPORARY AND PERMANENT SEEDING
121	BMP C121 MULCHING

ELEMENT #7 – PROTECT DRAIN INLETS

220	BMP C220 STORM DRAIN INLET PROTECTION

ELEMENT #8 – STABILIZE CHANNELS AND OUTLETS

235	BMP 235 STRAW WATTLES

ELEMENT #9 – CONTROL POLLUTANTS

152	BMP C152 SAWCUTTING AND SURFACE POLLUTION PREVENTION
153	BMP C153 MATERIAL DELIVERY, STORAGE AND CONTAINMENT

ELEMENT #10 – CONTROL DEWATERING

236	BMP C236 VEGETATIVE FILTRATION

ELEMENT #11 – MAINTAIN BMPs

160	BMP C160 CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT #12 – MANAGE THE PROJECT

160	BMP C160 CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT #13 – PROTECT LID BMPs

NO LID BMPs PROPOSED

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10-23-2023

ABC RECYCLING
TEMPORARY EROSION & SEDIMENT CONTROL

PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
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ELEMENT 1: PRESERVE VEGETATION / MARK CLEARING LIMITS

A. BEFORE BEGINNING LAND DISTURBING ACTIVITIES, INCLUDING CLEARING AND GRADING, CLEARLY MARK ALL CLEARING LIMITS, SENSITIVE AREAS AND THEIR BUFFERS, AND TREES THAT ARE TO BE PRESERVED WITHIN THE CONSTRUCTION AREA.

B. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM DEGREE PRACTICABLE.

ADDITIONAL GUIDANCE FOR ELEMENT 1

- PLASTIC, METAL, FABRIC FENCE, OR OTHER PHYSICAL BARRIERS MAY BE USED TO MARK THE CLEARING LIMITS. NOTE THE DIFFERENCE BETWEEN THE PRACTICAL USE AND PROPER INSTALLATION OF BMP C233: SILT FENCE AND THE PROPER USE AND INSTALLATION OF BMP C103: HIGH-VISIBILITY FENCE.
- IF IT IS NOT PRACTICAL TO RETAIN THE DUFF LAYER IN PLACE, THEN STOCKPILE IT ON SITE, COVER IT TO PREVENT EROSION, AND REPLACE IT IMMEDIATELY WHEN YOU FINISH DISTURBING THE SITE.

SUGGESTED BMPS FOR ELEMENT 1

- BMP C101: PRESERVING NATURAL VEGETATION
- BMP C102: BUFFER ZONES
- BMP C103: HIGH-VISIBILITY FENCE
- BMP C233: SILT FENCE

ELEMENT 2: ESTABLISH CONSTRUCTION ACCESS

A. LIMIT CONSTRUCTION VEHICLE ACCESS AND EXIT TO ONE ROUTE, IF POSSIBLE.

B. STABILIZE ACCESS POINTS WITH A PAD OF QUARRY SPALLS, CRUSHED ROCK, OR OTHER EQUIVALENT BMPS, TO MINIMIZE TRACKING OF SEDIMENT ONTO PUBLIC ROADS.

C. LOCATE WHEEL WASH OR TIRE BATHS ON SITE, IF THE STABILIZED CONSTRUCTION ENTRANCE IS NOT EFFECTIVE IN PREVENTING TRACKING SEDIMENT ONTO ROADS.

D. IF SEDIMENT IS TRACKED OFF SITE, CLEAN THE AFFECTED ROADWAY(S) THOROUGHLY AT THE END OF EACH DAY, OR MORE FREQUENTLY AS NECESSARY (FOR EXAMPLE, DURING WET WEATHER). REMOVE SEDIMENT FROM ROADS BY SHOVELING, SWEEPING, OR PICKING UP AND TRANSPORTING THE SEDIMENT TO A CONTROLLED SEDIMENT DISPOSAL AREA.

E. CONDUCT STREET WASHING ONLY AFTER SEDIMENT IS REMOVED IN ACCORDANCE WITH 2.D (ABOVE).

F. CONTROL STREET WASH WASTEWATER BY PUMPING BACK ON SITE, OR OTHERWISE PREVENT IT FROM DIS- CHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

ADDITIONAL GUIDANCE FOR ELEMENT 2

MINIMIZE CONSTRUCTION SITE ACCESS POINTS ALONG LINEAR PROJECTS, SUCH AS ROADWAYS. STREET WASHING MAY REQUIRE LOCAL JURISDICTION APPROVAL.

SUGGESTED BMPS FOR ELEMENT 2

- BMP C105: STABILIZED CONSTRUCTION ACCESS
- BMP C106: WHEEL WASH
- BMP C107: CONSTRUCTION ROAD / PARKING AREA STABILIZATION

ELEMENT 3: CONTROL FLOW RATES

A. PROTECT PROPERTIES AND WATERWAYS DOWNSTREAM OF DEVELOPMENT SITES FROM EROSION AND THE ASSOCIATED DISCHARGE OF TURBID WATERS DUE TO INCREASES IN THE VELOCITY AND PEAK VOLUMETRIC FLOW RATE OF STORMWATER RUNOFF FROM THE PROJECT SITE.

B. WHERE NECESSARY TO COMPLY WITH 3.A (ABOVE), CONSTRUCT STORMWATER INFILTRATION OR DETENTION BMPS AS ONE OF THE FIRST STEPS IN GRADING. ASSURE THAT DETENTION BMPS FUNCTION PROPERLY BEFORE CONSTRUCTING SITE IMPROVEMENTS (E.G., IMPERVIOUS SURFACES).

C. IF PERMANENT INFILTRATION BMPS ARE USED FOR TEMPORARY FLOW CONTROL DURING CONSTRUCTION, PROTECT THESE BMPS FROM SILTATION DURING THE CONSTRUCTION PHASE.

ADDITIONAL GUIDANCE FOR ELEMENT 3

- CONDUCT A DOWNSTREAM ANALYSIS IF CHANGES IN FLOWS COULD IMPAIR OR ALTER CONVEYANCE SYSTEMS, STREAMBANKS, BED SEDIMENT, OR AQUATIC HABITAT. SEE III-3.2 PREPARING A STORMWATER SITE PLAN FOR OFF-SITE ANALYSIS GUIDELINES.
- EVEN GENTLY SLOPED AREAS NEED FLOW CONTROLS SUCH AS BMP C235: WATTLES OR OTHER ENERGY DISSIPATION / FILTRATION STRUCTURES. PLACE DISSIPATION FACILITIES CLOSER TOGETHER ON STEEPER SLOPES. THESE METHODS PREVENT WATER FROM BUILDING HIGHER VELOCITIES AS IT FLOWS DOWNSTREAM WITHIN THE CONSTRUCTION SITE.
- CONTROL STRUCTURES DESIGNED FOR PERMANENT DETENTION BMPS ARE NOT APPROPRIATE FOR USE DURING CONSTRUCTION WITHOUT MODIFICATION. IF USED DURING CONSTRUCTION, MODIFY THE CONTROL STRUCTURE TO ALLOW FOR LONG-TERM STORAGE OF RUNOFF AND ENABLE SEDIMENT TO SETTLE. VERIFY THAT THE BMP IS SIZED APPROPRIATELY FOR THIS PURPOSE. RESTORE BMPS TO THEIR ORIGINAL DESIGN DIMENSIONS, REMOVE SEDIMENT, AND INSTALL A FINAL CONTROL STRUCTURE AT COMPLETION OF THE PROJECT.
- EROSION HAS THE POTENTIAL TO OCCUR BECAUSE OF INCREASES IN THE VOLUME, VELOCITY, AND PEAK FLOW RATE OF STORMWATER RUNOFF FROM THE PROJECT SITE. THE LOCAL PERMITTING AGENCY MAY REQUIRE INFILTRATION OR DETENTION BMP DESIGNS THAT PROVIDE ADDITIONAL OR DIFFERENT STORMWATER FLOW CONTROL THAN THE DESIGNS DETAILED IN THIS MANUAL. THESE REQUIREMENTS MAY BE NECESSARY TO ADDRESS LOCAL CONDITIONS OR TO PROTECT PROPERTIES AND WATERWAYS DOWNSTREAM.
- VELOCITY OF WATER LEAVING THE SITE SHOULD NOT EXCEED 3 FEET/SECOND, IF THE DISCHARGE IS TO A STREAM OR DITCH. INSTALL VELOCITY DISSIPATION, SUCH AS BMP C207: CHECK DAMS OR BMP C202: RIPRAP CHANNEL LINING TO ENSURE REDUCTION OF THE FLOW VELOCITY TO A NON-EROSIVE LEVEL.
- IF THE DISCHARGE FROM A PROJECT SITE IS TO A MUNICIPAL STORM DRAINAGE SYSTEM, THE ALLOWABLE DIS- CHARGE RATE MAY BE LIMITED BY THE CAPACITY OF THE PUBLIC SYSTEM. IT MAY BE NECESSARY TO CLEAN THE MUNICIPAL STORM DRAINAGE SYSTEM PRIOR TO THE START OF THE DISCHARGE TO PREVENT SCOURING SOLIDS FROM THE DRAINAGE SYSTEM. OBTAIN PERMISSION FROM THE OWNER OF THE COLLECTION SYSTEM BEFORE DISCHARGING TO IT. ENSURE THAT NO DOWNSTREAM PIPES ARE SURCHARGED AS A RESULT OF INCREASED FLOWS FROM THE PROJECT SITE.
- IF THE DISCHARGE FROM A PROJECT SITE IS DIRECTLY TO A FLOW CONTROL EXEMPT RECEIVING WATER LISTED IN APPENDIX I-A: FLOW CONTROL EXEMPT RECEIVING WATERS OR TO AN INFILTRATION SYSTEM, THERE IS NO DISCHARGE FLOW LIMIT.

SUGGESTED BMPS FOR ELEMENT 3

- BMP C203: WATER BARS
- BMP C207: CHECK DAMS
- BMP C209: OUTLET PROTECTION
- BMP C235: WATTLES
- BMP C240: SEDIMENT TRAP
- BMP C241: SEDIMENT POND (TEMPORARY)

ELEMENT 4: INSTALL SEDIMENT CONTROLS

A. CONSTRUCT SEDIMENT CONTROL BMPS (SEDIMENT PONDS, TRAPS, FILTERS, ETC.) AS ONE OF THE FIRST STEPS IN GRADING. THESE BMPS MUST BE FUNCTIONAL BEFORE OTHER LAND DISTURBING ACTIVITIES TAKE PLACE.

B. MINIMIZE SEDIMENT DISCHARGES FROM THE SITE. THE DESIGN, INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS MUST ADDRESS FACTORS SUCH AS THE AMOUNT, FREQUENCY, INTENSITY AND DURATION OF PRECIPITATION, THE NATURE OF RESULTING STORMWATER RUNOFF, AND SOIL CHARACTERISTICS, INCLUDING THE RANGE OF SOIL PARTICLE SIZES EXPECTED TO BE PRESENT ON THE SITE.

C. DIRECT STORMWATER RUNOFF FROM DISTURBED AREAS THROUGH BMP C241: SEDIMENT POND (TEMPORARY) OR OTHER APPROPRIATE SEDIMENT REMOVAL BMP, BEFORE THE RUNOFF LEAVES A CONSTRUCTION SITE OR BEFORE DISCHARGE TO AN INFILTRATION FACILITY. RUNOFF FROM FULLY STABILIZED AREAS MAY BE DISCHARGED WITHOUT A SEDIMENT REMOVAL BMP, BUT MUST CONTROL FLOW RATES PER ELEMENT 3: CONTROL FLOW RATES.

D. LOCATE BMPS INTENDED TO TRAP SEDIMENT ON SITE IN A MANNER TO AVOID INTERFERENCE WITH THE MOVEMENT OF JUVENILE SALMONIDS ATTEMPTING TO ENTER OFF-CHANNEL AREAS OR DRAINAGES.

E. PROVIDE AND MAINTAIN NATURAL BUFFERS AROUND SURFACE WATERS, DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION, UNLESS INFEASIBLE.

F. WHERE FEASIBLE, DESIGN OUTLET STRUCTURES THAT WITHDRAW IMPOUNDED STORMWATER FROM THE SURFACE TO AVOID DISCHARGING SEDIMENT THAT IS STILL SUSPENDED LOWER IN THE WATER COLUMN.

ADDITIONAL GUIDANCE FOR ELEMENT 4

- OUTLET STRUCTURES THAT WITHDRAW IMPOUNDED STORMWATER FROM THE SURFACE TO AVOID DISCHARGING SEDIMENT THAT IS STILL SUSPENDED LOWER IN THE WATER COLUMN ARE FOR THE CONSTRUCTION PERIOD ONLY. IF INSTALLING A FLOATING PUMP STRUCTURE, INCLUDE A STOPPER TO PREVENT THE PUMP BASKET FROM HITTING THE BOTTOM OF THE POND.
- IF A SEDIMENT TRAPPING BMP UTILIZES A CONTROL STRUCTURE THAT WILL ALSO BE USED IN A PERMANENT DETENTION BMP APPLICATION, THE CONTROL STRUCTURE CONSTRUCTION MUST BE FINALIZED FOR THE PERMANENT BMP APPLICATION UPON PROJECT COMPLETION.
- INSTALL SEDIMENT CONTROLS IN A MANNER THAT PROTECTS THE SENSITIVE AREAS AND THEIR BUFFERS MARKED IN ACCORDANCE WITH ELEMENT 1: PRESERVE VEGETATION / MARK CLEARING LIMITS.
- WHERE FEASIBLE, DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION.
- SEED AND MULCH EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS ACCORDING TO THE TIMING INDICATED IN ELEMENT 5: STABILIZE SOILS.
- FULL STABILIZATION INCLUDES CONCRETE OR ASPHALT PAVING; QUARRY SPALLS USED AS DITCH LINING; OR THE USE OF ROLLED EROSION PRODUCTS, A BONDED FIBER MATRIX PRODUCT, OR VEGETATIVE COVER IN A MANNER THAT WILL FULLY PREVENT SOIL EROSION.
- THE LOCAL PERMITTING AUTHORITY MAY INSPECT AND APPROVE AREAS FULLY STABILIZED BY MEANS OTHER THAN PAVEMENT OR QUARRY SPALLS.

SUGGESTED BMPS FOR ELEMENT 4

- BMP C231: BRUSH BARRIER
- BMP C232: GRAVEL FILTER BERM
- BMP C233: SILT FENCE
- BMP C234: VEGETATED STRIP
- BMP C235: WATTLES
- BMP C240: SEDIMENT TRAP
- BMP C241: SEDIMENT POND (TEMPORARY)
- BMP C250: CONSTRUCTION STORMWATER CHEMICAL TREATMENT
- BMP C251: CONSTRUCTION STORMWATER FILTRATION

ELEMENT 5: STABILIZE SOILS

A. STABILIZE EXPOSED AND UNWORKED SOILS BY APPLICATION OF EFFECTIVE BMPS THAT PREVENT EROSION. APPLICABLE BMPS INCLUDE, BUT ARE NOT LIMITED TO: TEMPORARY AND PERMANENT SEEDING, SODDING, MULCHING, PLASTIC COVERING, EROSION CONTROL FABRICS AND MATTING, SOIL APPLICATION OF POLYACRYLAMIDE (PAM), THE EARLY APPLICATION OF GRAVEL BASE ON AREAS TO BE PAVED, AND DUST CONTROL.

B. CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION.

C. CONTROL STORMWATER DISCHARGES, INCLUDING BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND TO MINIMIZE DOWNSTREAM CHANNEL AND STREAM BANK EROSION.

D. SOILS MUST NOT REMAIN EXPOSED AND UNWORKED FOR MORE THAN THE TIME PERIODS SET FORTH BELOW TO PREVENT EROSION:

a. DURING THE DRY SEASON (MAY 1 - SEPTEMBER 30): 7 DAYS

b. DURING THE WET SEASON (OCTOBER 1 - APRIL 30): 2 DAYS

E. STABILIZE SOILS AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST.

F. STABILIZE SOIL STOCKPILES FROM EROSION, PROTECT WITH SEDIMENT TRAPPING MEASURES, AND WHERE POSSIBLE, LOCATE AWAY FROM STORM DRAIN INLETS, WATERWAYS AND DRAINAGE CHANNELS.

G. MINIMIZE THE AMOUNT OF SOIL EXPOSED DURING CONSTRUCTION ACTIVITY.

H. MINIMIZE THE DISTURBANCE OF STEEP SLOPES.

I. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

ADDITIONAL GUIDANCE FOR ELEMENT 5

- SOIL STABILIZATION BMPS SHOULD BE APPROPRIATE FOR THE TIME OF YEAR, SITE CONDITIONS, ESTIMATED DURATION OF USE, AND POTENTIAL WATER QUALITY IMPACTS THAT STABILIZATION AGENTS MAY HAVE ON DOWNSTREAM WATERS OR GROUND WATER.
- ENSURE THAT GRAVEL BASE USED FOR STABILIZATION IS CLEAN AND DOES NOT CONTAIN FINES OR SEDIMENT.

SUGGESTED BMPS FOR ELEMENT 5

- BMP C120: TEMPORARY AND PERMANENT SEEDING
- BMP C121: MULCHING
- BMP C122: NETS AND BLANKETS
- BMP C123: PLASTIC COVERING
- BMP C124: SODDING
- BMP C125: TOPSOILING / COMPOSTING
- BMP C126: POLYACRYLAMIDE (PAM) FOR SOIL EROSION PROTECTION
- BMP C130: SURFACE ROUGHENING
- BMP C131: GRADIENT TERRACES
- BMP C140: DUST CONTROL

ELEMENT 6: PROTECT SLOPES

A. DESIGN AND CONSTRUCT CUT-AND-FILL SLOPES IN A MANNER TO MINIMIZE EROSION. APPLICABLE PRACTICES INCLUDE, BUT ARE NOT LIMITED TO, REDUCING CONTINUOUS LENGTH OF SLOPE WITH TERRACING AND DIVERSIONS, REDUCING SLOPE STEEPNESS, AND ROUGHENING SLOPE SURFACES (FOR EXAMPLE, TRACK WALKING).

B. DIVERT OFF-SITE STORMWATER (RUN-ON) OR GROUND WATER AWAY FROM SLOPES AND DISTURBED AREAS WITH INTERCEPTOR DIKES, PIPES AND/OR SWALES. OFF-SITE STORMWATER SHOULD BE MAN- AGED SEPARATELY FROM STORMWATER GENERATED ON SITE.

C. AT THE TOP OF SLOPES, COLLECT DRAINAGE IN PIPE SLOPE DRAINS OR PROTECTED CHANNELS TO PREVENT EROSION. TEMPORARY PIPE SLOPE DRAINS MUST BE SIZED TO CONVEY THE FLOW RATE CALCULATED BY ONE OF THE FOLLOWING METHODS:

a. SINGLE EVENT HYDROGRAPH METHOD: THE PEAK VOLUMETRIC FLOW RATE CALCULATED USING A 10-MINUTE TIME STEP FROM A TYPE 1A, 10-YEAR, 24-HOUR FREQUENCY STORM.

OR

b. CONTINUOUS SIMULATION METHOD: THE 10-YEAR PEAK FLOW RATE, AS DETERMINED BY AN APPROVED CONTINUOUS RUNOFF MODEL WITH A 15-MINUTE TIME STEP.

D. THE HYDROLOGIC ANALYSIS MUST USE THE EXISTING LAND COVER CONDITION FOR PREDICTING FLOW RATES FROM TRIBUTARY AREAS OUTSIDE THE PROJECT LIMITS. FOR TRIBUTARY AREAS ON THE PROJECT SITE, THE ANALYSIS MUST USE THE TEMPORARY OR PERMANENT PROJECT LAND COVER CONDITION, WHICHEVER WILL PRODUCE THE HIGHEST FLOW RATES. IF USING THE WESTERN WASHINGTON HYDRO- LOGY MODEL (WWHM) TO PREDICT FLOWS, BARE SOIL AREAS SHOULD BE MODELED AS "LANDSCAPED" AREA.

E. PLACE EXCAVATED MATERIAL ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS.

F. PLACE CHECK DAMS AT REGULAR INTERVALS WITHIN CONSTRUCTED CHANNELS THAT ARE CUT DOWN A SLOPE.

ADDITIONAL GUIDANCE FOR ELEMENT 6

- CONSIDER SOIL TYPE AND ITS POTENTIAL FOR EROSION.
- STABILIZE SOILS ON SLOPES, AS SPECIFIED IN ELEMENT 5: STABILIZE SOILS.
- BMP COMBINATIONS ARE THE MOST EFFECTIVE METHOD OF PROTECTING SLOPES WITH DISTURBED SOILS. FOR EXAMPLE, USE BOTH BMP C121: MULCHING AND BMP C122: NETS AND BLANKETS IN COMBINATION.

SUGGESTED BMPS FOR ELEMENT 6

- BMP C120: TEMPORARY AND PERMANENT SEEDING
- BMP C121: MULCHING
- BMP C122: NETS AND BLANKETS
- BMP C123: PLASTIC COVERING
- BMP C124: SODDING
- BMP C130: SURFACE ROUGHENING
- BMP C131: GRADIENT TERRACES
- BMP C200: INTERCEPTOR DIKE AND SWALE
- BMP C201: GRASS-LINED CHANNELS
- BMP C203: WATER BARS
- BMP C204: PIPE SLOPE DRAINS
- BMP C205: SUBSURFACE DRAINS
- BMP C206: LEVEL SPREADER
- BMP C207: CHECK DAMS
- BMP C208: TRIANGULAR SILT DIKE (TSD)

ELEMENT 7: PROTECT DRAIN INLETS

A. PROTECT ALL STORM DRAIN INLETS MADE OPERABLE DURING CONSTRUCTION SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT.

B. CLEAN OR REMOVE AND REPLACE INLET PROTECTION DEVICES WHEN SEDIMENT HAS FILLED ONE-THIRD OF THE AVAILABLE STORAGE (UNLESS A DIFFERENT STANDARD IS SPECIFIED BY THE PRODUCT MANUFACTURER).

ADDITIONAL GUIDANCE FOR ELEMENT 7

PROTECT ALL EXISTING STORM DRAIN INLETS SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT.

- KEEP ALL APPROACH ROADS CLEAN. DO NOT ALLOW SEDIMENT AND STREET WASH WATER TO ENTER STORM DRAINS WITHOUT PRIOR AND ADEQUATE TREATMENT (AS DEFINED ABOVE) UNLESS TREATMENT IS PROVIDED BEFORE THE STORM DRAIN DISCHARGES TO WATERS OF THE STATE.
- INLETS SHOULD BE INSPECTED WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

SUGGESTED BMPS FOR ELEMENT 7

- BMP C220: INLET PROTECTION

ELEMENT 8: STABILIZE CHANNELS AND OUTLETS

A. DESIGN, CONSTRUCT, AND STABILIZE ALL ON-SITE CONVEYANCE CHANNELS TO PREVENT EROSION FROM THE FLOW RATE CALCULATED BY ONE OF THE FOLLOWING METHODS:

a. SINGLE EVENT HYDROGRAPH METHOD: THE PEAK VOLUMETRIC FLOW RATE CALCULATED USING A 10-MINUTE TIME STEP FROM A TYPE 1A, 10-YEAR, 24-HOUR FREQUENCY STORM.

OR

b. CONTINUOUS SIMULATION METHOD: THE 10-YEAR PEAK FLOW RATE, AS DETERMINED BY AN APPROVED CONTINUOUS RUNOFF MODEL WITH A 15-MINUTE TIME STEP.

THE HYDROLOGIC ANALYSIS MUST USE THE EXISTING LAND COVER CONDITION FOR PREDICTING FLOW RATES FROM TRIBUTARY AREAS OUTSIDE THE PROJECT LIMITS. FOR TRIBUTARY AREAS ON THE PROJECT SITE, THE ANALYSIS MUST USE THE TEMPORARY OR PERMANENT PROJECT LAND COVER CONDITION, WHICHEVER WILL PRODUCE THE HIGHEST FLOW RATES. IF USING THE WESTERN WASHINGTON HYDRO- LOGY MODEL (WWHM) TO PREDICT FLOWS, BARE SOIL AREAS SHOULD BE MODELED AS "LANDSCAPED" AREA.

B. PROVIDE STABILIZATION, INCLUDING ARMORING MATERIAL, ADEQUATE TO PREVENT EROSION OF OUTLETS, ADJACENT STREAM BANKS, SLOPES AND DOWNSTREAM REACHES AT THE OUTLETS OF ALL CONVEYANCE SYSTEMS.

ADDITIONAL GUIDANCE FOR ELEMENT 8

THE BEST METHOD FOR STABILIZING CHANNELS IS TO COMPLETELY LINE THE CHANNEL WITH BMP C122: NETS AND BLANKETS FIRST, THEN ADD BMP C207: CHECK DAMS AS NECESSARY TO FUNCTION AS AN ANCHOR AND TO SLOW THE FLOW OF WATER.

SUGGESTED BMPS FOR ELEMENT 8

- BMP C122: NETS AND BLANKETS
- BMP C202: RIPRAP CHANNEL LINING
- BMP C207: CHECK DAMS
- BMP C209: OUTLET PROTECTION

ELEMENT 9: CONTROL POLLUTANTS

DESIGN, INSTALL, IMPLEMENT AND MAINTAIN EFFECTIVE POLLUTION PREVENTION MEASURES TO MINIMIZE THE DISCHARGE OF POLLUTANTS. THE PROJECT PROPONENT MUST:

A. HANDLE AND DISPOSE OF ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS THAT OCCUR ON SITE IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER.

B. PROVIDE COVER, CONTAINMENT, AND PROTECTION FROM VANDALISM FOR ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCTS, AND OTHER MATERIALS THAT HAVE THE POTENTIAL TO POSE A THREAT TO HUMAN HEALTH OR THE ENVIRONMENT. ON-SITE FUELING TANKS MUST INCLUDE SECONDARY CONTAINMENT. SECONDARY CONTAINMENT MEANS PLACING TANKS OR CONTAINERS WITHIN AN IMPERVIOUS STRUCTURE CAPABLE OF CONTAINING 110% OF THE VOLUME CONTAINED IN THE LARGEST TANK WITHIN THE CONTAINMENT STRUCTURE. DOUBLE-WALLED TANKS DO NOT REQUIRE ADDITIONAL SECONDARY CONTAINMENT.

C. CONDUCT MAINTENANCE, FUELING, AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES USING SPILL PREVENTION AND CONTROL MEASURES. CLEAN CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY SPILL INCIDENT.

D. DISCHARGE WHEEL WASH OR TIRE BATH WASTEWATER TO A SEPARATE ON-SITE TREATMENT SYSTEM THAT PREVENTS DISCHARGE TO SURFACE WATER, OR TO THE SANITARY SEWER, WITH LOCAL SEWER DISTRICT APPROVAL.

E. APPLY FERTILIZERS AND PESTICIDES IN A MANNER AND AT APPLICATION RATES THAT WILL NOT RESULT IN LOSS OF CHEMICAL TO STORMWATER RUNOFF. FOLLOW MANUFACTURERS' LABEL REQUIREMENTS FOR APPLICATION RATES AND PROCEDURES.

F. USE BMPS TO PREVENT CONTAMINATION OF STORMWATER RUNOFF BY PH-MODIFYING SOURCES. THE SOURCES FOR THIS CONTAMINATION INCLUDE, BUT ARE NOT LIMITED TO: RECYCLED CONCRETE STOCKPILES, BULK CEMENT, CEMENT KILN DUST, FLY ASH, NEW CONCRETE WASHING AND CURING WATERS, WASTE STREAMS GENERATED FROM CONCRETE GRINDING AND SAWING, EXPOSED AGGREGATE PROCESSES, DEWATERING CONCRETE VAULTS, CONCRETE PUMPING AND MIXER WASHOUT WATERS.

G. ADJUST THE PH OF STORMWATER IF NECESSARY TO PREVENT VIOLATIONS OF WATER QUALITY STANDARDS.

H. ASSURE THAT WASHOUT OF CONCRETE TRUCKS IS PERFORMED OFF SITE OR IN DESIGNATED CONCRETE WASHOUT AREAS ONLY. DO NOT WASH OUT CONCRETE TRUCK DRUMS OR CONCRETE HANDLING EQUIPMENT ONTO THE GROUND, OR INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS. WASHOUT OF SMALL CONCRETE HANDLING EQUIPMENT MAY BE DISPOSED OF IN A FORMED AREA AWAITING CONCRETE WHERE IT WILL NOT CONTAMINATE SURFACE OR GROUND WATER. DO NOT DUMP EXCESS CONCRETE ON SITE, EXCEPT IN DESIGNATED CONCRETE WASHOUT AREAS. CONCRETE SPILLAGE OR CONCRETE DISCHARGE DIRECTLY TO GROUND WATER OR SURFACE WATERS OF THE STATE IS PROHIBITED. DO NOT WASH OUT TO FORMED AREAS AWAITING INFILTRATION BMPS.

I. OBTAIN WRITTEN APPROVAL FROM ECOLOGY BEFORE USING CHEMICAL TREATMENT OTHER THAN CO2, DRY ICE, OR FOOD GRADE VINEGAR TO ADJUST PH.

J. UNCONTAMINATED WATER FROM WATER-ONLY BASED SHAFT DRILLING FOR CONSTRUCTION OF BUILDING, ROAD, AND BRIDGE FOUNDATIONS MAY BE INFILTRATED PROVIDED THE WASTEWATER IS MANAGED IN A WAY THAT PROHIBITS DISCHARGE TO SURFACE WATERS. PRIOR TO INFILTRATION, WATER FROM WATER-ONLY BASED SHAFT DRILLING THAT COMES INTO CONTACT WITH CURING CONCRETE MUST BE NEUTRALIZED UNTIL PH IS IN THE RANGE OF 6.5 TO 8.5 (SU).

ADDITIONAL GUIDANCE FOR ELEMENT 9

- WHEEL WASH AND/OR TIRE BATH WASTEWATER CAN BE COMBINED WITH WASTEWATER FROM CONCRETE WASHOUT AREAS IF THE WASTEWATERS WILL BE PROPERLY DISPOSED OF AT AN OFFSITE LOCATION OR TREATMENT FACILITY.
- DO NOT USE UPLAND LAND APPLICATIONS FOR DISCHARGING WASTEWATER FROM CONCRETE WASHOUT AREAS.
- WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
- CONDUCT OIL CHANGES, HYDRAULIC SYSTEM DRAIN DOWN, SOLVENT AND DEGREASING CLEANING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS.
- CLEAN CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. EMERGENCY REPAIRS MAY BE PERFORMED ON-SITE USING TEMPORARY PLASTIC PLACED BENEATH AND, IF RAINING, OVER THE VEHICLE.

SUGGESTED BMPS FOR ELEMENT 9

- BMP C151: CONCRETE HANDLING
- BMP C152: SAWCUTTING AND SURFACING POLLUTION PREVENTION
- BMP C153: MATERIAL DELIVERY, STORAGE, AND CONTAINMENT
- BMP C154: CONCRETE WASHOUT AREA
- BMP C250: CONSTRUCTION STORMWATER CHEMICAL TREATMENT
- BMP C251: CONSTRUCTION STORMWATER FILTRATION
- BMP C252: TREATING AND DISPOSING OF HIGH PH WATER

ALSO SEE THE SOURCE CONTROL BMPS DETAILED IN VOLUME IV

ELEMENT 10: CONTROL DEWATERING

A. DISCHARGE FOUNDATION, VAULT, AND TRENCH DEWATERING WATER, WHICH HAVE SIMILAR CHARACTERISTICS TO STORMWATER RUNOFF AT THE SITE, INTO A CONTROLLED CONVEYANCE SYSTEM BEFORE DISCHARGE TO BMP C240: SEDIMENT TRAP OR BMP C241: SEDIMENT POND (TEMPORARY).

B. DISCHARGE CLEAN, NON-TURBID DEWATERING WATER, SUCH AS WELL-POINT GROUND WATER, TO SYSTEMS TRIBUTARY TO, OR DIRECTLY INTO SURFACE WATERS OF THE STATE, AS SPECIFIED IN ELEMENT 8: STABILIZE CHANNELS AND OUTLETS, PROVIDED THE DEWATERING FLOW DOES NOT CAUSE EROSION OR FLOODING OF RECEIVING WATERS. DO NOT ROUTE CLEAN DEWATERING WATER THROUGH STORMWATER SEDIMENT BMPS. NOTE THAT “SURFACE WATERS OF THE STATE” MAY EXIST ON A CONSTRUCTION SITE AS WELL AS OFF SITE; FOR EXAMPLE, A CREEK RUNNING THROUGH A SITE.

C. HANDLE HIGHLY TURBID OR OTHERWISE CONTAMINATED DEWATERING WATER SEPARATELY FROM STORM- WATER.

D. OTHER DEWATERING TREATMENT OR DISPOSAL OPTIONS MAY INCLUDE:

a. INFILTRATION.

b. TRANSPORT OFF SITE IN A VEHICLE, SUCH AS A VACUUM FLUSH TRUCK, FOR LEGAL DISPOSAL IN A MANNER THAT DOES NOT POLLUTE STATE WATERS.

c. ECOLOGY-APPROVED ON-SITE CHEMICAL TREATMENT OR OTHER SUITABLE TREATMENT TECHNOLOGIES.

d. SANITARY OR COMBINED SEWER DISCHARGE WITH LOCAL SEWER DISTRICT APPROVAL, IF THERE IS NO OTHER OPTION.

e. USE OF A SEDIMENTATION BAG THAT DISCHARGES TO A DITCH OR SWALE FOR SMALL VOLUMES OF LOCALIZED DEWATERING.

ADDITIONAL GUIDANCE FOR ELEMENT 10

- CHANNELS MUST BE STABILIZED, AS SPECIFIED IN ELEMENT 8: STABILIZE CHANNELS AND OUTLETS.
- CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM CAN CREATE HIGHLY TURBID OR CONTAMINATED DEWATERING WATER.
- DISCHARGING SEDIMENT-LADEN (MUDDY) WATER INTO WATERS OF THE STATE LIKELY CONSTITUTES VIOLATION OF WATER QUALITY STANDARDS FOR TURBIDITY. THE EASIEST WAY TO AVOID DISCHARGING MUDDY WATER IS THROUGH INFILTRATION AND PRESERVING VEGETATION.
- DEWATERING WATER FROM CONTAMINATED SITES MUST BE HANDLED SEPARATELY FROM STORMWATER. DIRECT CONTAMINATED STORMWATER TO A SANITARY SEWER WHERE ALLOWED BY THE LOCAL SEWER AUTHORITY, OR TO OTHER APPROVED TREATMENT.

SUGGESTED BMPS FOR ELEMENT 10

- BMP C203: WATER BARS
- BMP C236: VEGETATIVE FILTRATION

ELEMENT 11: MAINTAIN BMPS

A. MAINTAIN AND REPAIR ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMPS AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION IN ACCORDANCE WITH BMP SPECIFICATIONS.

B. REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL BMPS WITHIN 30 DAYS AFTER ACHIEVING FINAL SITE STABILIZATION OR AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED.

ADDITIONAL GUIDANCE FOR ELEMENT 11

- SOME TEMPORARY EROSION AND SEDIMENT CONTROL BMPS ARE BIODEGRADABLE AND DESIGNED TO REMAIN IN PLACE FOLLOWING CONSTRUCTION. BMP C122: NETS AND BLANKETS IS AN EXAMPLE OF A BMP WITH BIODEGRADABLE OPTIONS.
- PROVIDE PROTECTION TO ALL BMPS INSTALLED FOR THE PERMANENT CONTROL OF STORMWATER FROM SEDIMENT AND COMPACTION. ALL BMPS THAT ARE TO REMAIN IN PLACE FOLLOWING COMPLETION OF CONSTRUCTION SHALL BE EXAMINED AND PLACED IN FULL OPERATING CONDITIONS. IF SEDIMENT ENTERS THE BMPS DURING CONSTRUCTION, IT SHALL BE REMOVED AND THE FACILITY SHALL BE RETURNED TO THE CONDITIONS SPECIFIED IN THE CONSTRUCTION DOCUMENTS.
- REMOVE OR STABILIZE TRAPPED SEDIMENT ON SITE. PERMANENTLY STABILIZE DISTURBED SOIL RESULTING FROM REMOVAL OF BMPS OR VEGETATION.

SUGGESTED BMPS FOR ELEMENT 11

- BMP C150: MATERIALS ON HAND
- BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT 12: MANAGE THE PROJECT

A. PHASE DEVELOPMENT PROJECTS TO THE MAXIMUM DEGREE PRACTICABLE AND TAKE INTO ACCOUNT SEASONAL WORK LIMITATIONS.

B. INSPECT, MAINTAIN AND REPAIR ALL BMPS AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. PROJECTS REGULATED UNDER THE CONSTRUCTION STORMWATER GENERAL PERMIT (CSWGP) MUST CONDUCT SITE INSPECTIONS AND MONITORING IN ACCORDANCE WITH SPECIAL CONDITION S4 OF THE CSWGP.

C. MAINTAIN, UPDATE, AND IMPLEMENT THE CONSTRUCTION SWPPP.

D. PROJECTS THAT DISTURB ONE OR MORE ACRES MUST HAVE SITE INSPECTIONS CONDUCTED BY A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL). PROJECT SITES DISTURBING LESS THAN ONE ACRE MAY HAVE A CESCL OR A PERSON WITHOUT CESCL CERTIFICATION CONDUCT INSPECTIONS. BY THE INITIATION OF CONSTRUCTION, THE CONSTRUCTION SWPPP MUST IDENTIFY THE CESCL OR INSPECTOR, WHO MUST BE PRESENT ON SITE OR ON-CALL AT ALL TIMES.

ADDITIONAL GUIDANCE FOR ELEMENT 12

THE PROJECT MANAGER MUST ENSURE THAT THE PROJECT IS BUILT IN SUCH A WAY TO COMPLY WITH ALL CONSTRUCTION SWPPP ELEMENTS, AS DETAILED IN THIS SECTION. CONSIDERATIONS FOR THE PROJECT MANAGER INCLUDE, BUT ARE NOT LIMITED TO:

- CONSTRUCTION PHASING
- SEASONAL WORK LIMITATIONS
- COORDINATION WITH UTILITIES AND OTHER CONTRACTORS
- INSPECTION
- MONITORING
- MAINTAINING AN UPDATED CONSTRUCTION SWPPP

PHASING OF CONSTRUCTION

PHASE DEVELOPMENT PROJECTS WHERE FEASIBLE IN ORDER TO PREVENT SOIL EROSION AND TRANSPORTING OF SEDIMENT FROM THE SITE DURING CONSTRUCTION. REVEGETATE EXPOSED AREAS AND MAINTAIN THAT VEGETATION AS AN INTEGRAL PART OF THE CLEARING ACTIVITIES FOR ANY PHASE.

CLEARING AND GRADING ACTIVITIES FOR DEVELOPMENTS SHALL BE PERMITTED ONLY IF CONDUCTED USING AN APPROVED SITE DEVELOPMENT PLAN (E.G., SUBDIVISION APPROVAL) THAT ESTABLISHES PERMITTED AREAS OF CLEARING, GRADING, CUTTING, AND FILLING. MINIMIZE REMOVING TREES AND DISTURBING OR COMPACTING NATIVE SOILS WHEN ESTABLISHING PERMITTED CLEARING AND GRADING AREAS. SHOW ON THE SITE PLANS AND THE DEVELOPMENT SITE PERMITTED CLEARING AND GRADING AREAS AND ANY OTHER AREAS REQUIRED TO PRESERVE CRITICAL OR SENSITIVE AREAS, BUFFERS, NATIVE GROWTH PROTECTION EASEMENTS, OR TREE RETENTION AREAS AS MAY BE REQUIRED BY LOCAL JURISDICTIONS.

INSPECTION

ALL BMPS MUST BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. SITE INSPECTIONS MUST BE CONDUCTED BY A PERSON KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICES OF EROSION AND SEDIMENT CONTROL. THE PERSON MUST HAVE THE SKILLS TO 1) ASSESS THE SITE CONDITIONS AND CONSTRUCTION ACTIVITIES THAT COULD IMPACT THE QUALITY OF STORMWATER, AND 2) ASSESS THE EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES USED TO CONTROL THE QUALITY OF STORMWATER DISCHARGES.

FOR CONSTRUCTION SITES ONE ACRE OR LARGER THAT DISCHARGE STORMWATER TO SURFACE WATERS OF THE STATE, A CESCL MUST BE IDENTIFIED IN THE CONSTRUCTION SWPPP; THIS PERSON MUST BE ON-SITE OR ON-CALL AT ALL TIMES. CERTIFICATION MUST BE OBTAINED THROUGH AN APPROVED TRAINING PROGRAM THAT MEETS THE EROSION AND SEDIMENT CONTROL TRAINING STANDARDS ESTABLISHED BY ECOLOGY. SEE BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD.

APPROPRIATE BMPS OR DESIGN CHANGES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE WHENEVER INSPECTION AND/OR MONITORING REVEALS THAT THE BMPS IDENTIFIED IN THE CONSTRUCTION SWPPP ARE INADEQUATE, DUE TO THE ACTUAL DISCHARGE OF /OR POTENTIAL TO DISCHARGE A SIGNIFICANT AMOUNT OF ANY POLLUTANT.

THE CESCL OR INSPECTOR MUST EXAMINE STORMWATER VISUALLY FOR THE PRESENCE OF SUSPENDED SEDIMENT, TURBIDITY, DISCOLORATION, AND OIL SHEEN. THEY MUST EVALUATE THE EFFECTIVENESS OF BMPS AND DETERMINE IF IT IS NECESSARY TO INSTALL, MAINTAIN, OR REPAIR BMPS TO IMPROVE THE QUALITY OF STORMWATER DISCHARGES.

BASED ON THE RESULTS OF THE INSPECTION, CONSTRUCTION SITE OPERATORS MUST CORRECT THE PROBLEMS IDENTIFIED BY:

- REVIEWING THE CONSTRUCTION SWPPP FOR COMPLIANCE WITH THE 13 ELEMENTS AND MAKING APPROPRIATE REVISIONS WITHIN 7 DAYS OF THE INSPECTION.
- IMMEDIATELY BEGINNING THE PROCESS OF FULLY IMPLEMENTING AND MAINTAINING APPROPRIATE SOURCE CONTROL AND/OR TREATMENT BMPS AS SOON AS POSSIBLE, ADDRESSING THE PROBLEMS NO LATER THAN WITHIN 10 DAYS OF THE INSPECTION. IF INSTALLATION OF NECESSARY TREATMENT BMPS IS NOT FEASIBLE WITHIN 10 DAYS, THE CONSTRUCTION SITE OPERATOR MAY REQUEST AN EXTENSION WITHIN THE INITIAL 10- DAY RESPONSE PERIOD.
- DOCUMENTING BMP IMPLEMENTATION AND MAINTENANCE IN THE SITE LOG BOOK (APPLIES ONLY TO SITES THAT HAVE COVERAGE UNDER THE CONSTRUCTION STORMWATER GENERAL PERMIT).

THE CESCL MUST INSPECT ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES, ALL BMPS, AND ALL STORMWATER DISCHARGE POINTS AT LEAST ONCE EVERY CALENDAR WEEK AND WITHIN 24 HOURS OF ANY DISCHARGE FROM THE SITE. (FOR PURPOSES OF THIS CONDITION, INDIVIDUAL DISCHARGE EVENTS THAT LAST MORE THAN ONE DAY DO NOT REQUIRE DAILY INSPECTIONS. FOR EXAMPLE, IF A STORMWATER POND DISCHARGES CONTINUOUSLY OVER THE COURSE OF A WEEK, ONLY ONE INSPECTION IS REQUIRED THAT WEEK.) THE CESCL OR INSPECTOR MAY REDUCE THE INSPECTION FREQUENCY FOR TEMPORARY STABILIZED, INACTIVE SITES TO ONCE EVERY CALENDAR MONTH

MAINTAINING AN UPDATED CONSTRUCTION SWPPP

CESCL CONTACT INFORMATION SHALL BE PROVIDED TO THE CITY OF FERNDALE AT OR BEFORE PRE-CONSTRUCION. THE CONSTRUCTION SWPPP WILL BE RETAINED ON-SITE AND WILL BE UPDATED ON A REGULAR BASIS. MODIFICATIONS TO THE CONSTRUCTION SWPPP WILL BE MADE WHENEVER THERE IS A SIGNIFICANT CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF ANY BMP.

RETAIN THE CONSTRUCTION SWPPP ON-SITE OR WITHIN REASONABLE ACCESS TO THE SITE.

MODIFY THE CONSTRUCTION SWPPP WHENEVER THERE IS A CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE AT THE CONSTRUCTION SITE THAT HAS, OR COULD HAVE, A SIGNIFICANT EFFECT ON THE DISCHARGE OF POLLUTANTS TO WATERS OF THE STATE.

THE CONSTRUCTION SWPPP MUST BE MODIFIED IF, DURING INSPECTIONS OR INVESTIGATIONS CONDUCTED BY THE OWNER/OPERATOR, OR THE APPLICABLE LOCAL OR STATE REGULATORY AUTHORITY, IT IS DETERMINED THAT THE CONSTRUCTION SWPPP IS INEFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING POLLUTANTS IN STORMWATER DIS- CHARGES FROM THE SITE. MODIFY THE CONSTRUCTION SWPPP AS NECESSARY TO INCLUDE ADDITIONAL OR MODIFIED BMPS DESIGNED TO CORRECT PROBLEMS IDENTIFIED. COMPLETE REVISIONS TO THE CONSTRUCTION SWPPP WITHIN SEVEN (7) DAYS FOLLOWING THE INSPECTION.

SUGGESTED BMPS FOR ELEMENT 12

- BMP C150: MATERIALS ON HAND
- BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD
- BMP C162: SCHEDULING

ELEMENT 13: PROTECT LOW IMPACT DEVELOPMENT BMPS

THE PRIMARY PURPOSE OF ON-SITE STORMWATER MANAGEMENT IS TO REDUCE THE DISRUPTION OF THE NATURAL SITE HYDROLOGY THROUGH INFILTRATION. BMPS USED TO MEET I-3.4.5 MR5: ON-SITE STORMWATER MANAGEMENT (OFTEN CALLED LID BMPS) ARE PERMANENT FACILITIES.

A. PROTECT ALL LID BMPS (INCLUDING, BUT NOT LIMITED TO BMP T7.30: BIORETENTION, BMP T5.14: RAIN GARDENS, AND BMP T5.15: PERMEABLE PAVEMENTS) FROM SEDIMENTATION THROUGH INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL BMPS ON PORTIONS OF THE SITE THAT DRAIN INTO THE LID BMPS. RESTORE THE BMPS TO THEIR FULLY FUNCTIONING CONDITION IF THEY ACCUMULATE SEDIMENT DURING CONSTRUCTION. RESTORING THE BMP MUST INCLUDE REMOVAL OF SEDIMENT AND ANY SEDIMENT-LADEN BIORETENTION/RAIN GARDEN SOILS, AND REPLACING THE REMOVED SOILS WITH SOILS MEETING THE DESIGN SPECIFICATION.

B. MAINTAIN THE INFILTRATION CAPABILITIES OF LID BMPS BY PROTECTING AGAINST COMPACTION BY CONSTRUCTION EQUIPMENT AND FOOT TRAFFIC. PROTECT COMPLETED LAWN AND LANDSCAPED AREAS FROM COMPACTION DUE TO CONSTRUCTION EQUIPMENT.

C. CONTROL EROSION AND AVOID INTRODUCING SEDIMENT FROM SURROUNDING LAND USES ONTO BMP T5.15: PERMEABLE PAVEMENTS. DO NOT ALLOW MUDDY CONSTRUCTION EQUIPMENT ON THE BASE MATERIAL OR PAVEMENT. DO NOT ALLOW SEDIMENT-LADEN RUNOFF ONTO PERMEABLE PAVEMENTS OR BASE MATERIALS.

D. PERMEABLE PAVEMENT FOULED WITH SEDIMENTS OR NO LONGER PASSING AN INITIAL INFILTRATION TEST MUST BE CLEANED USING PROCEDURES IN ACCORDANCE WITH THIS MANUAL OR THE MANUFACTURER'S PROCEDURES.

E. KEEP ALL HEAVY EQUIPMENT OFF EXISTING SOILS UNDER LID BMPS THAT HAVE BEEN EXCAVATED TO FINAL GRADE TO RETAIN THE INFILTRATION RATE OF THE SOILS.

ADDITIONAL GUIDANCE FOR ELEMENT 13

SEE CHAPTER 5: PRECISION SITE PREPARATION, CONSTRUCTION & INSPECTION OF LID FACILITIES IN THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND (HINMAN AND WULKAN, 2012) FOR MORE DETAIL ON PROTECTING LID INTEGRATED MANAGEMENT PRACTICES.

NOTE THAT THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND (HINMAN AND WULKAN, 2012) IS FOR ADDITIONAL INFORMATIONAL PURPOSES ONLY. YOU MUST FOLLOW THE GUIDANCE WITHIN THIS MANUAL IF THERE ARE ANY DISCREPANCIES BETWEEN THIS MANUAL AND THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND

(HINMAN AND WULKAN, 2012).

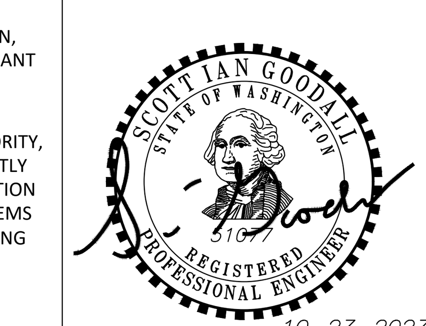
SUGGESTED BMPS FOR ELEMENT 13

- BMP C102: BUFFER ZONES
- BMP C103: HIGH-VISIBILITY FENCE
- BMP C200: INTERCEPTOR DIKE AND SWALE
- BMP C201: GRASS-LINED CHANNELS
- BMP C207: CHECK DAMS
- BMP C208: TRIANGULAR SILT DIKE (TSD)
- BMP C231: BRUSH BARRIER
- BMP C233: SILT FENCE
- BMP C234: VEGETATED STRIP

A STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM



10–23–2023

ABC RECYCLING
STORMWATER POLUTION PROTECTION PLAN
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

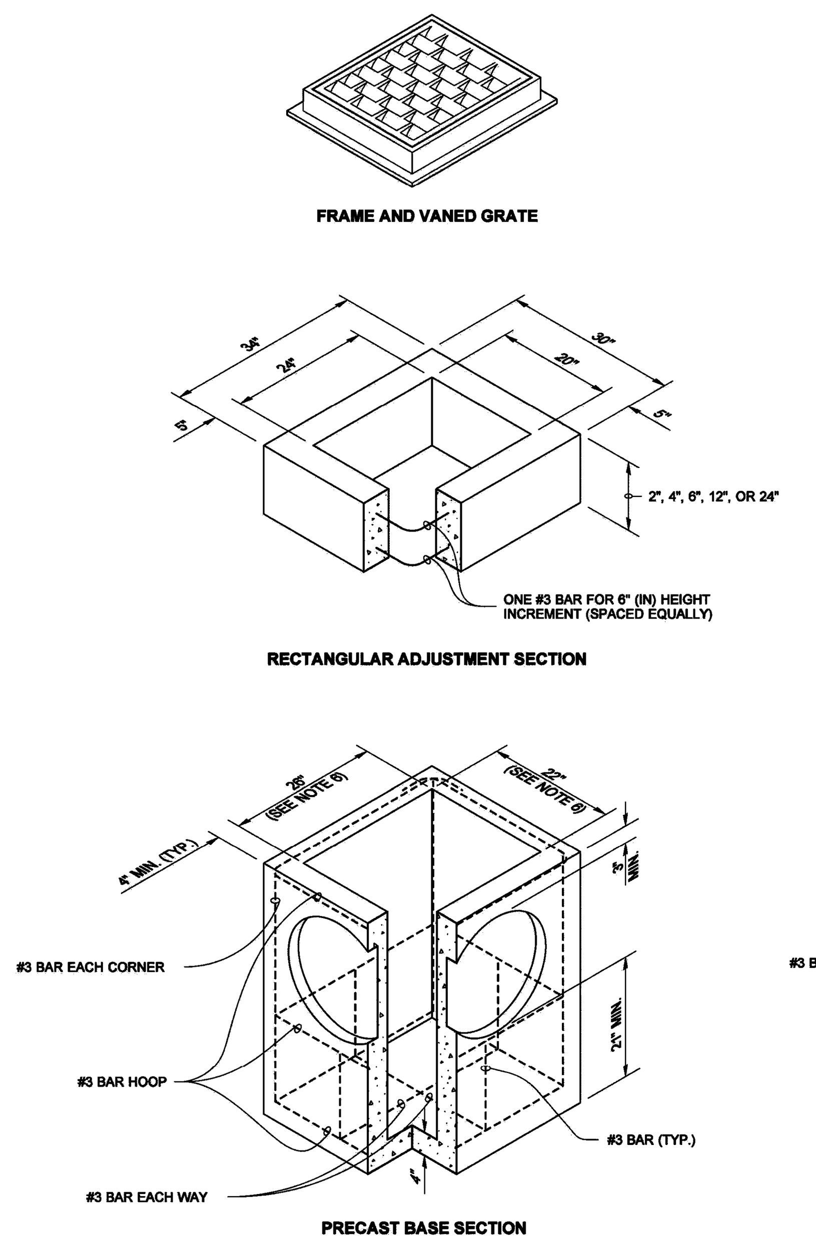
REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023



PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER (INCHES)
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP * (STD. SPEC. SECT. 9-05.20)	12"
SOLID WALL PVC (STD. SPEC. SECT. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. SECT. 9-05.12(2))	15"

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the **ALTERNATIVE PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3**.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1 : 24 or steeper.
6. The opening shall be measured at the top of the **Precast Base Section**.
7. All pickup holes shall be grouted full after the basin has been placed.

JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

Julie Heilman 2020.09.01 07:52:50 -07'00'

CATCH BASIN TYPE 1

STANDARD PLAN B-5.20-03

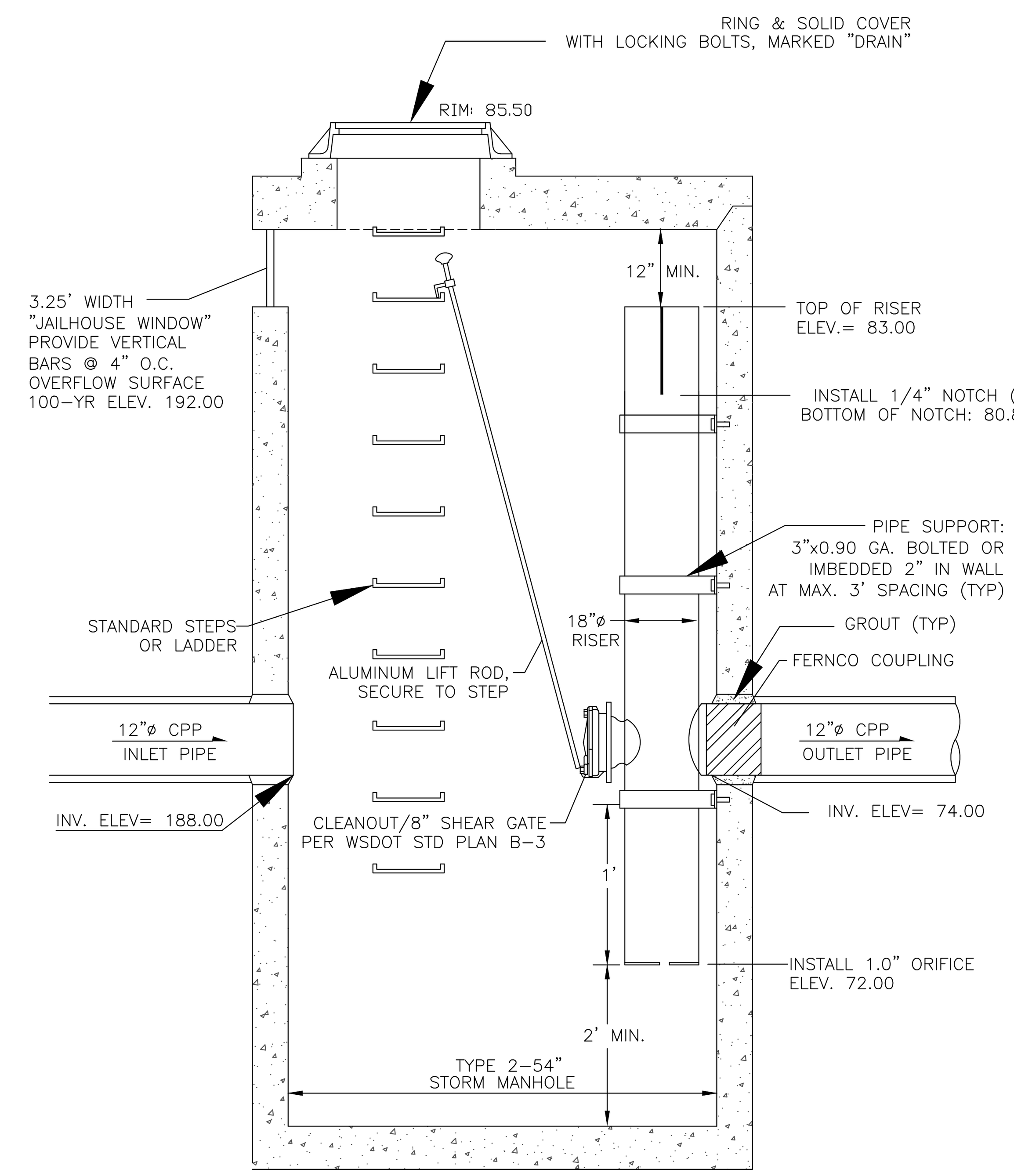
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Roark, Steve
STATE DESIGN ENGINEER
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

CATCH BASIN TYPE 1

NTS



NOTES:

THE PIPE SUPPORTS AND THE FLOW RESTRICTOR SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND BE ANCHORED AT A MAXIMUM SPACING OF 36" (IN). ATTACH THE PIPE SUPPORTS TO THE MANHOLE WITH 5/8" (IN) STAINLESS STEEL EXPANSION BOLTS OR EMBED THE SUPPORTS INTO THE MANHOLE WALL 2" (IN).

THE VERTICAL RISER STEM OF THE FLOW RESTRICTOR SHALL BE THE SAME DIAMETER AS THE HORIZONTAL OUTLET PIPE.

THE FLOW RESTRICTOR SHALL BE FABRICATED FROM ONE OF THE FOLLOWING MATERIALS:

0.060" (IN) CORRUGATED ALUMINUM ALLOY DRAIN PIPE
0.064" (IN) CORRUGATED GALVANIZED STEEL DRAIN PIPE WITH TREATMENT 1
0.064" (IN) CORRUGATED ALUMINIZED STEEL DRAIN PIPE
0.060" (IN) ALUMINUM ALLOY FLAT SHEET, IN ACCORDANCE WITH ASTM B 209, 5052 H32 OR EPS
HIGH DENSITY POLYETHYLENE STORM SEWER PIPE

THE FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT: THE SHEAR GATE IS VISIBLE FROM THE TOP; THE CLIMB-DOWN SPACE IS CLEAR OF THE RISER AND GATE; THE FRAME IS CLEAR OF THE CURB.

THE SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26 AND ASTM B 275, DESIGNATION ZG32A; OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B.

THE LIFT HANDLE SHALL BE MADE OF A SIMILAR METAL TO THE GATE (TO PREVENT GALVANIC CORROSION), IT MAY BE OF SOLID ROD OR HOLLOW TUBING, WITH ADJUSTABLE HOOK AS REQUIRED.

A NEOPRENE RUBBER GASKET IS REQUIRED BETWEEN THE RISER MOUNTING FLANGE AND THE GATE FLANGE.

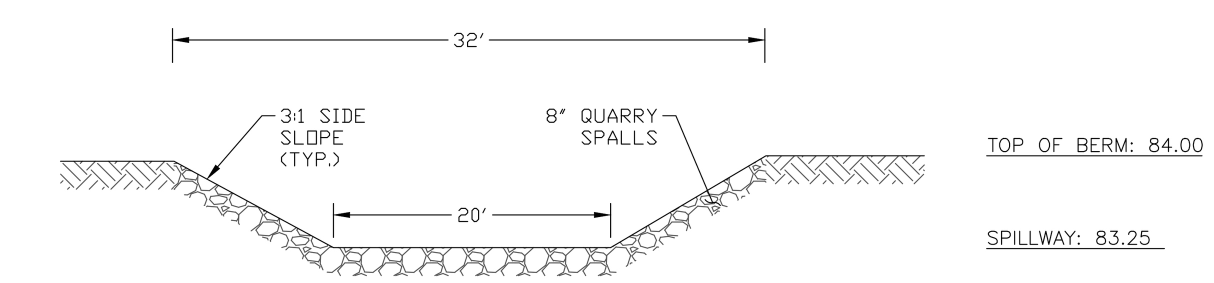
INSTALL THE GATE SO THAT THE LEVEL-LINE MARK IS LEVEL WHEN THE GATE IS CLOSED.

THE MATING SURFACES OF THE LID AND THE BODY SHALL BE MACHINED FOR PROPER FIT.

ALL SHEAR GATE BOLTS SHALL BE STAINLESS STEEL.

THE SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, A STOP TAB, OR SOME OTHER DEVICE.

ALTERNATIVE SHEAR GATE DESIGNS ARE ACCEPTABLE IF MATERIAL SPECIFICATIONS ARE MET.



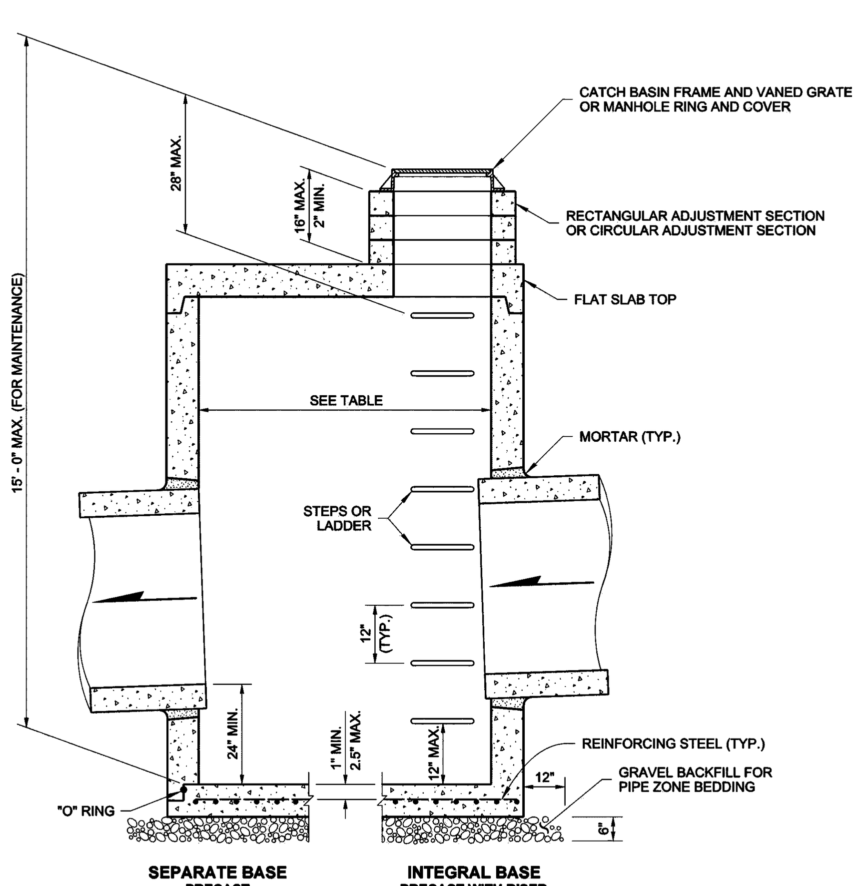
CONTROL STRUCTURE

NTS

EMERGENCY OVERFLOW SPILLWAY DETAIL

NTS

DRAWN BY: FERN LIDDELL



NOTES

1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3.**

CATCH BASIN DIMENSIONS				
CATCH BASIN DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
54"	4.5"	8"	42"	8"
60"	5"	8"	48"	8"
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	8"	12"	84"	12"
120"	10"	12"	96"	12"
144"	12"	12"	108"	12"

PIPE ALLOWANCES					
CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER				
	CONCRETE	ALL METAL	CPSSP ① PP ④	SOLID WALL PVC ②	PROFILE WALL PVC ③
48"	24"	30"	24"	30"	30"
54"	30"	36"	30"	36"	36"
60"	36"	42"	36"	42"	42"
72"	42"	54"	42"	48"	48"
84"	54"	60"	54"	48"	48"
96"	60"	72"	60"	48"	48"
120"	66"	84"	60"	48"	48"
144"	78"	96"	60"	48"	48"

① Corrugated Polyethylene Storm Sewer Pipe (See **Standard Specification Section 9-05.20**)
② (See **Standard Specification Section 9-05.12(1)**)
③ (See **Standard Specification Section 9-05.12(2)**)
④ Polypropylene Pipe (See **Standard Specification Section 9-05.24**)

JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

Heilman, Julie Feb 20 2018 12:49 PM cosign

CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-02

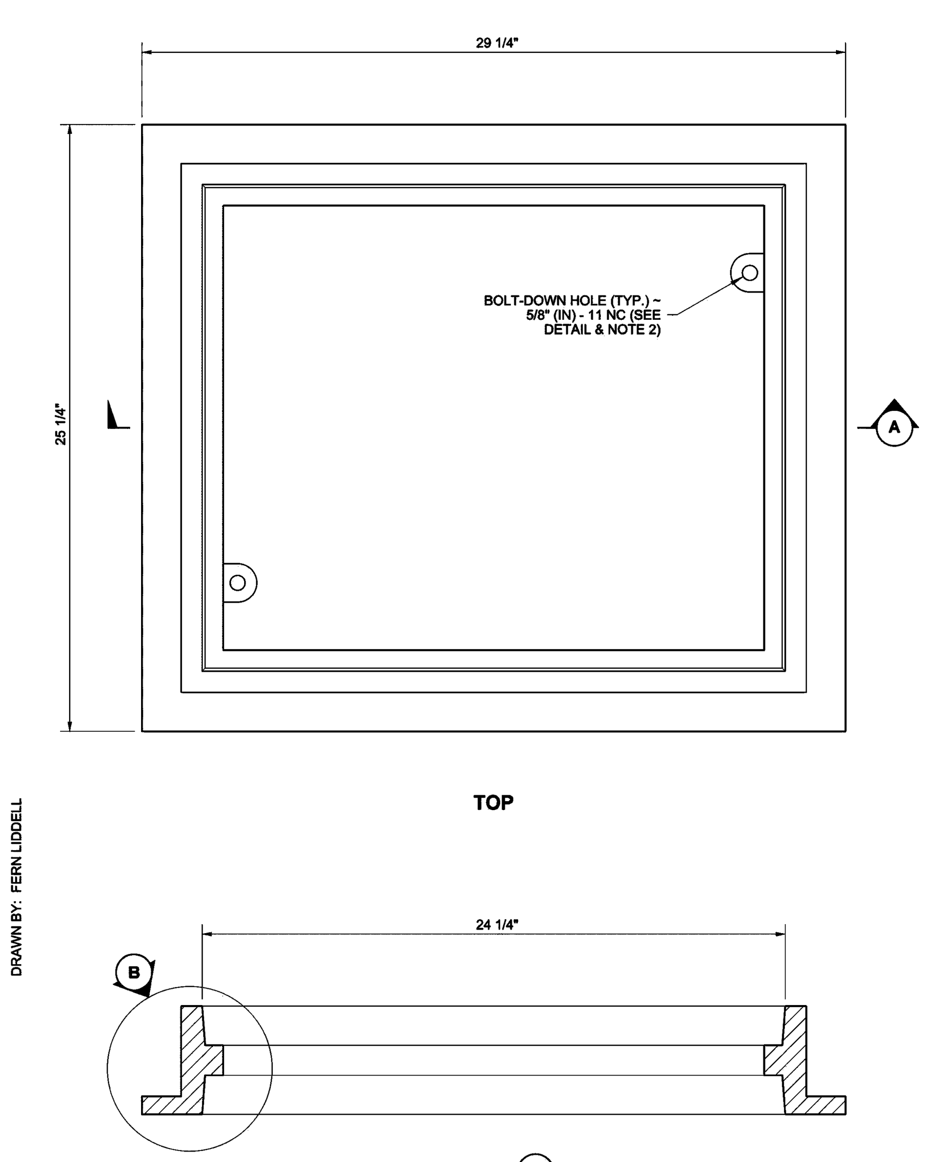
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION
Carpenter, Jeff Mar 2 2018 10:01 AM
STATE DESIGN ENGINEER
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

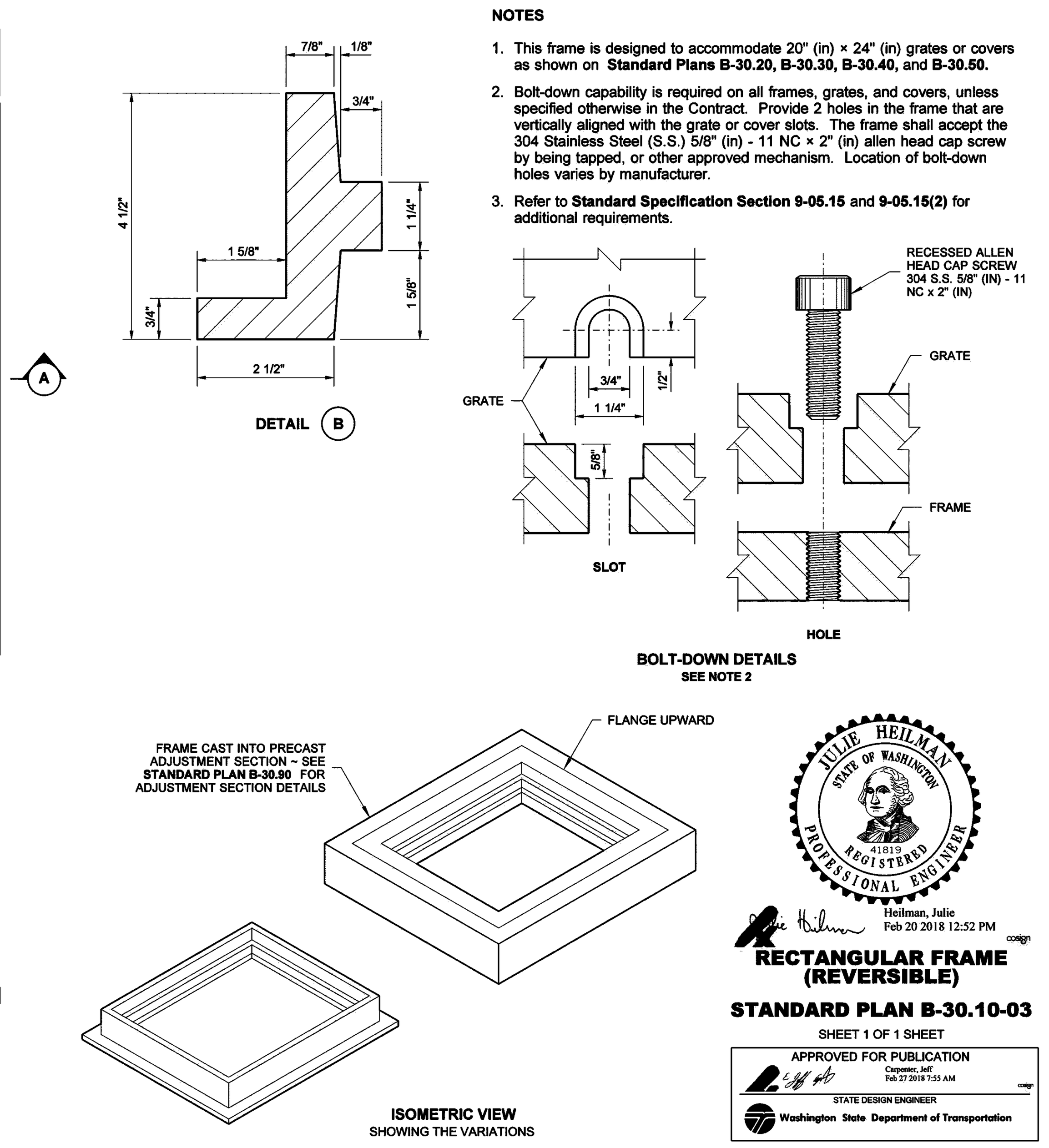
CATCH BASIN TYPE 2

NTS



NOTES

1. This frame is designed to accommodate 20" (in) × 24" (in) grates or covers as shown on **Standard Plans B-30.20, B-30.30, B-30.40,** and **B-30.50.**
2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.



JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

Heilman, Julie Feb 20 2018 12:52 PM

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-03

SHEET 1 OF 1 SHEET

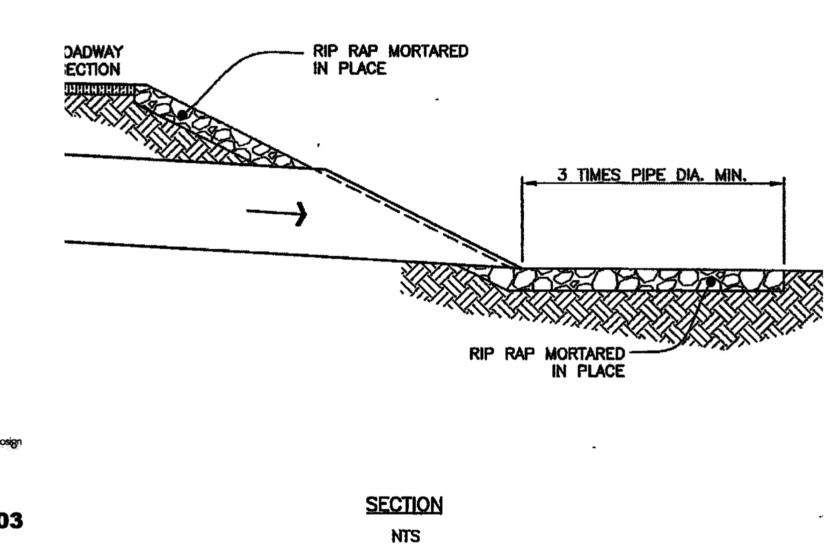
APPROVED FOR PUBLICATION
Carpenter, Jeff
STATE DESIGN ENGINEER
Washington State Department of Transportation

RECTANGULAR FRAME (REVERSIBLE)

NTS

NOTES:

1. INSTALL STRAW ROLLS ON SLOPES GREATER THAN .
2. INSTALL ALONG OUTER EXTENT OF CRITICAL AREAS BUFFER AT MINIMUM. TARGET TOE OF SLOPE AREAS WHERE FILL FROM JAMES STREET IS TO BE INSTALLED AT 3:1 MAXIMUM SLOPE.
3. SEE PLAN VIEW FOR ANTICIPATED INSTALLATION LOCATIONS(S).



STORM PIPE OUTLET PROTECTION

NTS

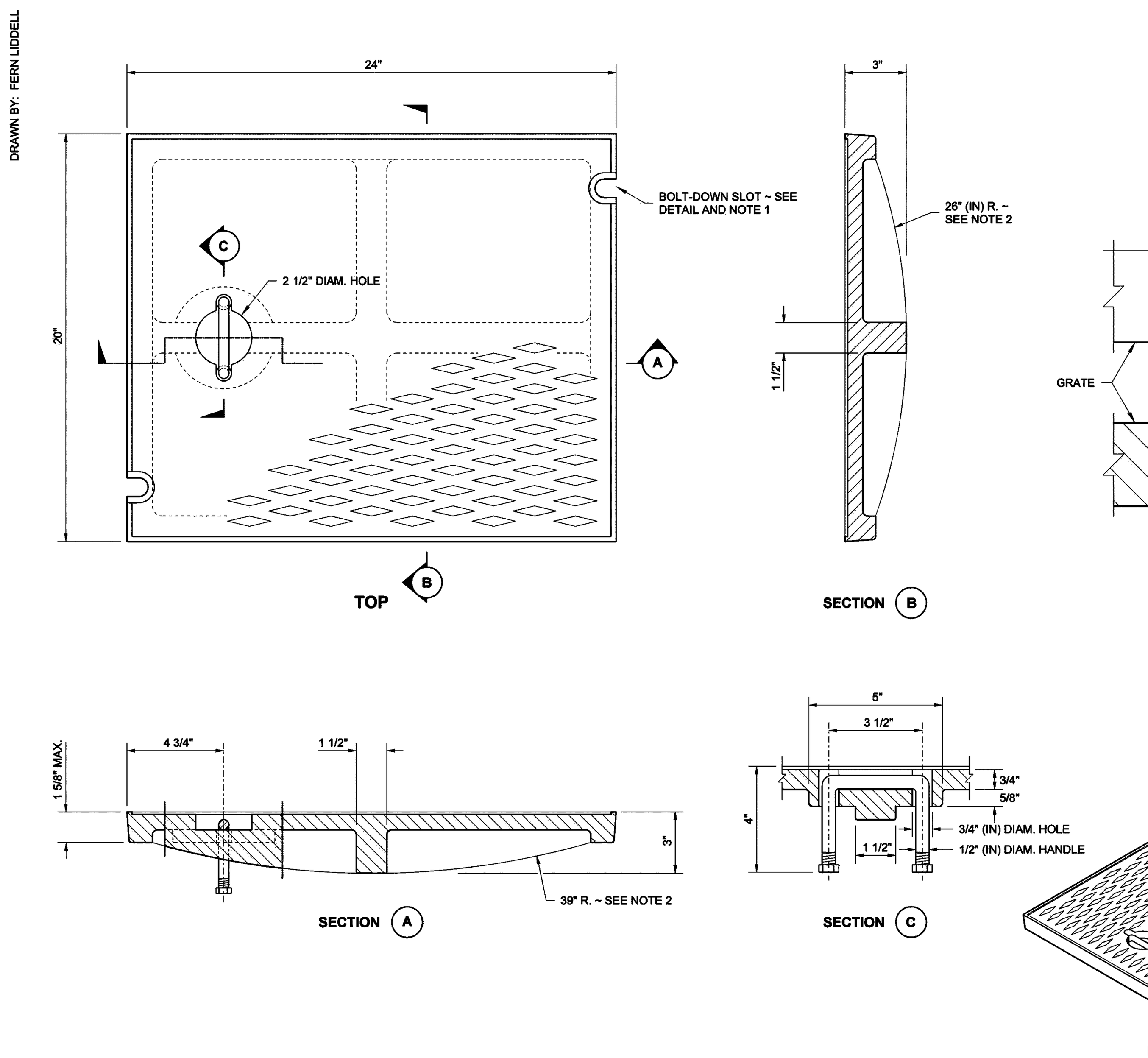
IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
03.15.2022

ABC RECYCLING
STORM DRAIN DETAILS-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

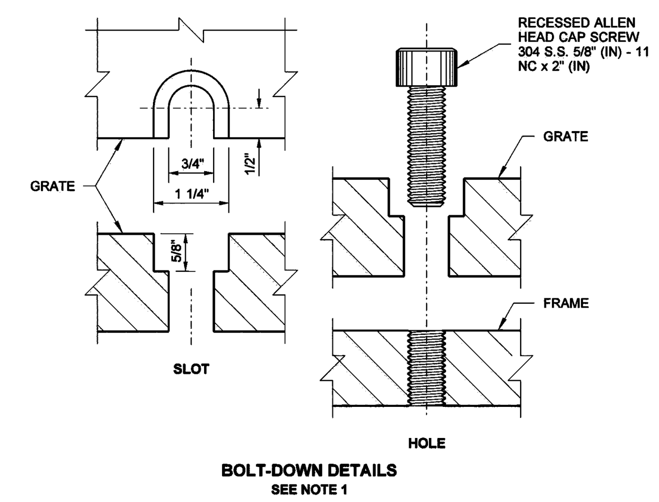
REV	DATE	BY	DESCRIPTION

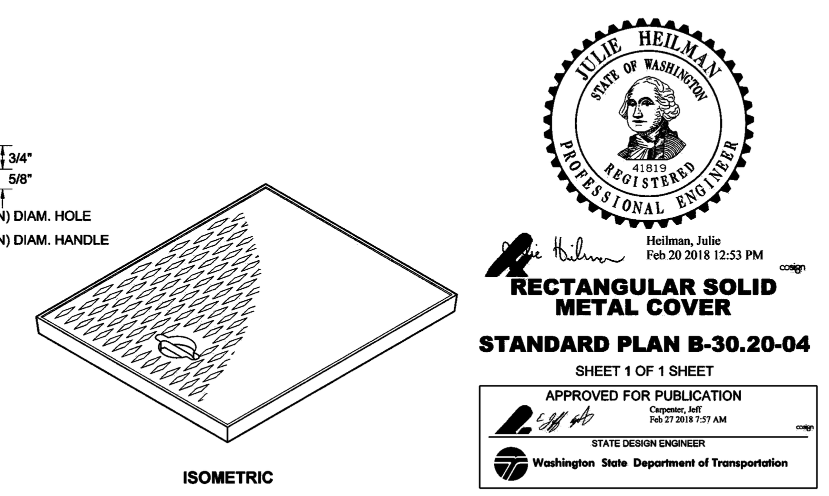
PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023



NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Alternative reinforcing designs are acceptable in lieu of the rib design.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.
4. For frame details, see **Standard Plan B-30.10.**

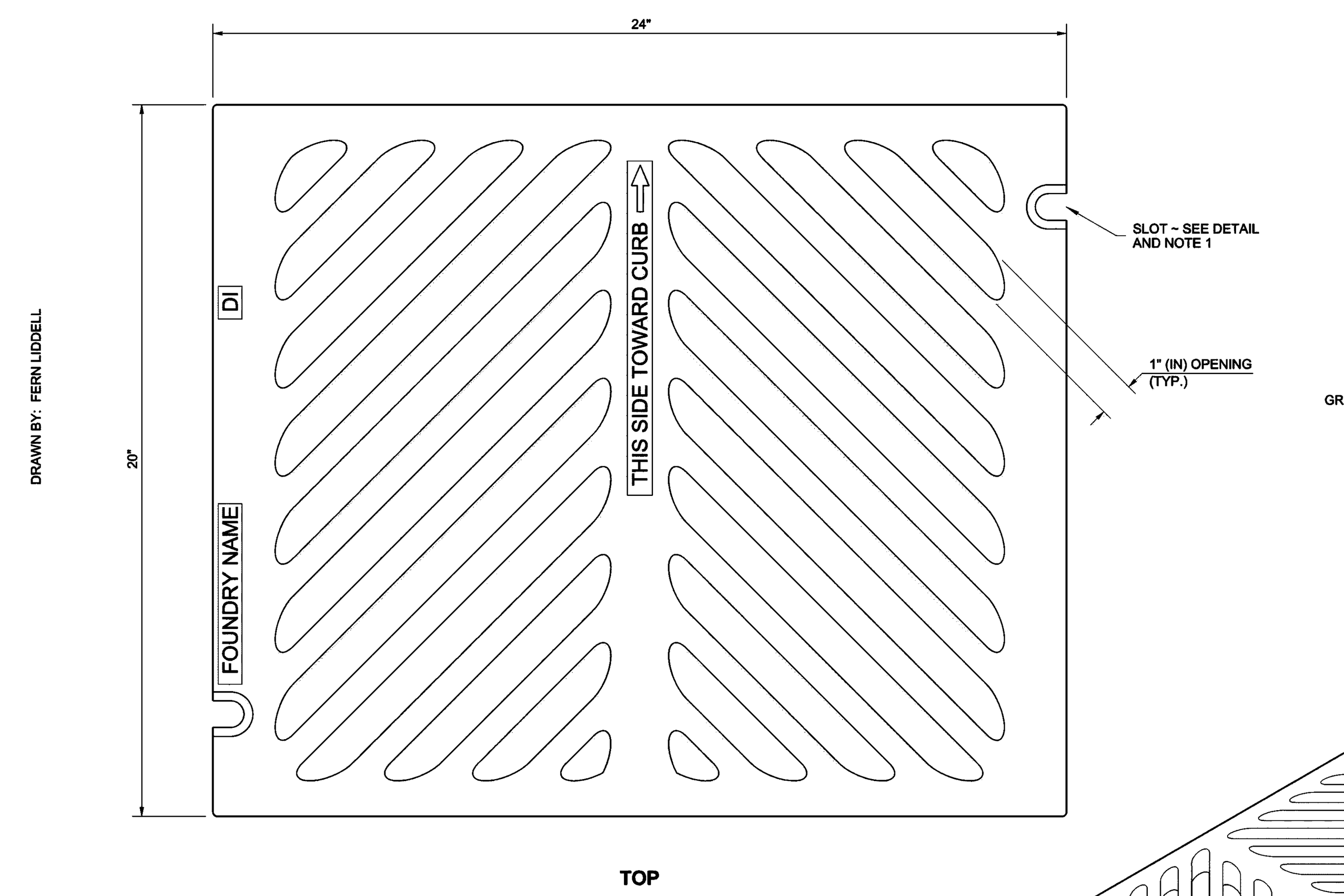




RECTANGULAR SOLID METAL COVER
STANDARD PLAN B-30.20-04
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

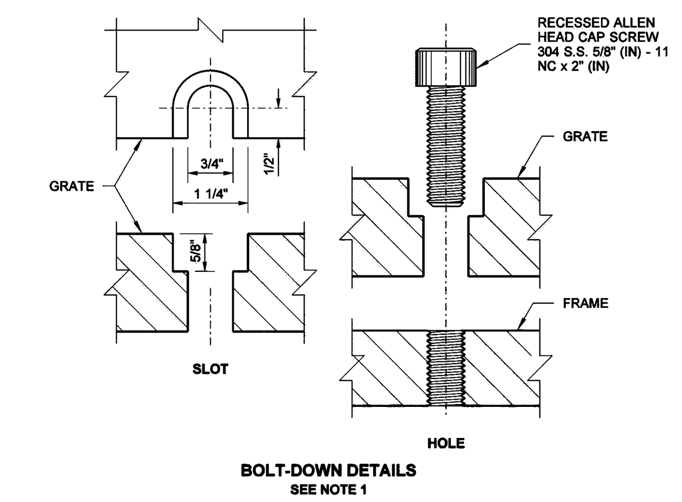
RECTANGULAR SOLID METAL COVER

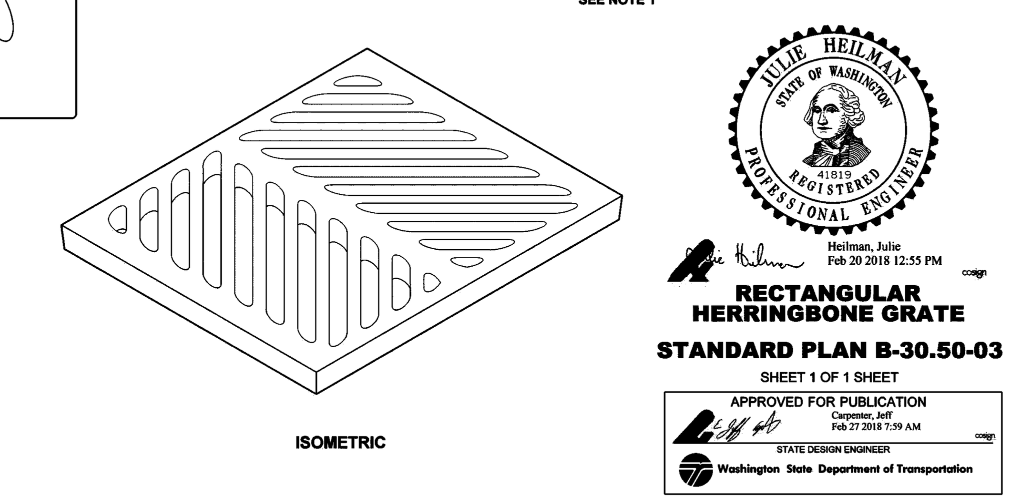
NTS



NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Refer to **Standard Specification section 9-05.15,** and **9-05.15(2)** for additional requirements.
3. For frame details, see **Standard Plan B-30.10**.
4. The thickness of the grate shall not exceed 1 5/8" (in).

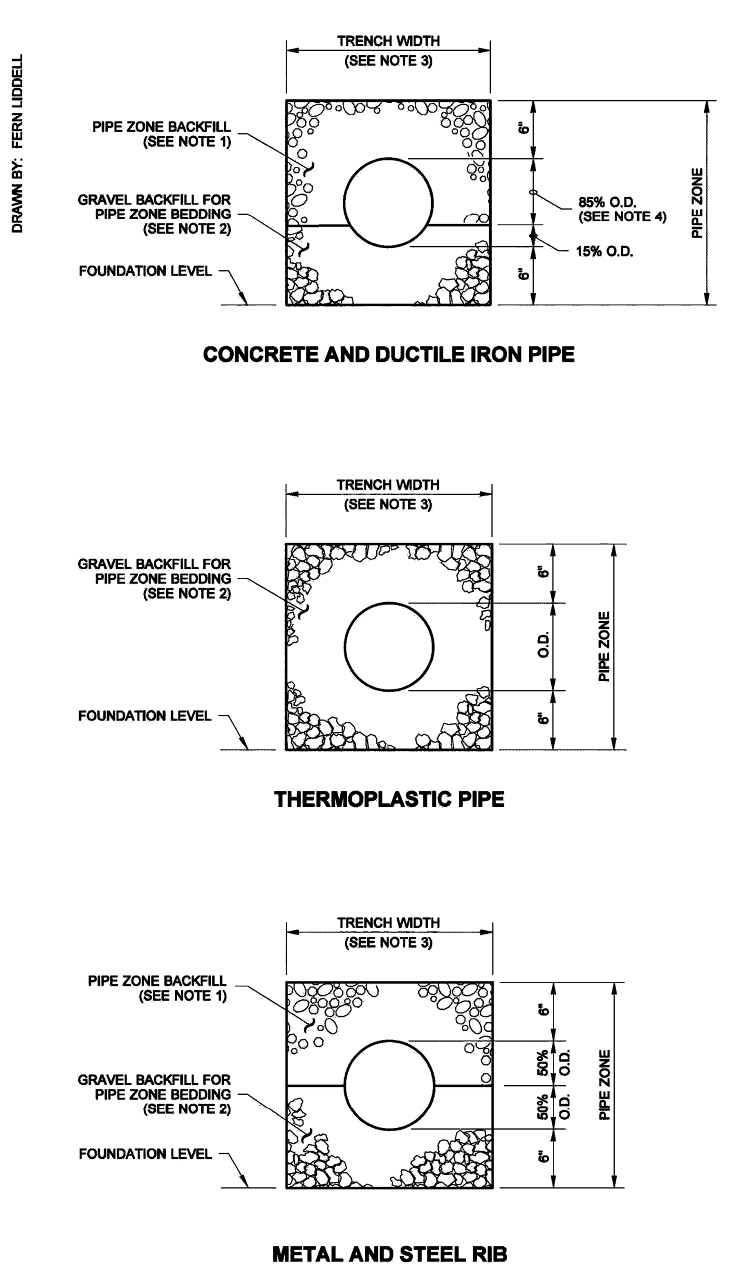


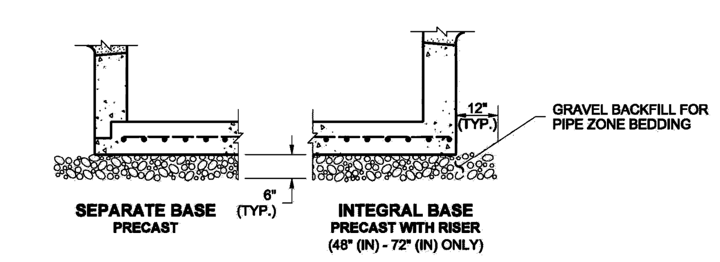


RECTANGULAR HERRINGBONE GRATE
STANDARD PLAN B-30.50-03
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

RECTANGULAR HERRINGBONE GRATE

NTS



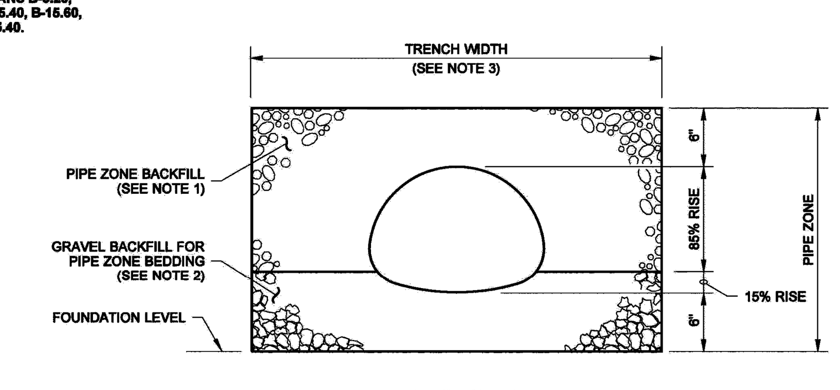


TYPICAL CONDITION FOR DRAINAGE STRUCTURE

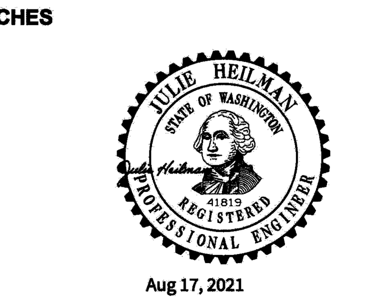
THIS DETAIL APPLIES TO STANDARD PLANS B-5.20, B-5.40, B-5.60, B-10.20, B-10.40, B-15.20, B-15.40, B-15.60, B-25.20, B-25.60, B-30.20 AND B-30.40.

NOTES

1. See **Standard Specifications Section 7-08.3(3)** for Pipe Zone Backfill.
2. See **Standard Specifications Section 9-03.12(3)** for Gravel Backfill for Pipe Zone Bedding.
3. See **Standard Specifications Section 2-09.4** for Measurement of Trench Width.
4. For sanitary sewer installation, concrete pipe shall be imbedded to spring line.



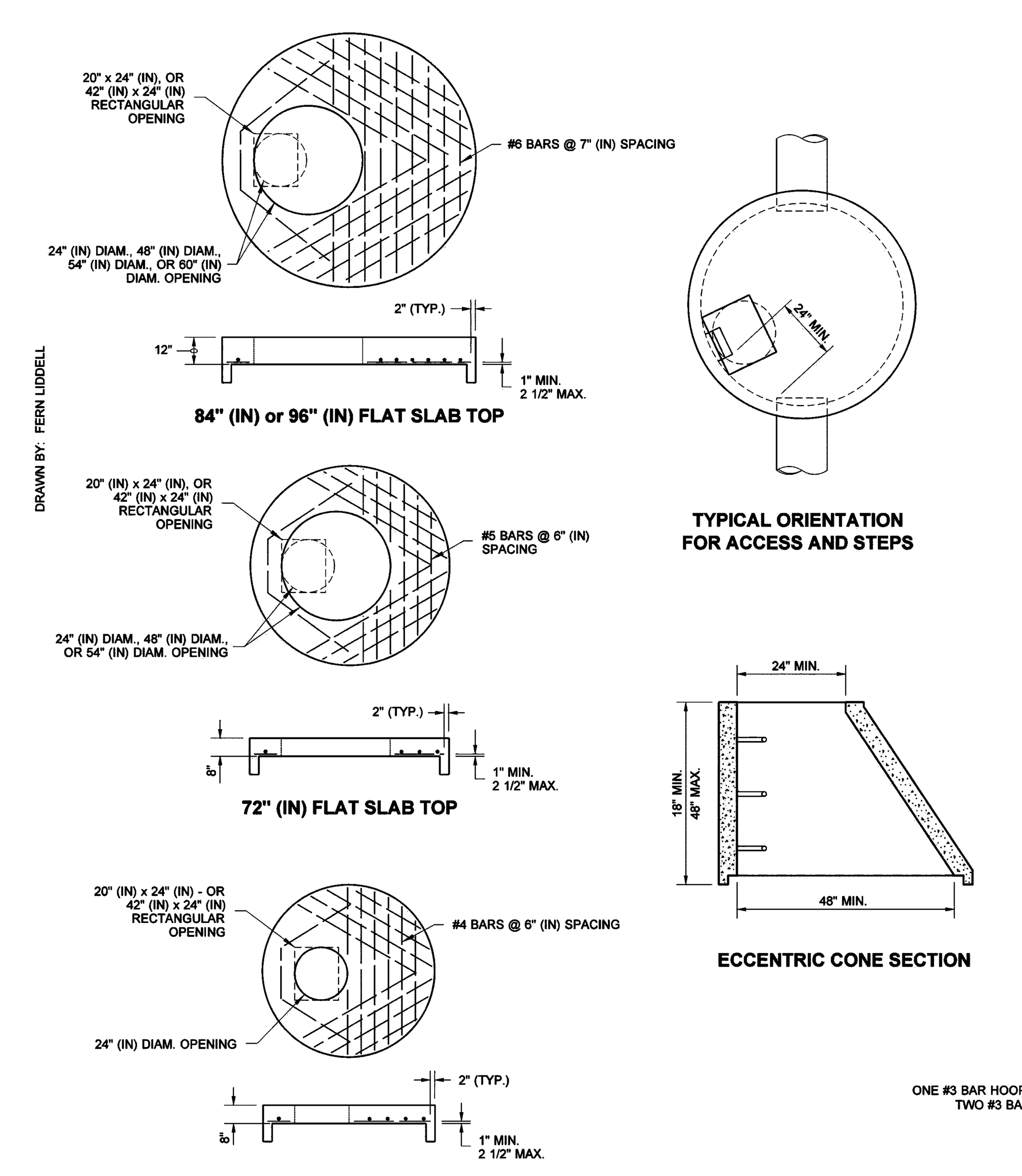
CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS		
PIPE	SIZE	MINIMUM DISTANCE BETWEEN BARRELS
CIRCULAR PIPE (DIAMETER)	UP TO 48"	24"
METAL PIPE ARCH (SPAN)	48" AND LARGER	DIAMETER/2 OR 36" WHICHEVER IS LESS



PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-55.20-03
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Aug 17, 2021
STATE DESIGN ENGINEER
Washington State Department of Transportation

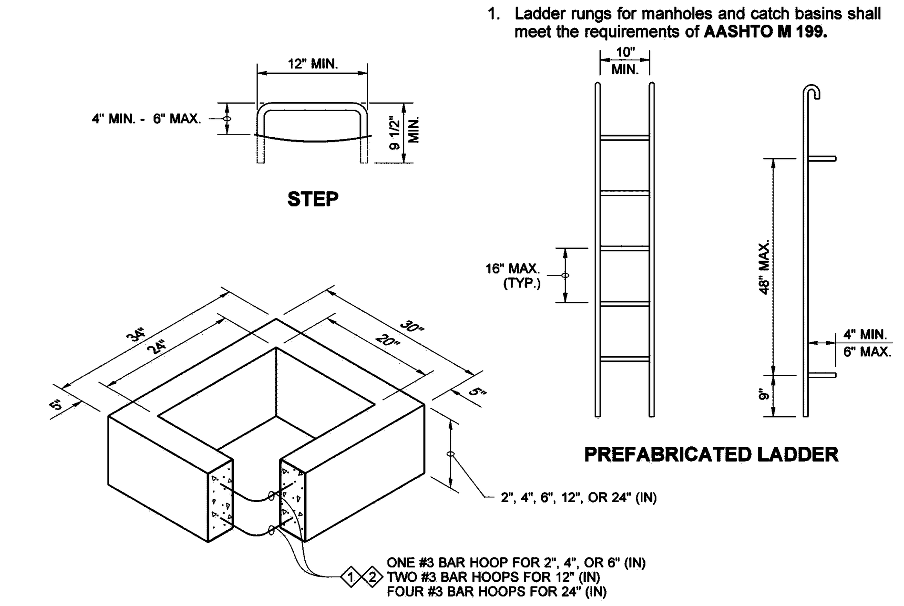
PIPE ZONE BEDDING AND BACKFILL

NTS



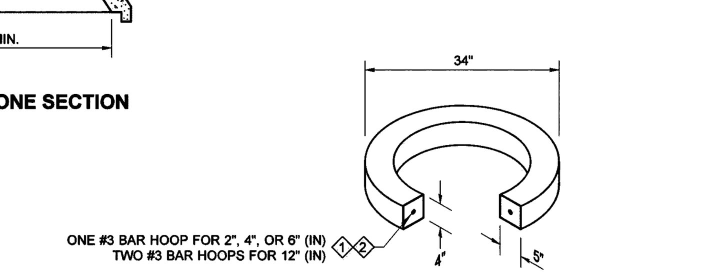
NOTE

1. Ladder rungs for manholes and catch basins shall meet the requirements of **AASHTO M 199.**



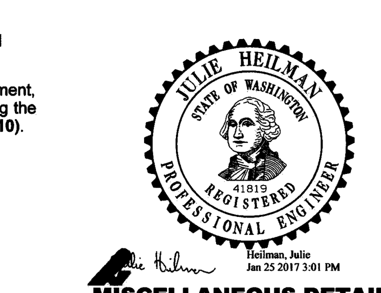
RECTANGULAR ADJUSTMENT SECTION

1. As an acceptable alternative to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used for adjustment sections.
2. As an acceptable alternative to conventional steel reinforcment, manufacturers shall use Synthetic Structural Fibers meeting the requirements of **Standard Specification Section 9-05.50(10)**.



CIRCULAR ADJUSTMENT SECTION

For rectangular and circular adjustment sections, approved alternate material compositions are acceptable in lieu of precast concrete designs



MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES
STANDARD PLAN B-30.90-02
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES

NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

ABC RECYCLING
STORM DRAIN DETAILS-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

GRATING PACIFIC

ACO DRAIN - KLASSIKDRAIN K300/KS300

Polymer Concrete Catch Basins

Polymer concrete catch basins are used either as stand alone area drains or more commonly as the outlet to a trench run. They provide the highest hydraulic output and allow easy access to the pipe system for maintenance.

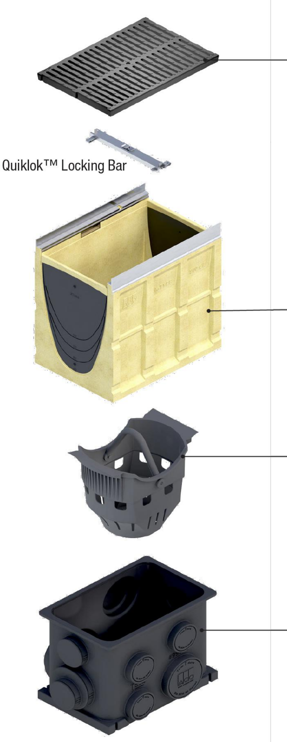
In-line Type 903 and 904 catch basins same width and visually indistinguishable from trench run.

K300 Catch Basins Parts Table

Part Description	Part No. K300	Part No. KS300	Volume Gallons*	Weight lbs.
K3-903 in-line catch basin - 19.69"	94614	94615	30.4	88.0
K3-904 in-line catch basin - 19.69"	94635	94636	40.2	98.0
Series 600 optional riser	99902		9.8	10.0
Foul air trap - fits both 902 & 600 basins	90854		—	1.2

*Volume is up to grate seat and without trash bucket.

K3-Type 903
12 in. Wide In-Line Catch Basin



Grates - choice of grates to match/complement channel with DrainLok™ or QuickLok™ boltless locking. QuickLok™ grates require a removable QuickLok™ locking bar for easy access to trash bucket and pipework.

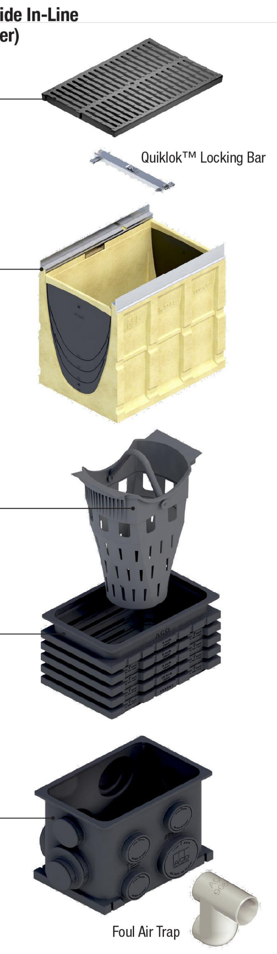
Top section - polymer concrete with integrally cast-in galvanized or stainless steel frame. Guides aid connection of male channel ends at #10, 20, 30 and 40 depths. Other channels can be connected by removing wall to required height. Blanking end rail supplied.

Trash bucket - plastic trash bucket designed to collect debris washed from trench run. Supported in catch basin top to avoid creation of a vacuum and reduction in outflow. K3-904 uses deeper bucket with riser.

Riser - a plastic riser, supplied with K3-904, designed to provide additional catch basin depth and hydraulic output. Guides enable cutting to size at 2" intervals - minimum 2" and maximum 12" height. Additional units can be used (a maximum of 2 is recommended to ensure snake access is maintained and for structural stability). Contact Grating Pacific for non-polyethylene riser.

Base - polyethylene bases with wide range of Schedule 40 4", 6" and 8" cut-outs for easy pipe connection. Cut-outs on end and side allow connection of ACO foul air trap. Contact Grating Pacific for non-polyethylene bases.

K3-Type 904 12 in. Wide In-Line Catch Basin (with riser)



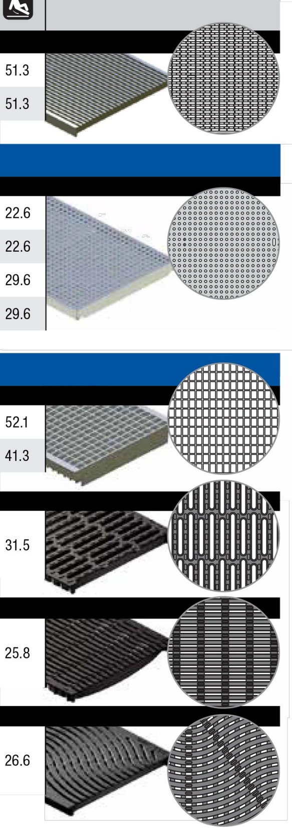
Page 1 of 1

GRATING PACIFIC

Locking mechanism
Compliant with Americans with Disabilities Act of 1990 Section 4.5.5
ASME A112.6.3 - 2001 Heel resistant less than 0.31" (8mm)
Heel safe equal or less than 0.25" (6.5mm)
Bicycle Safe compliant to Australian Standard AS 3996 - 2006
Anti-slip grates - BPN over 24

KLASSIKDRAIN K300/KS300 DRAINLOK™ GRATES

Description	Part No.	Length in.	Slot Size in.	Intake Area sq. in.	Wgt. lbs.	Locking mechanism	ADA	Heel resistant	Heel safe	Bicycle safe	Anti-slip
LOAD CLASS A - 3,500 LBS. - EN 1433 (58 PSI) PEDESTRIAN											
LONGITUDINAL STAINLESS											
Type 847D - stainless	142223	39.37"	0.81 x 0.24	263.2	28.6	DL	✔	✔	✔	✔	51.3
Type 848D - stainless	142224	19.69"	0.81 x 0.24	131.6	14.5	DL	✔	✔	✔	✔	51.3
*Grade 304 stainless steel											
LOAD CLASS B - 28,000 LBS. - EN 1433 (483 PSI) LIGHT DUTY											
PERFORATED SLOTTED STEEL											
Type 811D - galvanized	138090	39.37"	0.25 dia.	64.8	30.9	DL	✔	✔	✔	✔	22.6
Type 813D - galvanized	138091	19.69"	0.25 dia.	31.9	15.0	DL	✔	✔	✔	✔	22.6
Type 865D - stainless*	138092	39.37"	0.25 dia.	64.8	30.9	DL	✔	✔	✔	✔	29.6
Type 866D - stainless*	138093	19.69"	0.25 dia.	31.9	15.0	DL	✔	✔	✔	✔	29.6
*Grade 304 stainless steel											
LOAD CLASS C - 56,000 LBS. - EN 1433 (967 PSI) COMMERCIAL VEHICLE											
MESH STEEL											
Type 805D - galvanized	13819	19.69"	0.63 x 0.87	163.7	29.5	DL	✘	✘	✘	✔	52.1
Type 830D - stainless*	13849	19.69"	0.63 x 0.87	163.7	29.5	DL	✘	✘	✘	✔	41.3
*Grade 304 stainless steel											
SLOTTED IRON											
Type 860D - iron	13870	19.69"	0.47 x 2.57 avg	88.1	38.0	DL	✘	✘	✘	✔	31.5
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
LONGITUDINAL IRON											
Type 876D - iron	99588	19.69"	1.97 x 0.24	64.3	35.8	DL	✔	✔	✔	✔	25.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
WAVE IRON											
Type 880D - iron	99581	19.69"	0.27 x 0.9 avg	88.5	48.0	DL	✔	✔	✘	✔	26.6
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											



DrainLok™ - Boltless & Barless Locking System

1. Position grate onto channel and align anti-shunt detail with recess in rail.
2. Push down or stand on grate until it clicks into position.
3. To remove first grate, insert grate removal tool into slots at end of grate, pull up sharply. Remaining grates can be removed by hand.

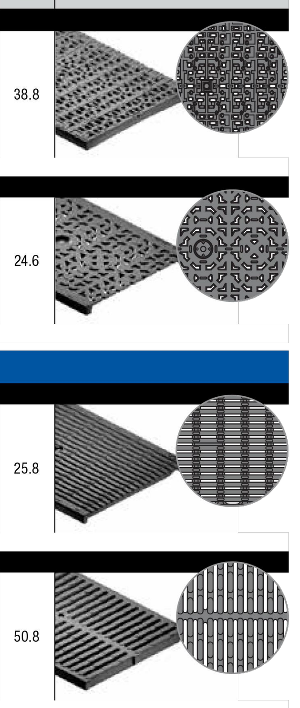
Page 1 of 2

GRATING PACIFIC

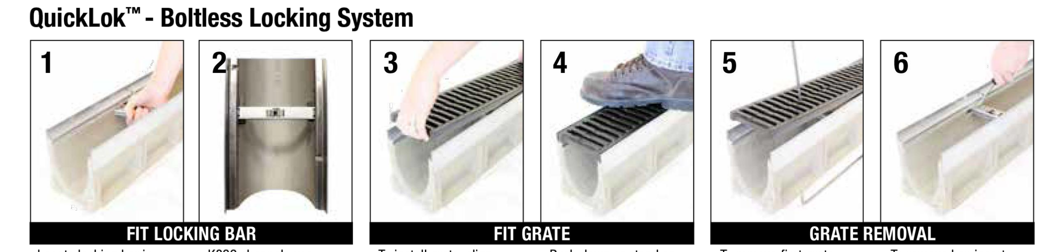
Locking mechanism
Compliant with Americans with Disabilities Act of 1990 Section 4.5.5
ASME A112.6.3 - 2001 Heel resistant less than 0.31" (8mm)
Heel safe equal or less than 0.25" (6.5mm)
Bicycle Safe compliant to Australian Standard AS 3996 - 2006
Anti-slip grates - BPN over 24

KLASSIKDRAIN K300/KS300 QUICKLOK™ GRATES

Description	Part No.	Length in.	Slot Size in.	Intake Area sq. in.	Wgt. lbs.	Locking mechanism	ADA	Heel resistant	Heel safe	Bicycle safe	Anti-slip
LOAD CLASS C - 56,000 LBS. - EN 1433 (967 PSI) COMMERCIAL VEHICLE											
DECORATIVE STEEL											
Type 881Q - iron	93950	19.69"	0.29 x 0.43 avg	54.6	47.0	QL	✔	✘	✘	✔	38.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
MOSAIC IRON											
Type 879Q - iron	93958	19.69"	0.30 x 0.98 avg	47.0	47.3	QL	✔	✘	✘	✔	24.6
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
LOAD CLASS E - 135,000 LBS. - EN 1433 (2,321 PSI) INDUSTRIAL											
LONGITUDINAL IRON											
Type 878Q - iron	138130	19.69"	1.0 x 0.31	61.8	52.9	QL	✔	✔	✔	✔	25.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
SLOTTED IRON											
Type 861Q - iron	10431	19.69"	0.39 x 5.71	97.0	56.0	QL	✘	✘	✘	✔	50.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											



QuickLok™ - Boltless Locking System

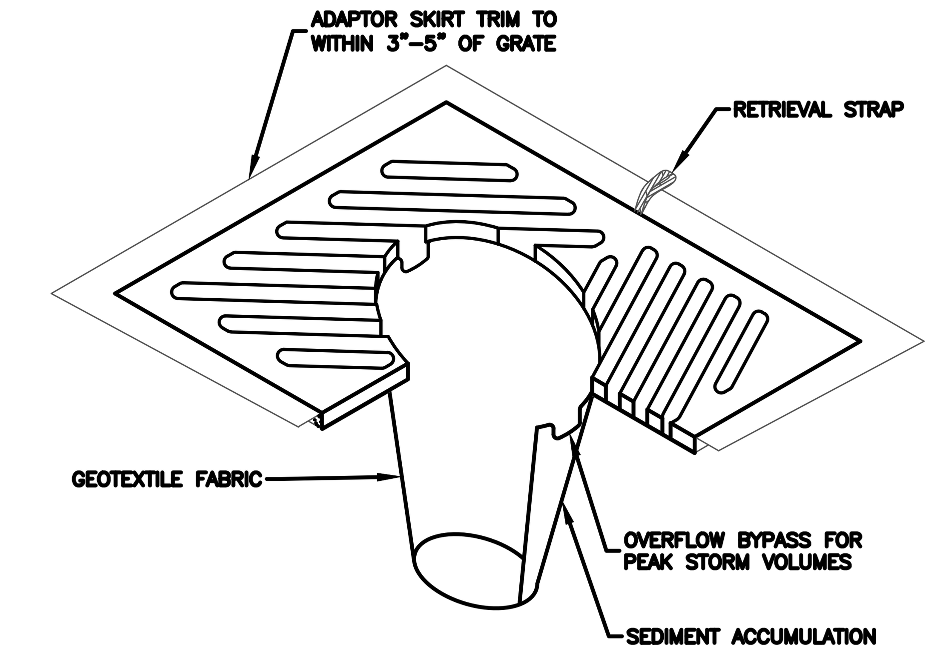


1. Locate locking bar in recesses, rotate and use hammer to tap securely into place. Serrated ends grip in recess.
2. K300 channels use plastic safety clip to hold in place.
3. To install grate, align QuickLok™ stud directly over locking bar.
4. Push down or stand on grate until it clicks into position.
5. To remove first grate, insert grate removal tool into slots at end of grate, pull up sharply. Remaining grates can be removed by hand.
6. To remove bar, insert screwdriver into hole at end of bar and lever back serrated end; rotate bar free.

Page 2 of 2

ACO TRENCH DRAIN SYSTEMS - K300-KS300 CATCH BASINS AND GRATES

NTS



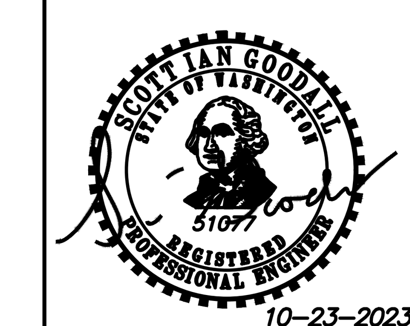
NOTES:

1. CATCH BASIN INSERT SHALL BE INSTALLED PRIOR TO CLEARING AND GRADING ACTIVITY.
2. INSTALL UPON PLACEMENT OF A NEW CATCH BASIN.
3. SEDIMENT SHALL BE REMOVED FROM THE INSERT SOCK WHEN IT BECOMES HALF FULL.
4. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING, AND RE–INSERTING INSERT SOCK INTO THE CATCH BASIN.

INLET PROTECTION

NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM



ABC RECYCLING
STORM DRAIN DETAILS-3
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

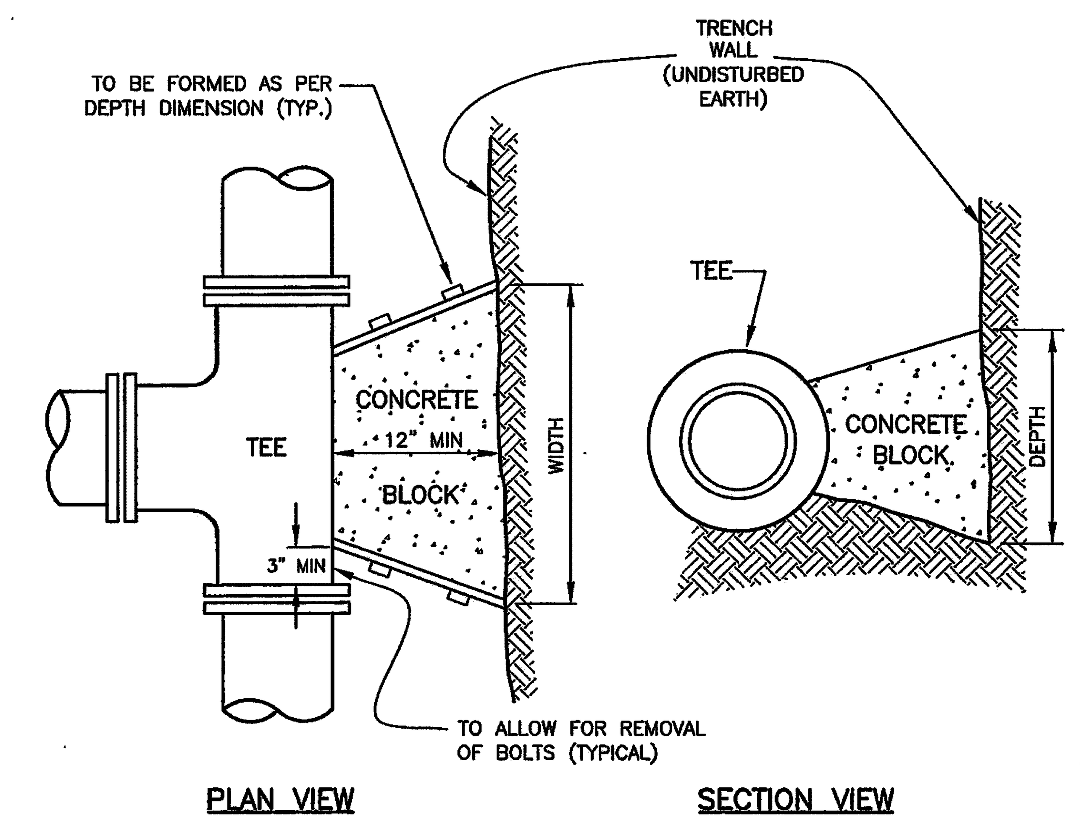
DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

23
OF: 27

Z:\Shared\PROJECTS\21029 741 Marine Dr (ABC Recycling)\DWG\21029_ABC_Recycling_Site_Plan_2.dwg Oct 23, 2023–5:34pm

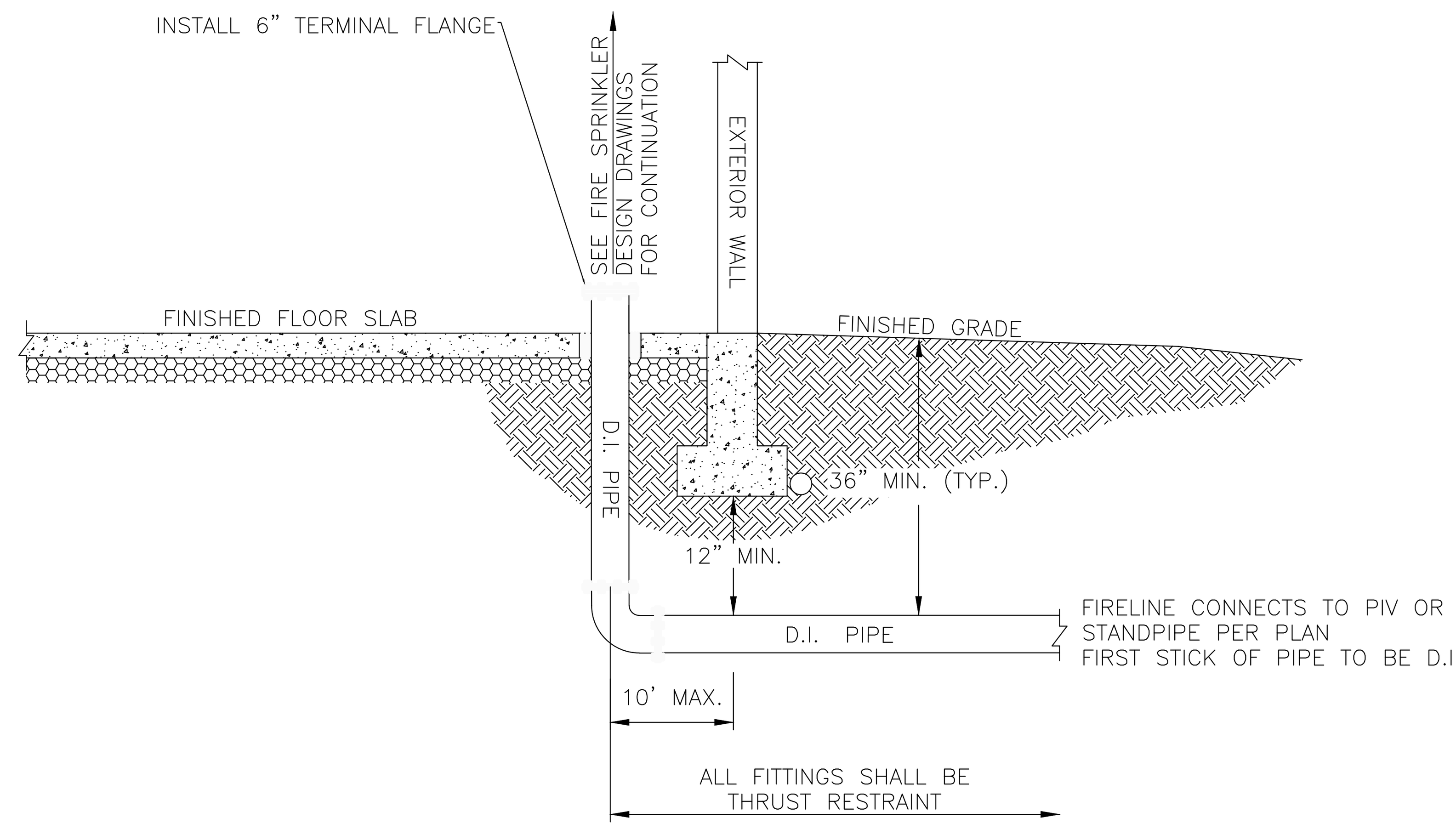


NOTE
- ALL DIMENSIONS APPLY TO STABLE TRENCH WALLS. UNDER VARIABLE CONDITIONS, SIZE OF THRUST BLOCK SHALL BE DETERMINED BY THE CITY ENGINEER.
- WRAP ALL FITTINGS WITH VISQUINE MIN. 6" PAST FLANGES, PRIOR TO POURING CONCRETE THRUST BLOCK.

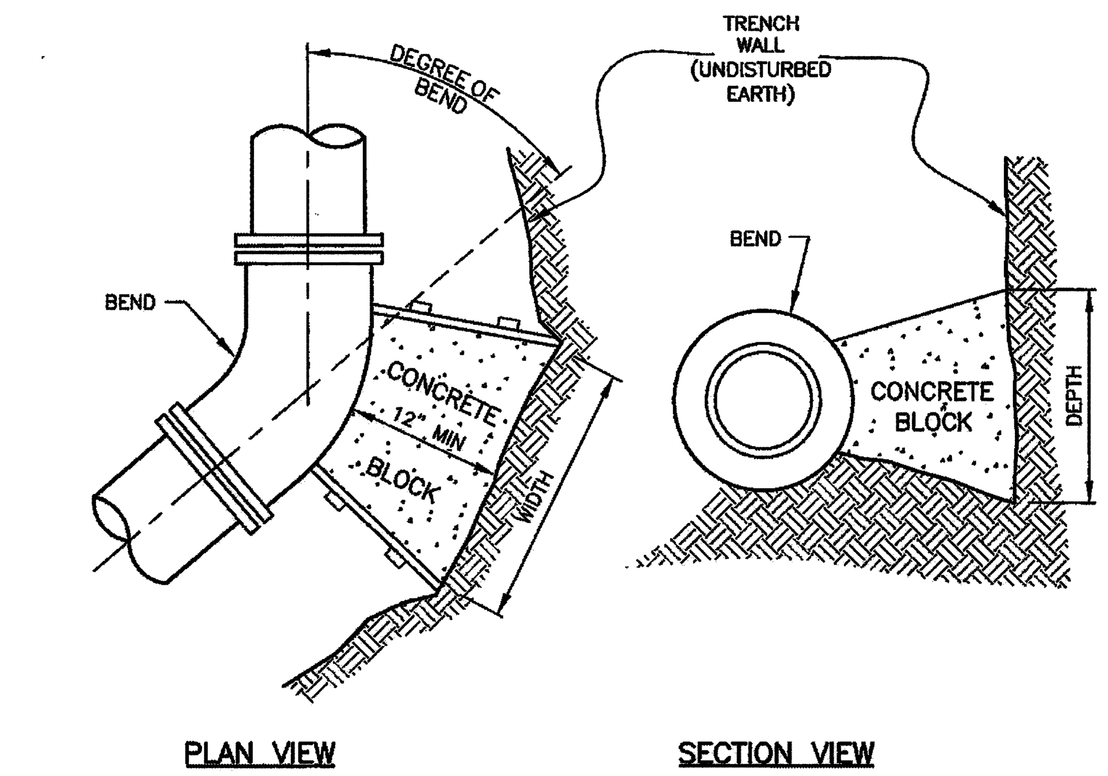
100 P.S.I. OPERATING PRESSURE

SIZE	WIDTH	DEPTH
6"	1'-6"	1'-6"
8"	2'-0"	2'-0"
10"	2'-6"	2'-6"
12"	3'-0"	3'-0"
16"	4'-6"	3'-6"
20"	6'-0"	4-0"
24"	7'-0"	5'-0"

THRUST BLOCK-TEE
NTS



FIRE LINE BUILDING CONNECTION
NTS



NOTE
- ALL DIMENSIONS APPLY TO STABLE TRENCH WALLS. UNDER VARIABLE CONDITIONS, SIZE OF THRUST BLOCK SHALL BE DETERMINED BY THE CITY ENGINEER.
- WRAP ALL FITTINGS WITH VISQUINE MIN. 6" PAST FLANGES, PRIOR TO POURING CONCRETE THRUST BLOCK.

100 P.S.I. OPERATING PRESSURE

SIZE	11¼°		22½°		45°		90°	
	WIDTH	DEPTH	WIDTH	DEPTH	WIDTH	DEPTH	WIDTH	DEPTH
6"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	1'-6"	2'-3"	1'-6"
8"	1'-3"	1'-3"	1'-3"	1'-3"	1'-9"	1'-9"	3'-0"	2'-0"
10"	1'-9"	1'-6"	1'-9"	1'-6"	2'-3"	2'-3"	3'-6"	2'-6"
12"	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"	2'-6"	4'-0"	3'-0"
16"	2'-9"	2'-3"	2'-9"	2'-3"	4'-0"	3'-0"	6'-3"	3'-6"
20"	3'-6"	2'-9"	3'-6"	2'-9"	4'-6"	4'-0"	8'-6"	4'-0"
24"	4'-6"	3'-0"	4'-6"	3'-0"	5'-6"	5'-0"	9'-9"	5'-0"

THRUST BLOCK-ELBOW
NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER
08.09.2023

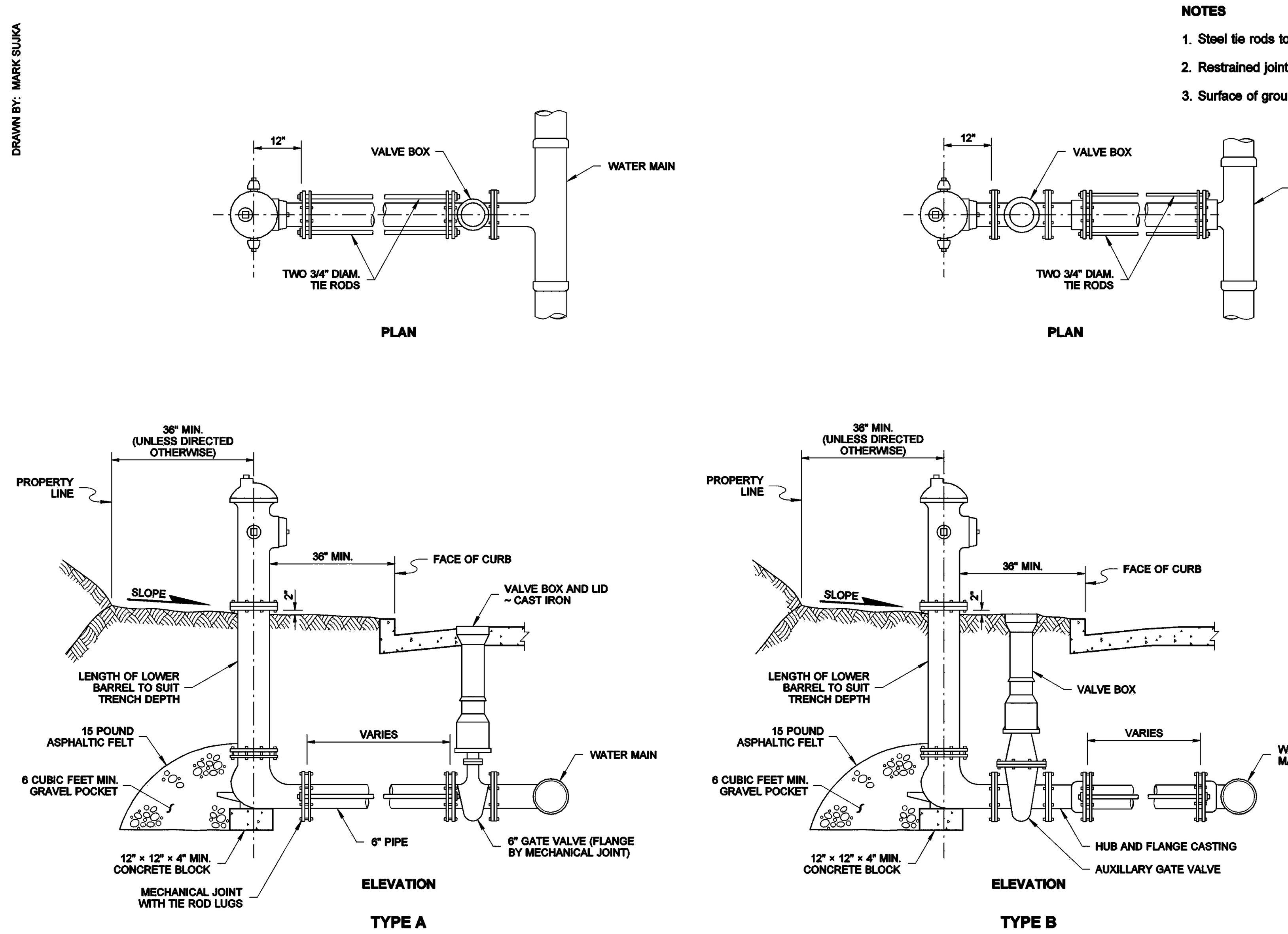
ABC RECYCLING
WATER DETAILS-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

NOTES

1. Steel tie rods to be heavily coated with asphalt after installation.
2. Restrained joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.



MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED PROFESSIONAL ENGINEER
EXPIRES JULY 1, 2007

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

HYDRANT SETTING TYPES A AND B

STANDARD PLAN B-90.10-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

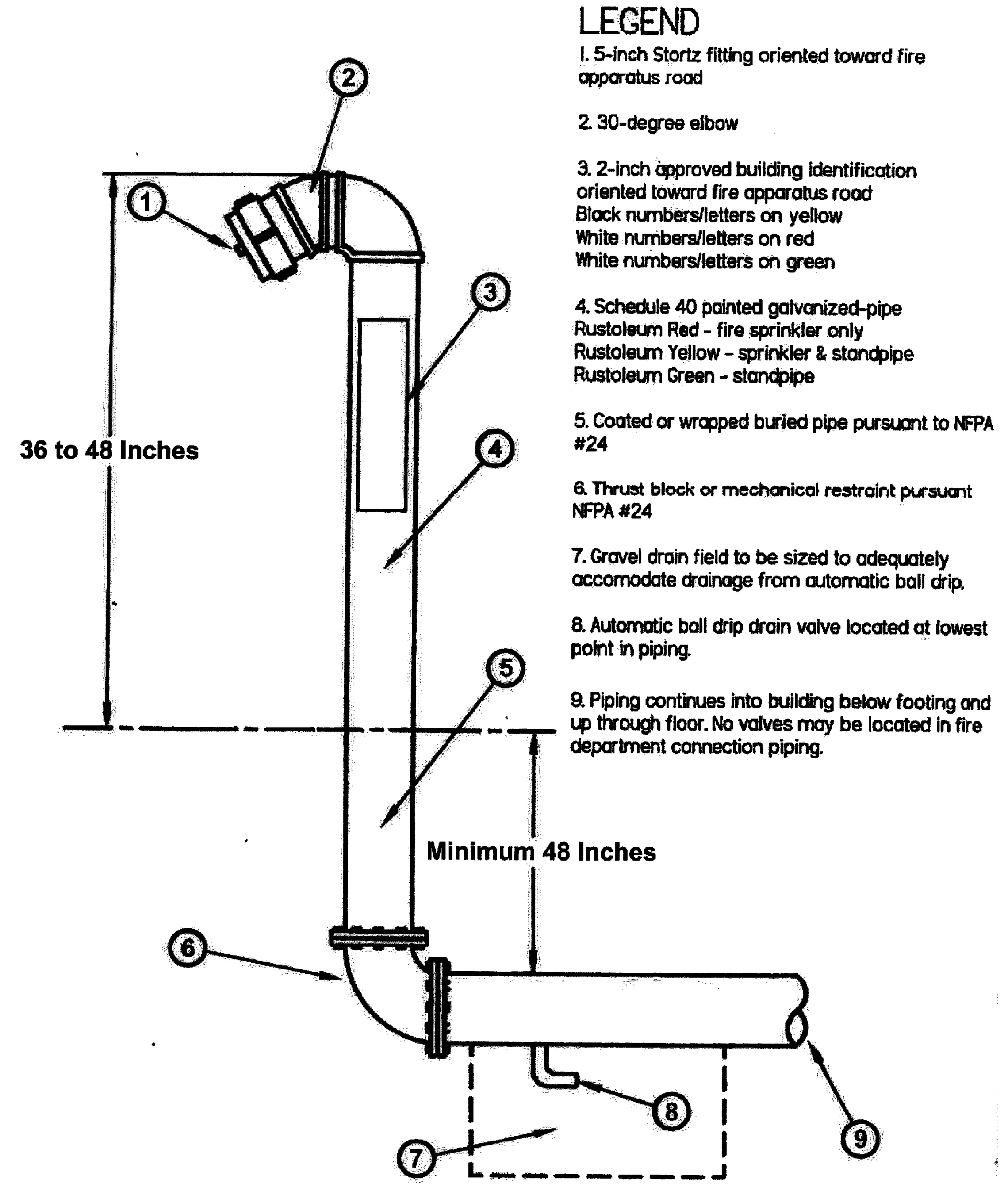
Harold J. Peterfeso — *06-08-06*

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

HYDRANT SETTINGS TYPE A & B

NTS



LEGEND

1. 5-inch Stortz fitting oriented toward fire apparatus road
2. 30-degree elbow
3. 2-inch approved building identification oriented toward fire apparatus road
   Black numbers/letters on yellow
   White numbers/letters on red
   White numbers/letters on green
4. Schedule 40 painted galvanized-pipe
   Rustoleum Red - fire sprinkler only
   Rustoleum Yellow - sprinkler & standpipe
   Rustoleum Green - standpipe
5. Coated or wrapped buried pipe pursuant to NFPA #24
6. Thrust block or mechanical restraint pursuant NFPA #24
7. Gravel drain field to be sized to adequately accomodate drainage from automatic ball drip.
8. Automatic ball drip drain valve located at lowest point in piping.
9. Piping continues into building below footing and up through floor. No valves may be located in fire department connection piping.

FDC DETAIL

NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
08.09.2023

ABC RECYCLING
WATER DETAILS-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

PROPOSED STORM STRUCTURES

STRUCTURE NAME	STRUCTURE DETAILS
CB-1	RIM = 84.500 SUMP = 77.347 PIPE = CB-1_CB-2 INV OUT = 79.35 3D LENGTH = 47.48
CB-2	RIM = 84.500 SUMP = 77.092 PIPE = CB-1_CB-2 INV IN = 79.09 3D LENGTH = 47.48 PIPE = CB-2_CB-3 INV OUT = 79.09 3D LENGTH = 47.48
CB-3	RIM = 84.500 SUMP = 76.837 PIPE = CB-2_CB-3 INV IN = 78.84 3D LENGTH = 47.48 PIPE = CB-3_CB-4 INV OUT = 78.84 3D LENGTH = 46.71
CB-4	RIM = 84.526 SUMP = 76.607 PIPE = CB-3_CB-4 INV IN = 78.61 3D LENGTH = 46.71 PIPE = CB-4_CB-5 INV OUT = 78.61 3D LENGTH = 45.00 PIPE = CB-4_CB-15 INV OUT = 78.61 3D LENGTH = 101.45
CB-5	RIM = 84.254 SUMP = 76.378 PIPE = CB-4_CB-5 INV IN = 78.38 3D LENGTH = 45.00 PIPE = CB-5_CB-6 INV OUT = 78.38 3D LENGTH = 44.99
CB-6	RIM = 84.600 SUMP = 76.230 PIPE = CB-5_CB-6 INV IN = 78.23 3D LENGTH = 44.99 PIPE = CB-6_CB-11 INV IN = 78.23 3D LENGTH = 31.57 PIPE = CB-6_CB ACO INV OUT = 78.23 3D LENGTH = 207.74
CB-7	RIM = 84.600 SUMP = 74.292 PIPE = CB ACO_B-7 INV IN = 76.29 3D LENGTH = 173.51 PIPE = CB-7_CB-8 INV OUT = 76.29 3D LENGTH = 31.35
CB-8	RIM = 83.759 SUMP = 74.128 PIPE = CB-7_CB-8 INV IN = 76.13 3D LENGTH = 31.35 PIPE = CB-8_CB-9 INV IN = 76.13 3D LENGTH = 100.19 PIPE = CB-8_CB-14 INV OUT = 76.13 3D LENGTH = 66.26
CB-9	RIM = 83.945 SUMP = 74.640 PIPE = CB-13_CB-9 INV IN = 76.64 3D LENGTH = 133.05 PIPE = CB-8_CB-9 INV OUT = 76.64 3D LENGTH = 100.19
CB-11	RIM = 84.847 SUMP = 76.400 PIPE = CB-6_CB-11 INV OUT = 78.40 3D LENGTH = 31.57
CB-12	RIM = 83.819 SUMP = 75.553 PIPE = CB ACO_CB-12 INV OUT = 77.55 3D LENGTH = 72.35
CB-13	RIM = 81.244 SUMP = 75.316 PIPE = CB-13_CB-9 INV OUT = 77.32 3D LENGTH = 133.05
CB-14	RIM = 83.759 SUMP = 73.782 PIPE = CB-8_CB-14 INV IN = 75.78 3D LENGTH = 66.26 PIPE = CB-14_RR-8 INV OUT = 75.78 3D LENGTH = 60.19
CB-15	RIM = 86.595 SUMP = 77.127 PIPE = CB-4_CB-15 INV IN = 79.13 3D LENGTH = 101.45
CB-ACO	RIM = 84.600 SUMP = 75.180 PIPE = CB-6_CB ACO INV IN = 77.18 3D LENGTH = 207.74 PIPE = CB ACO_CB-12 INV IN = 77.18 3D LENGTH = 72.35 PIPE = CB ACO_B-7 INV OUT = 77.18 3D LENGTH = 173.51
RR-1	RIM = 83.304 SUMP = 77.223 PIPE = RR-1_RR-2 INV OUT = 79.22 3D LENGTH = 97.47
RR-2	RIM = 83.304 SUMP = 76.722 PIPE = RR-1_RR-2 INV IN = 78.72 3D LENGTH = 97.47 PIPE = RR-2_RR-3 INV OUT = 78.72 3D LENGTH = 97.47
RR-3	RIM = 83.304 SUMP = 76.222 PIPE = RR-2_RR-3 INV IN = 78.22 3D LENGTH = 97.47 PIPE = RR-3_RR-4 INV OUT = 78.22 3D LENGTH = 97.47
RR-4	RIM = 83.304 SUMP = 75.722 PIPE = RR-3_RR-4 INV IN = 77.72 3D LENGTH = 97.47 PIPE = RR-4_RR-5 INV OUT = 77.72 3D LENGTH = 97.47
RR-5	RIM = 83.304 SUMP = 75.222 PIPE = RR-4_RR-5 INV IN = 77.22 3D LENGTH = 97.47 PIPE = RR-5_RR-6 INV OUT = 77.22 3D LENGTH = 97.47

PROPOSED STORM STRUCTURES

STRUCTURE NAME	STRUCTURE DETAILS
RR-6	RIM = 83.304 SUMP = 74.722 PIPE = RR-5_RR-6 INV IN = 76.72 3D LENGTH = 97.47 PIPE = RR-6_RR-7 INV OUT = 76.72 3D LENGTH = 62.91
RR-7	RIM = 83.161 SUMP = 74.395 PIPE = RR-6_RR-7 INV IN = 76.40 3D LENGTH = 62.91 PIPE = RR-7_RR-8 INV OUT = 76.40 3D LENGTH = 74.79
RR-8	RIM = 82.841 SUMP = 73.469 PIPE = RR-7_RR-8 INV IN = 75.47 3D LENGTH = 74.79 PIPE = RR-8_RR-9 INV IN = 75.47 3D LENGTH = 97.69 PIPE = CB-14_RR-8 INV IN = 75.47 3D LENGTH = 60.19 PIPE = RR-8_POND INV OUT = 75.47 3D LENGTH = 91.57
RR-9	RIM = 82.841 SUMP = 73.970 PIPE = RR-9_RR-10 INV IN = 75.97 3D LENGTH = 67.85 PIPE = RR-8_RR-9 INV OUT = 75.97 3D LENGTH = 97.69
RR-10	RIM = 82.889 SUMP = 74.320 PIPE = RR-10_RR-11 INV OUT = 76.32 3D LENGTH = 48.56 PIPE = RR-9_RR-10 INV OUT = 76.32 3D LENGTH = 67.85
RR-11	RIM = 83.214 SUMP = 74.574 PIPE = RR-10_RR-11 INV IN = 76.57 3D LENGTH = 48.56
SDCS-1	RIM = 83.058 SUMP = 73.667 PIPE = POND_SDCS-1 INV IN = 75.67 3D LENGTH = 75.96 PIPE = SDCS-1_SDCS-2 INV OUT = 75.67 3D LENGTH = 36.97
SDCS-2	RIM = 83.206 SUMP = 73.486 PIPE = SDCS-2_TREATMENT INV IN = 75.49 3D LENGTH = 1.04 PIPE = SDCS-1_SDCS-2 INV IN = 75.49 3D LENGTH = 36.97
SDCS-3	RIM = 83.255 SUMP = 73.193 PIPE = TREATMENT_SDCS-3 INV IN = 75.19 3D LENGTH = 57.46 PIPE = SDCS-3_SDCS-4 INV OUT = 75.19 3D LENGTH = 57.84
SDCS-4	RIM = 81.148 SUMP = 72.000 PIPE = SDCS-3_SDCS-4 INV IN = 74.00 3D LENGTH = 57.84

PROPOSED STORM PIPES

PIPE NAME	PIPE SIZE	Length	Slope
CB-1_CB-2	12"ø CPP, 12"	47.48	0.51%
CB-2_CB-3	12"ø CPP, 12"	47.48	0.50%
CB-3_CB-4	12"ø CPP, 12"	46.71	0.47%
CB-4_CB-5	12"ø CPP, 12"	45.00	0.49%
CB-4_CB-15	12"ø CPP, 12"	101.45	-0.50%
CB-5_CB-6	12"ø CPP, 12"	44.99	0.31%
CB-6_CB-11	12"ø CPP, 12"	31.57	0.50%
CB-6_CB ACO	12"ø CPP, 12"	207.74	0.50%
CB-7_CB-8	12"ø CPP, 12"	31.35	0.48%
CB-8_CB-9	12"ø CPP, 12"	100.19	0.50%
CB-8_CB-14	12"ø CPP, 12"	66.26	0.50%
CB-13_CB-9	12"ø CPP, 12"	133.05	0.50%
CB-14_RR-8	12"ø CPP, 12"	60.19	0.50%
CB ACO_B-7	12"ø CPP, 12"	173.51	0.50%
CB ACO_CB-12	12"ø CPP, 12"	72.35	0.50%
POND_SDCS-1	18"ø CPP, 18"	75.96	0.43%
RR-1_RR-2	12"ø CPP, 12"	97.47	0.50%
RR-2_RR-3	12"ø CPP, 12"	97.47	0.50%
RR-3_RR-4	12"ø CPP, 12"	97.47	0.50%
RR-4_RR-5	12"ø CPP, 12"	97.47	0.50%
RR-5_RR-6	12"ø CPP, 12"	97.47	0.50%
RR-6_RR-7	12"ø CPP, 12"	62.91	0.50%
RR-7_RR-8	12"ø CPP, 12"	74.79	1.20%
RR-8_POND	12"ø CPP, 12"	91.57	0.51%
RR-8_RR-9	12"ø CPP, 12"	97.69	0.50%
RR-9_RR-10	12"ø CPP, 12"	67.85	0.50%
RR-10_RR-11	12"ø CPP, 12"	48.56	-0.50%
SDCS-1_SDCS-2	18"ø CPP, 18"	36.97	0.44%
SDCS-2_TREATMENT	18"ø CPP, 18"	1.04	-0.00%
SDCS-3_SDCS-4	18"ø CPP, 18"	57.84	1.96%
TREATMENT_SDCS-3	18"ø CPP, 18"	57.46	0.50%

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
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SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
STORM & WATERMAIN STRUCTURES & PIPES
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

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ABC RECYCLING
BASIN MAP

741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

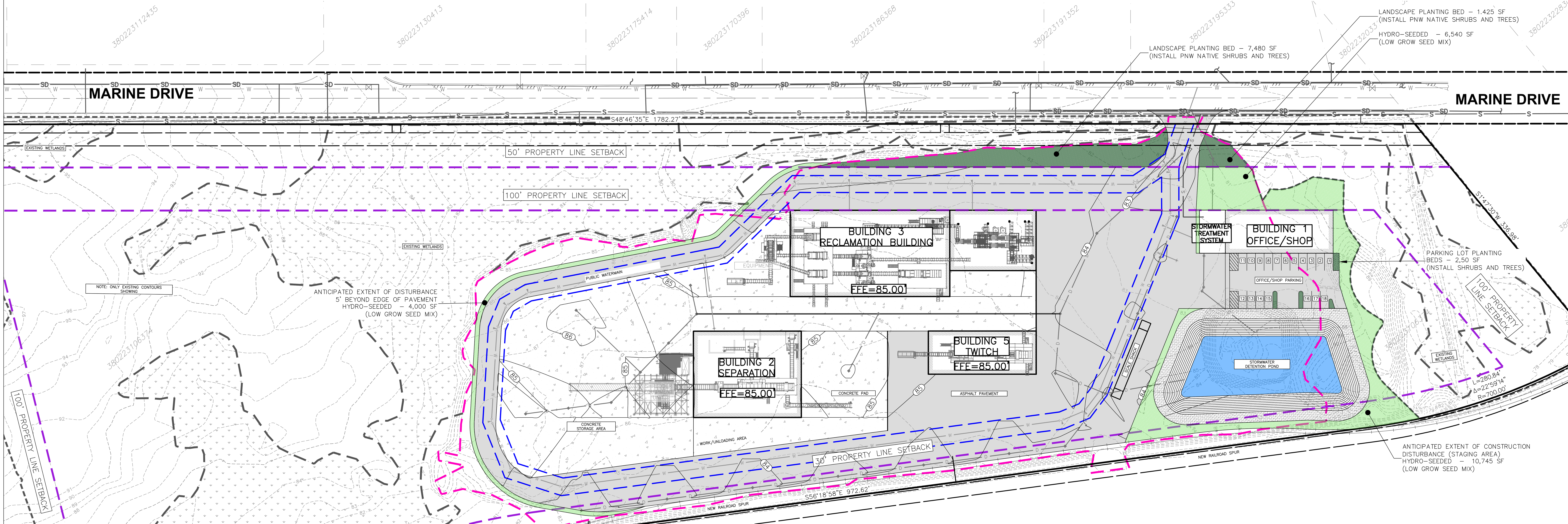
BASIN MAP LEGEND

136,059 FT²	ASPHALT
90,650 FT²	CONCRETE
52,000 FT²	BUILDINGS
13,226 FT²	GRAVEL
21,766 FT²	POND

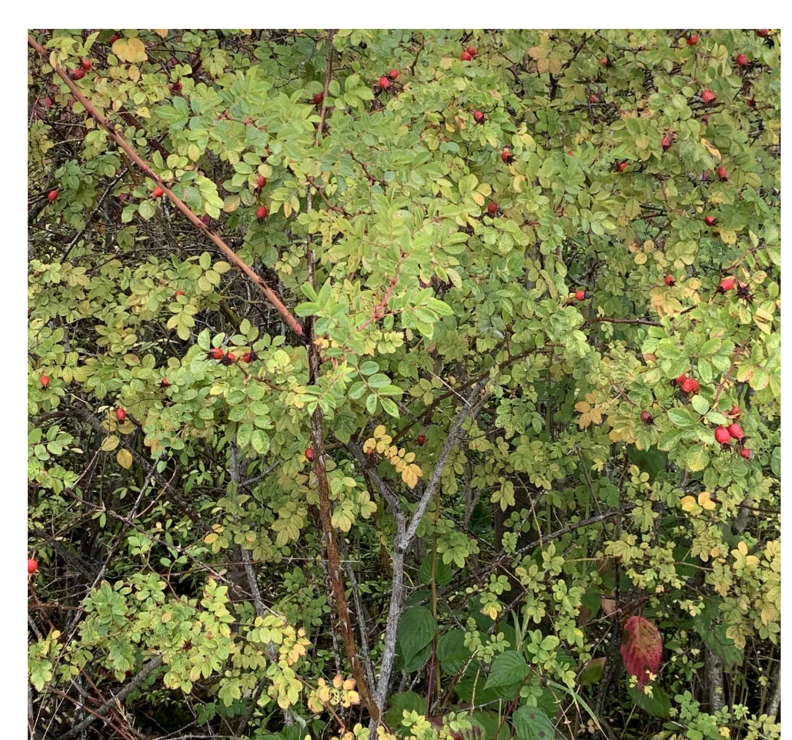
40 20 0 40
H. SCALE: 1"=40'

STREET VIEW LOOKING NROTH (SOUTH OF EXISTING DRIVEWAY ENTRANCE)

STREET VIEW LOOKING SOUTH (NORTH OF EXISTING DRIVEWAY ENTRANCE)



VIEW LOOKING WEST FROM SIDEWALK



EXISTING NOOTKA ROSE

EXISTING PINE TREE AND DOGWOOD

EXISTING DOGWOOD AND HAWTHORN

IMPACT DESIGN
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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
SCOTT CHRISTOPHER RIGGINS
CERTIFICATE NO. 1254

ABC RECYCLING
LANDSCAPE PLAN - OVERVIEW
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: SCR
CHECKED BY: SCR
ISSUE DATE: 10-23-2023

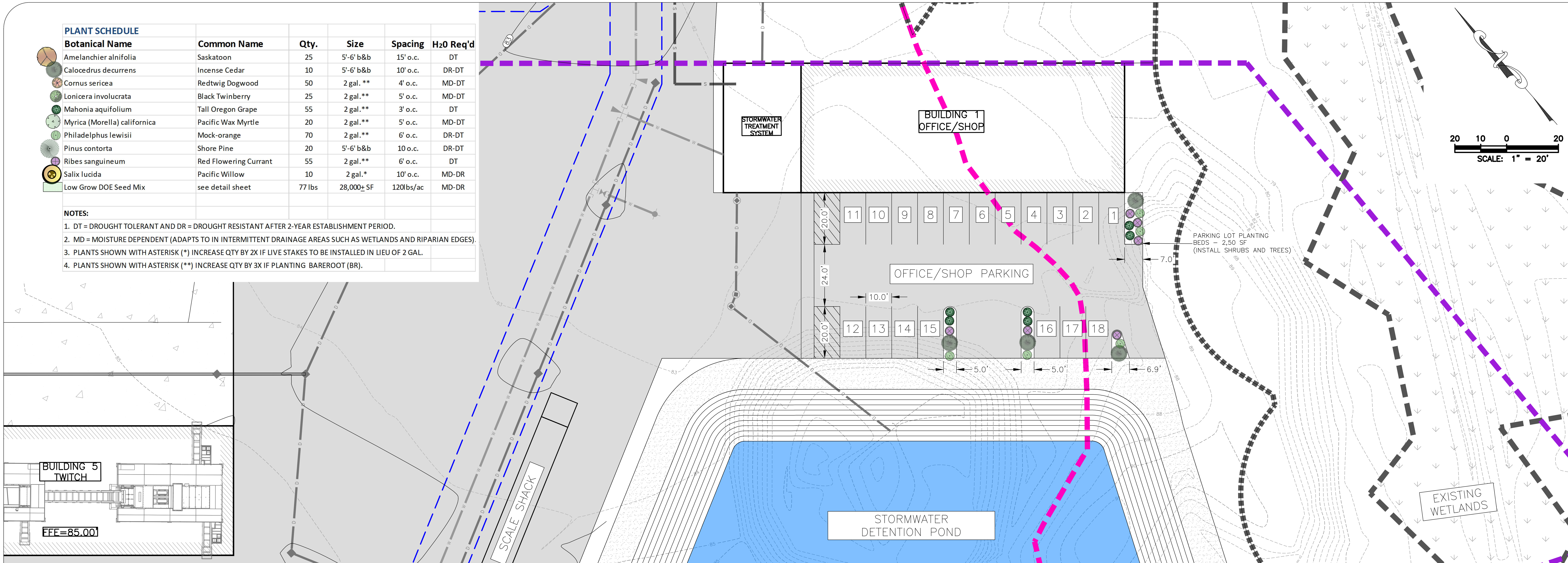
L1
OF: L1-L3

PLANT SCHEDULE

Botanical Name	Common Name	Qty.	Size	Spacing	H_2O Req'd
Amelanchier alnifolia	Saskatoon	25	5'-6' b&b	15' o.c.	DT
Calocedrus decurrens	Incense Cedar	10	5'-6' b&b	10' o.c.	DR-DT
Cornus sericea	Redtwig Dogwood	50	2 gal. **	4' o.c.	MD-DT
Lonicera involucrata	Black Twinberry	25	2 gal.**	5' o.c.	MD-DT
Mahonia aquifolium	Tall Oregon Grape	55	2 gal.**	3' o.c.	DT
Myrica (Morella) californica	Pacific Wax Myrtle	20	2 gal.**	5' o.c.	MD-DT
Philadelphus lewisii	Mock-orange	70	2 gal.**	6' o.c.	DR-DT
Pinus contorta	Shore Pine	20	5'-6' b&b	10 o.c.	DR-DT
Ribes sanguineum	Red Flowering Currant	55	2 gal.**	6' o.c.	DT
Salix lucida	Pacific Willow	10	2 gal.*	10' o.c.	MD-DR
Low Grow DOE Seed Mix	see detail sheet	77 lbs	28,000± SF	120lbs/ac	MD-DR

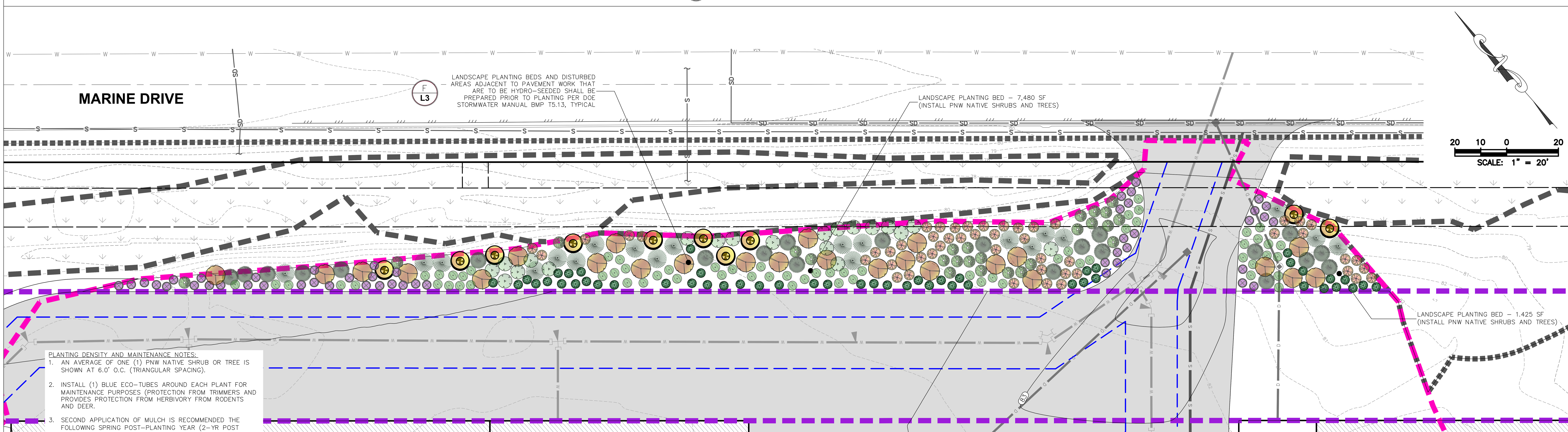
NOTES:

1. DT = DROUGHT TOLERANT AND DR = DROUGHT RESISTANT AFTER 2-YEAR ESTABLISHMENT PERIOD.
2. MD = MOISTURE DEPENDENT (ADAPTS TO IN INTERMITTENT DRAINAGE AREAS SUCH AS WETLANDS AND RIPARIAN EDGES).
3. PLANTS SHOWN WITH ASTERISK (*) INCREASE QTY BY 2X IF LIVE STAKES TO BE INSTALLED IN LIEU OF 2 GAL.
4. PLANTS SHOWN WITH ASTERISK (**) INCREASE QTY BY 3X IF PLANTING BAREROOT (BR).



A OFFICE/SHOP PARKING PLANTING PLAN

SCALE: 1" = 30'



PLANTING DENSITY AND MAINTENANCE NOTES:

1. AN AVERAGE OF ONE (1) PNW NATIVE SHRUB OR TREE IS SHOWN AT 6.0' O.C. (TRIANGULAR SPACING).
2. INSTALL (1) BLUE ECO-TUBES AROUND EACH PLANT FOR MAINTENANCE PURPOSES (PROTECTION FROM TRIMMERS AND PROVIDES PROTECTION FROM HERBIVORY FROM RODENTS AND DEER.
3. SECOND APPLICATION OF MULCH IS RECOMMENDED THE FOLLOWING SPRING POST-PLANTING YEAR (2-YR POST PLANTING).

B MARINE DRIVE FRONTAGE PLANTING PLAN

SCALE: 1" = 20'

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
SCOTT CHRISTOPHER RIGGINS
CERTIFICATE NO. 1254

ABC RECYCLING
LANDSCAPE PLANTING PLAN

PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

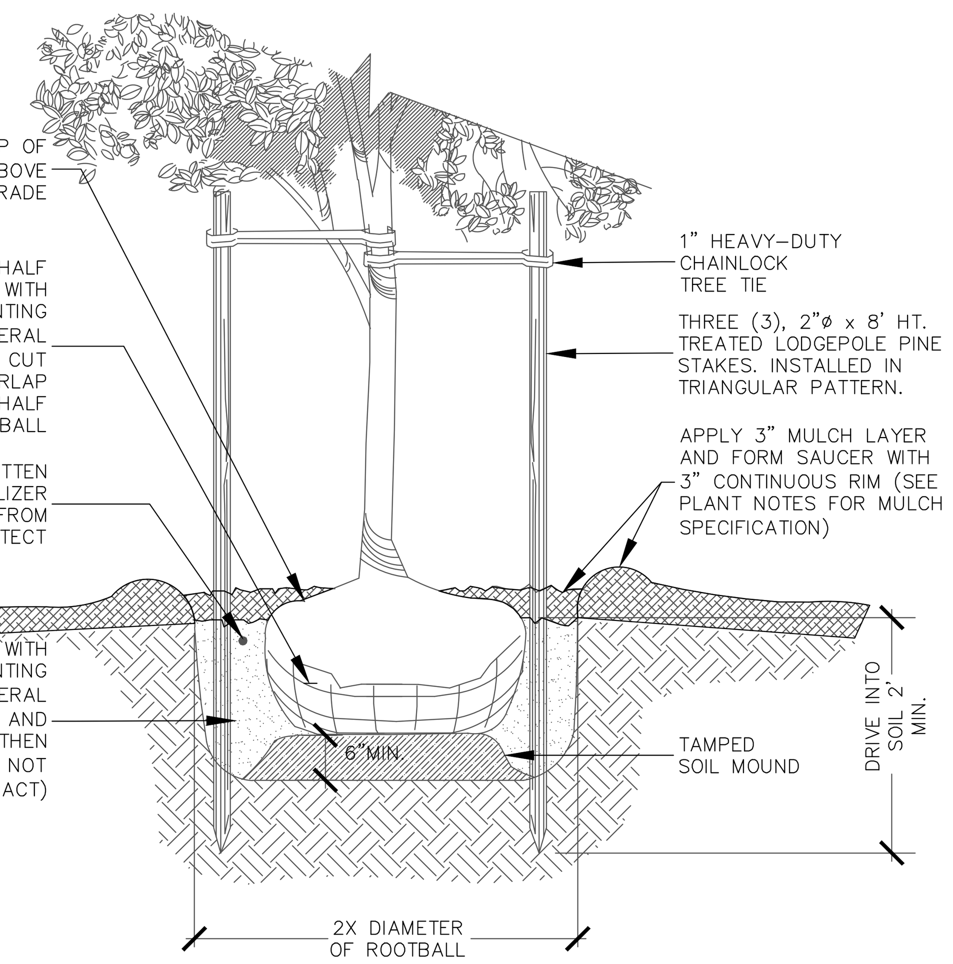
DESIGNED/DRAWN BY: SCR

CHECKED BY: SCR

ISSUE DATE: 10-23-2023

L2

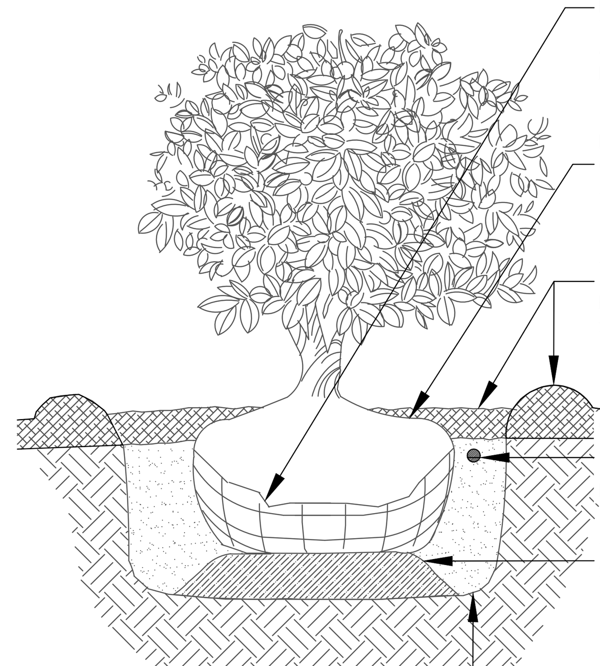
OF: L1-L3



NOTES:
1. INSTALL ROOT BARRIER ALONG BACK OF SIDEWALK. ROOT BARRIER MINIMUM DEPTH OF 18" REQUIRED.
2. INSTALL ROOT BARRIER UP TO 15' MINIUMUM EACH SIDE OF TREE.
3. PLANTING HOLE SHALL BE 2X AS WIDE ROOTBALL AND AS DEEP OR SLIGHTLY DEEPER THAN HEIGHT OF ROOTBALL.

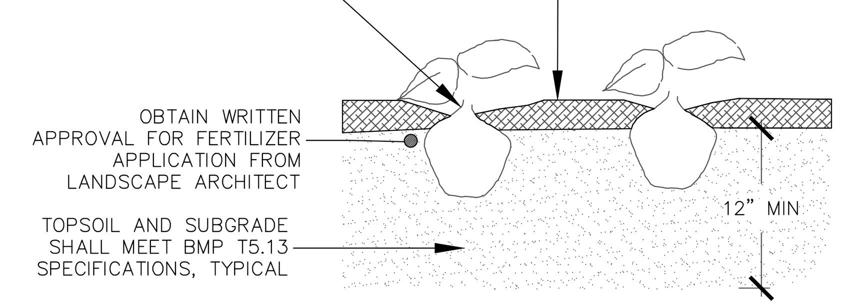
(A) DECIDUOUS TREE
NTS

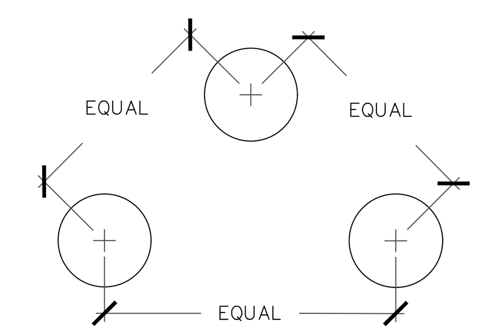
NOTE:
PLANTING HOLE SHALL BE 2X AS WIDE AS ROOTBALL AND AS DEEP OR SLIGHTLY DEEPER THAN HEIGHT OF ROOTBALL



(B) SHRUB
NTS

NOTE:
SET GROUNDCOVER 1' FROM ADJACENT PAVEMENT EDGE AND SPACE AS INDICATED ON TRIANGULAR SPACING DIAGRAM





PLAN VIEW – TRIANGULAR SPACING

(C) GROUND COVER
NTS

recommended mixes for both temporary and permanent seeding.

- Apply these mixes, with the exception of the wet area seed mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Apply the wet area seed mix at a rate of 60 pounds per acre.
- Consult the local suppliers or the local conservation district for their recommendations. The appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used, depending on the soil type and hydrology of the area.

Table II-3.4: Temporary and Permanent Seed Mixes

Common Name	Latin Name	% Weight	% Purity	% Germination
Temporary Erosion Control Seed Mix A standard mix for areas requiring a temporary vegetative cover.				
Chewings or annual blue grass	*Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye	*Lolium perenne*	50	98	90
Redtop or colonial bentgrass	*Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover	*Trifolium repens*	5	98	90
Landscaping Seed Mix A recommended mix for landscaping seed.				
Perennial rye blend	*Lolium perenne*	70	98	90
Chewings and red fescue blend	*Festuca rubra var. commutata* or *Fes-tuca rubra*	30	98	90
Low-Growing Turf Seed Mix A turf seed mix for dry situations where there is no need for watering. This mix requires very little main-tenance.				
Dwarf tall fescue (several varieties)	*Festuca arundin-acea var.*	45	98	90
Dwarf perennial rye (Barclay)	*Lolium perenne var. barclay*	30	98	90
Red fescue	*Festuca rubra*	20	98	90
Colonial bentgrass	*Agrostis tenuis*	5	98	90
Bioswale Seed Mix A seed mix for bioswales and other intermittently wet areas.				
Tall or meadow fes-	*Festuca arundin-*	75-80	98	90

2019 Stormwater Management Manual for Western Washington

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(D) LOW-GROWING TURF SEED MIX - 2019 MANUAL
NTS

1. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARITY WITH ALL UNDERGROUND UTILITIES, PIPES AND STRUCTURES. CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR ANY COST INCURRED DUE TO DAMAGE OF SAID UTILITIES. VERIFY ALL UTILITY LOCATIONS, PADS, AND APPURTENANCES PRIOR TO PLANTING ACTIVITY. DO NOT BLOCK ACCESS TO UTILITY STRUCTURES. IDENTIFY DISCREPANCIES IMMEDIATELY TO LANDSCAPE ARCHITECT.

2. ALL PLANT MATERIAL SHALL BE NURSERY GROWN (NOT FIELD COLLECTED), CONTAINERIZED OR BALLED AND BURLAPPED. PROVIDE ONLY SOUND, HEALTHY, VIGOROUS PLANTS, FREE OF DEFECTS, DISEASE, AND ALL FORMS OF INFESTATION. MEASUREMENTS, CALIPER, BRANCHING, GRADING QUALITY, BALLING AND BURLAPPING PLANT MATERIAL SHALL CONFORM TO MINIMUM STANDARDS OF ANSI Z60.0, LATEST EDITION.

3. ALL CONTAINER GROWN NURSERY STOCK SHALL BE HEALTHY, VIGOROUS, WELL-ROOTED, AND ESTABLISHED IN THE CONTAINER IN WHICH IT IS GROWN. CONTAINER GROWN NURSERY STOCK SHALL HAVE A WELL-ESTABLISHED ROOT SYSTEM REACHING THE SIDES OF THE CONTAINER TO MAINTAIN A FIRM BALL WHEN THE CONTAINER IS REMOVED, BUT SHALL NOT HAVE EXCESSIVE ROOT GROWTH ENCIRCLING THE INSIDE OF THE CONTAINER.

4. PLANTS SHALL NOT BE PRUNED PRIOR TO DELIVERY. PRUNE PLANTS ONLY AFTER PLANTING AND ACCORDING TO STANDARD HORTICULTURAL PRACTICE TO PRESERVE THE NATURAL CHARACTER OF THE TREE. REMOVE ALL DEAD WOOD, SUCKERS AND BROKEN OR BADLY BRUISED BRANCHES. USE ONLY CLEAN SHARP TOOLS.

5. PLANTS SHALL BE TRUE TO SPECIES AND VARIETY AND SHALL CONFORM TO SPECIFIED MEASUREMENTS, HOWEVER, LARGER PLANTS MAY BE USED IF APPROVED BY LANDSCAPE ARCHITECT. USE OF SUCH PLANTS SHALL NOT INCREASE CONTRACT PRICE. SPECIFIED HEIGHT AND AND SPREAD DIMENSIONS REFER TO MAIN BODY OF PLANT AND NOT BRANCH TIP TO TIP. CALIPER MEASUREMENT SHALL BE TAKEN AT A POINT ON THE TRUNK 6 INCHES ABOVE THE NATURAL GROUND LINE FOR TREES UNDER 4 INCHES IN CALIPER, AND AT A POINT 12 INCHES ABOVE THE GROUND FOR TREES 4 INCHES OR GREATER IN CALIPER. IF A RANGE OF SIZES IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND NO LESS THAN 40% OF THE PLANTS SHALL BE AS LARGE AS THE MAXIMUM SIZE SPECIFIED.PRIOR TO INSTALLATION, ALL PLANT MATERIAL PROPOSED FOR USE ON THE PROJECT SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT AT THE TIME OF DELIVERY TO THE SITE FOR CONFORMANCE WITH THE REQUIREMENTS OF THE PLANT SCHEDULE, PLANT SPECIFICATIONS, AND STORAGE AND HANDLING REQUIREMENTS. CONTRACTOR IS TO PROVIDE A MINIMUM OF TWO WEEKS NOTICE PRIOR TO DELIVERY TO THE LANDSCAPE ARCHITECT.

6. MODIFICATIONS OF PLANTING BEDS AND PLACEMENT OF TREES, SHRUBS, GROUNDCOVERS, SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

7. TREES SHALL BE PLACED FIRST, THEN SHRUBS, AND THEN GROUNDCOVERS. TREES SHALL BE STAKED OR GUYED PER DETAILS WITHIN 24 HOURS OF INSTALLATION. TREE TRUNKS SHALL BE LOCATED NO CLOSER THAN 5' FROM FENCE LINE, SHRUBS SHALL BE LOCATED SO THAT AT MATURITY THERE WILL BE A MINIMUM 3' CLEAR BETWEEN FENCE.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL COMPLETE PLANT COUNTS TO COVER AREAS AT THE SPECIFIED SPACING.

9. DURING INSTALLATION, NOTIFY THE OWNER'S REPRESENTATIVE OF ANY CONDITIONS THAT MAY BE HARMFUL TO PLANT LIFE SUCH AS; POOR DRAINAGE, HAZARDOUS MATERIALS, ECT. MAKE RECOMMENDATIONS TO ADDRESS THE SPECIFIC SITUATION IMMEDIATELY TO THE OWNER'S REPRESENTATIVE.

10. TOPSOIL "A" (IMPORTED TOPSOIL) SHALL BE APPLIED IN LANDSCAPE AREAS WHERE TREES, SHRUBS, AND GROUND COVER ARE TO BE INSTALLED NEAR THE BUILDING. TOPSOIL "B" CAN BE USED IN LIEU OF TOPSOIL "A" (IMPORTED SOIL) IN AREAS THAT ARE DESIGNATED FOR LAWN/GRASS SEED MIX OR AREAS APPROVED BY LANDSCAPE ARCHITECT SUCH AS AROUND THE PERIMETER OF THE SITE. TOPSOIL "C"/AMENDED SOIL AREAS CONSIST OF LANDSCAPE/GRASS AREAS WHERE CONSTRUCTION ACTIVITIES CAUSED DISTURBANCE TO SOIL AND RESTORATION OF GRASS AND TOPSOIL IS REQUIRED.

11. MULCH SHALL BE MEDIUM TO COARSE PARTICLE SIZE, SHREDDED WOOD MULCH (ARBORIST MIX). MINIMUM DEPTH OF 3". SUBMITTAL OF PRODUCT TO BE REVIEWED AND APPROVED BY LANDSCAPE ARCHITECT.

12. FINISH GRADE (TOP OF MULCH) IN PLANTING BEDS AND FINISH GRADE OF TURF SHALL BE 1/2" BELOW FINISHED SURFACE OF ADJACENT WALK OR PAVED AREAS. LAWN/GRASS AREAS NEAR PAVED/HARD SURFACES SHALL BE AT 1/2" BELOW ADJACENT SURFACES.

13. THE CONTRACTOR SHALL BEGIN MAINTENANCE IMMEDIATELY FOLLOWING PLANT INSTALLATION. THE CONTRACTOR SHALL MAINTAIN THE PLANTED AREAS FOR 90 DAYS AFTER ACHIEVING COMPLETION OF PLANTING (LANDSCAPE SUBSTANTIAL COMPLETION WHICH IS NOT THE SAME AS ARCHITECTURAL SUBSTANTIAL COMPLETION).

14. PLANT ESTABLISHMENT/MAINTENANCE PROCEDURES SHALL INCLUDE WATERING, PROTECTION FROM INSECTS OR DISEASE, WEEDING, PRUNING, MOWING, AND OTHER ACTIVITIES AS MAY BE REQUIRED. CONTRACTOR SHALL IMMEDIATELY REPLACE ANY PLANT MATERIALS THAT ARE NOT VIGOROUS OR TYPICAL OF SIZE AND SPECIES. TREE STAKES SHALL BE KEPT SECURE AT ALL TIMES. DEFECTIVE MATERIALS AS DETERMINED BY THE LANDSCAPE ARCHITECT SHALL BE REPLACED IMMEDIATELY WITH PLANT MATERIALS OF THE SAME SPECIES AT A SIZE TO MATCH EXISTING ADJACENT MATERIALS.

15. STANDARD COMMERCIAL GRADE FERTILIZERS AND HERBICIDES SHALL NOT BE APPLIED UNLESS THE CONTRACTOR HAS DEEMED IT NECESSARY TO PROMOTE HEALTHY AND SUSTAINABLE GROWTH. THE CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL FROM THE OWNER BEFORE APPLYING FERTILIZERS AND HERBICIDES.

16. PLANT ESTABLISHMENT WATERING SHALL BE ACHIEVED BY TEMPORARY IRRIGATION SYSTEM WITH POINT OF CONNECTION COMPONENTS AT PROPOSED HOSE BIBBS & YARD HYDRANT(S). THE TEMPORARY WATERING/IRRIGATION SYSTEM SHALL DELIVER UNIFORM DISTRIBUTION OF ADEQUATE WATER TO ESTABLISH ALL PLANTS AND SUSTAIN THEM DURING (2) DRY SEASONS (MAY 1ST THRU OCTOBER 15TH). TREES INSTALLED OUTSIDE THE EXTENT OF THE TEMPORARY IRRIGATION SYSTEM SHALL HAVE A MINIMUM OF ONE (1)-15 GALLON TREEGATOR OR SIMILAR SLOW RELEASE WATERING DEVICE ATTACHED TO EACH TRUNK FOR HAND AND/OR TRUCK WATERING. 10-GALLONS OF WATER PER 1-INCH CALIPER IS REQUIRED PER TREE PER WEEK (3" CALIPER TREE SHALL HAVE 2-BAG SLOW RELEASE SYSTEM INSTALLED).

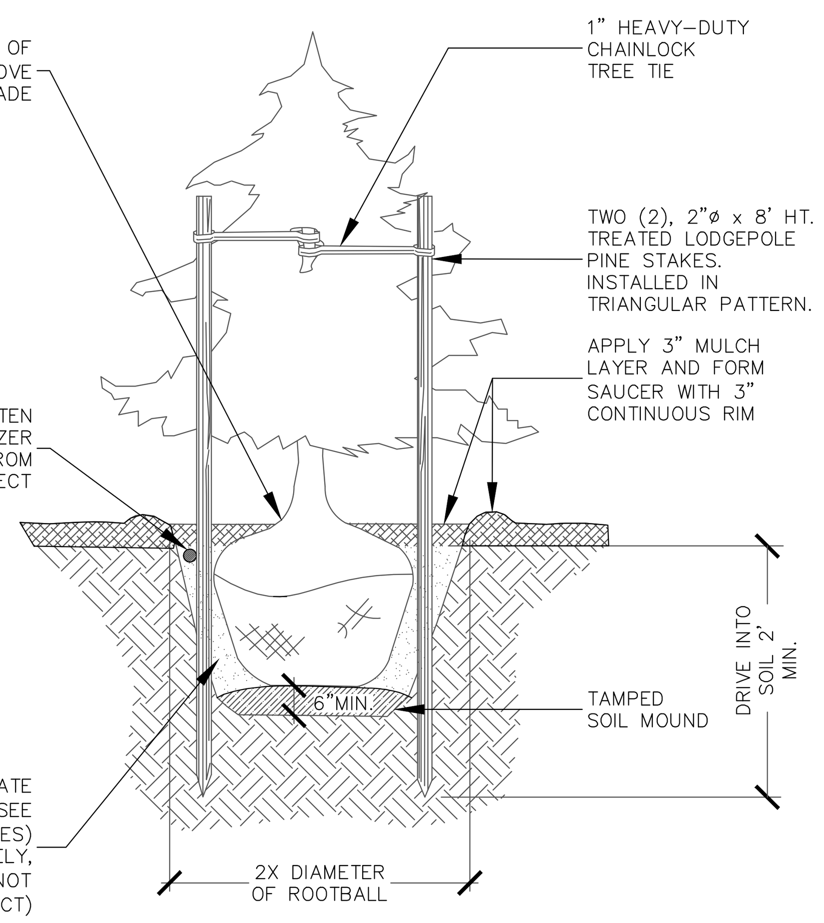
17. ALL DISTURBED AREAS SHALL BE RE-VEGETATED AS GRASS/LAWN OR COMBINATION OF MULCH & PLANTS SPECIFIED IN PLANTING SCHEDULE. ALL GRASS/LAWN AREAS SHALL BE HYDRO-SEEDED.

18. HYDRO-SEEDED ONLY. HYDRO-SEED MIX APPLICATION SHALL TAKE PLACE PRIOR TO BEGINNING OF WET SEASON (LATE AUGUST TO MID-OCTOBER) AND SHALL BE WATERED AS NECESSARY. FENCE OR TAPE-OFF LAWN AREAS TO PREVENT FOOT TRAFFIC FROM ENTERING THE SEEDED AREAS. THE FENCE OR SIMILAR BARRIER SHALL BE REMOVED AFTER LAWN ESTABLISHMENT.

19. SOD SHALL BE USED IN LIEU OF HYDRO-SEED MIX AS A LAST RESORT AND SHALL BE APPROVED SEED MIX OR SIMILAR AND OWNER APPROVAL REQUIRED PRIOR TO INSTALLATION.

20. AREAS OF DISTURBANCE, SUCH AS BARE SOIL &/OR AREAS IMPACTED BY VEHICULAR USE OF ANY KIND, OR STORAGE OF MATERIALS OUTSIDE OF THE CLEARING LIMITS SHOWN ON APPROVED CIVIL ENGINEERING PLANS SHALL RECEIVE FULL SUBGRADE PREPARATION, INCLUDING COMPOST AMENDMENTS IF NEEDED, IN ORDER TO RE-ESTABLISHED THE VEGETATION COVER TYPE PRIOR TO UNFORSEEN CONSTRUCTION IMPACTS.

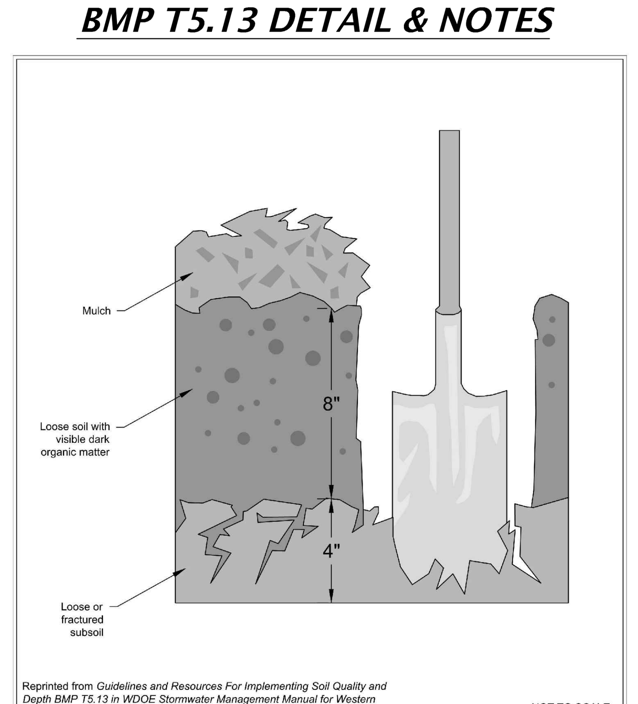
(G) GENERAL LANDSCAPE NOTES
NTS



NOTES:
1. ARBORVITE SHALL BE STAKED AS SHOWN BELOW WITH OWNER'S CONSENT. OBTAIN WRITTEN APPROVAL PRIOR TO STAKING.
2. PLANTING HOLE SHALL BE 2X AS WIDE AS ROOTBALL AND AS DEEP OR SLIGHTLY DEEPER THAN HEIGHT OF ROOTBALL.

(E) LARGE CONIFER TREE
NTS

BMP T5.13 DETAIL & NOTES



Reprinted from *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington*, 2010, Washington Organic Recycling Council

NOT TO SCALE

DEPARTMENT OF ECOLOGY State of Washington

Planting Bed Cross-Section

Revised June 2016

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BMP T5.13 NOTES

ESTABLISH A MINIMUM SOIL QUALITY AND DEPTH IS NOT THE SAME AS PRESERVATION OF NATURALLY OCCURRING SOIL AND VEGETATION. HOWEVER, ESTABLISHING A MINIMUM SOIL QUALITY AND DEPTH WILL PROVIDE IMPROVED ON-SITE MANAGEMENT OF STORMWATER FLOW AND WATER QUALITY. SOIL ORGANIC MATTER CAN BE ATTAINED THROUGH NUMEROUS MATERIALS SUCH AS COMPOST, COMPOSTED WOODY MATERIAL, BIOSOLIDS AND FOREST PRODUCT RESIDUALS. IT IS IMPORTANT THAT THE MATERIALS USED TO MEET THE SOIL QUALITY AND DEPTH BMP BE APPROPRIATE AND BENEFICIAL TO THE PLANT COVER TO BE ESTABLISHED. LIKEWISE, IT IS IMPORTANT THAT IMPORTED TOPSOILS IMPROVE SOIL CONDITIONS AND DO NOT HAVE AN EXCESSIVE PERCENT OF CLAY FINES. THIS BMP CAN BE CONSIDERED INFEASIBLE ON TILL SOIL SLOPES GREATER THAN 33 PERCENT.

DESIGN GUIDELINES

SOIL RETENTION: RETAIN, IN AN UNDISTURBED STATE, THE DUFF LAYER AND NATIVE TOPSOIL TO THE MAXIMUM EXTENT PRACTICABLE. IN ANY AREAS REQUIRING GRADING REMOVE AND STOCKPILE THE DUFF LAYER AND TOPSOIL ON SITE IN A DESIGNATED, CONTROLLED ARE, NOT ADJACENT TO PUBLIC RESOURCES AND CRITICAL AREAS, TO BE REAPPLIED TO OTHER PORTIONS OF THE SITE WHERE FEASIBLE.

SOIL QUALITY: ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE THE FOLLOWING:
1. A TOPSOIL LAYER WITH A MINIMUM ORGANIC MATTER CONTENT OF 10% DRY WEIGHT IN PLANTING BEDS, AND 5% ORGANIC MATTER CONTENT IN TURF AREAS, AND A PH FROM 6.0 TO 8.0 OR MATCHING THE PH OF THE UNDISTURBED SOIL. THE TOPSOIL LAYER DEPTH SHALL BE PER PLAN. SUBSOILS BELOW THE TOPSOIL LAYER SHOULD BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
2. MULCH PLANTING BEDS WITH 4 INCHES OF WOOD CHIP MULCH. USE COMPOST AND OTHER MATERIALS THAT MEET THESE ORGANIC CONTENT REQUIREMENTS:
   2.a. THE ORGANIC CONTENT FOR "PRE-APPROVED" AMENDMENT RATES CAN BE MET ONLY USING COMPOST MEETING THE COMPOST SPECIFICATION FOR BIORETENTION (BMP T7.30), WITH THE EXCEPTION THAT THE COMPOST MAY HAVE UP TO 35% BIOSOLIDS OR MANURE. THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 40% TO 65%, AND A CARBON TO THE NITROGEN RATION BELOW 25:1. THE CARBON TO NITROGEN RATION MAY BE AS HIGH 35:1 FOR PLANTING COMPOSED ENTIRELY OF PLANTS NATIVE TO THE PUGET SOUND LOWLANDS REGION.
   2.b. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIALS MEETING (A.) ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATIO REQUIREMENTS, AND MEETING THE CONTAMINANT STANDARDS OF GRADE A COMPOST.

THE RESULTING SOIL SHOULD BE CONDUCIVE TO THE TYPE OF VEGETATION TO BE ESTABLISHED.

IMPLEMENTATION OPTIONS: THE SOIL QUALITY DESIGN GUIDELINES LISTED ABOVE CAN BE MET BY USING ONE OF THE METHODS LISTED:
1. LEAVE UNDISTURBED NATIVE VEGETATION AND SOIL, AND PROTECT FROM COMPACTION DURING CONSTRUCTION.
2. IMPORT TOPSOIL (TOPSOIL "A")
3. CONSTRUCT TOPSOIL ON-SITE (TOPSOIL "B") – AMEND EXISTING SITE TOPSOIL OR SUBSOIL EITHER AT DEFAULT 'PRE-APPROVED' RATES BASED ON TESTS OF THE SOIL AMENDMENT.
4. STOCKPILE EXISTING TOPSOIL DURING GRADING, AND REPLACED IT PRIOR TO PLANTING, STOCKPILED TOPSOIL MUST ALSO BE AMENDED IF NEEDED TO MEET THE ORGANIC MATTER OR DEPTH REQUIREMENTS, EITHER AT A DEFAULT 'PRE-APPROVED' RATE OR AT A CUSTOM CALCULATED RATE.

SEE SITE SPECIFIC SOIL SPECIFICATIONS: MORE THAN ONE METHOD MAY BE USED ON DIFFERENT PORTIONS OF THE SAME SITE. SOIL THAT ALREADY MEETS THE DEPTH AND ORGANIC MATTER QUALITY STANDARDS, AND IS NOT COMPACTED, DOES NOT NEED TO BE AMENDED.

SITE SPECIFIC SPECIFICATIONS

TOPSOIL "A"/IMPORTED TOPSOIL:
IMPORTED TOPSOIL SHALL BE GARDEN MIX BY GREEN EARTH TECHNOLOGY, LLC (360.354.4936) OR APPROVED EQUAL. IMPORTED TOPSOIL SHALL BE FREE OF NOXIOUS WEED MATERIAL (SEEDS, RHIZOMES, AND/OR ROOTS). IMPORTED TOPSOIL SHALL BE FREE OF DELETERIOUS MATERIALS, ROCKS, AND DEBRIS WHICH WILL NOT PASS THROUGH THREE-QUARTER INCH 3/4" SCREEN. THE COMPONENTS OF THE SOIL MUST BE EVENLY DISTRIBUTED THROUGHOUT THE TOPSOIL MIX.

TOPSOIL "B"/CONSTRUCTED TOPSOIL:
CONTRACTOR SHALL CONSTRUCT TOPSOIL B ON-SITE USING COMBINATION OF NATIVE TOPSOIL AND IMPORTED COMPOST. NATIVE TOPSOIL SHALL BE TAKEN FROM VEGETATED/LANDSCAPE AREAS WITHIN PROJECT WORK LIMITS. THE TOP TWELVE (12") OF THE SOIL COLUMN SHALL BE USED IN THE TOPSOIL B MIX AND STOCKPILED IN DESIGNATED AREA(S). STOCKPILED MATERIAL SHALL BE FREE OF NOXIOUS WEEDS. TOPSOIL B SHALL BE FREE OF NOXIOUS WEED MATERIAL (SEEDS, RHIZOMES, AND/OR ROOTS). TOPSOIL B SHALL BE FREE OF DELETERIOUS MATERIALS, ROCKS, AND DEBRIS WHICH WILL NOT PASS THROUGH 3/4" SCREEN. DESIGN INTENT IS TO INCLUDE ROCK OR ORGANIC MATERIAL IN THE TOPSOIL LAYER SO AS TO CREATE MACRO PORES AND ORGANIC MATTER RESERVES. NATIVE SOIL TO IMPORTED COMPOST RATIO SHALL BE THREE TO ONE (3 NATIVE SOIL : 1 COMPOST). THE COMPONENTS OF THE CONSTRUCTED TOPSOIL MUST BE EVENLY DISTRIBUTED THROUGHOUT THE TOPSOIL MIX.

TOPSOIL "C"/AMENDED SOIL:
CONTRACTOR SHALL LOOSEN (DO NOT TILL) CLEARED LANDSCAPE AREAS WITH EXCAVATOR TEETH OR CLEARING/GRUB RACK ADAPTER FOR EXCAVATOR TO MEET 8" MINIMUM LOOSE DEPTH REQUIREMENT. TILLING DOES NOT MEET THE LOOSENING DEPTH REQUIREMENT. TILLING TO OCCURE AFTER A 2" LAYER OF "COMPOSTED MATERIALS" IN WAC 173-350-220 (INCLUDING CONTAMINANT LEVELS AND OTHER STANDARDS). THE COMPOST SHALL BE INCORPORATED INTO UPPER 4" OF DISTURBED SOIL. THE COMPOST SHALL BE FROM YARD TRIMMINGS OR SIMILAR ORGANIC MATTER COMPOSTED THROUGH AEROBIC DECOMPOSITION AS AVAILABLE AT GREEN EARTH TECHNOLOGY, LLC (360.354.4936) OR APPROVED EQUAL. IMPORTED COMPOST SHALL BE COMPOSTED IN ACCORDANCE WITH WAC 173-350-220 AND FREE OF NOXIOUS WEED MATERIAL. PROVIDE ONE-GALLON (1-GALLON) SAMPLE AND SOURCE FOR APPROVAL BY ARCHITECT PRIOR TO DELIVERY TO SITE.

GROWING MEDIUM/TOPSOIL A, B, AND C SHALL CONFORM TO THE FOLLOWING SOIL CHARACTERISTICS:

1. SOIL QUALITY – ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE:

- CONSTRUCTION MATERIAL(S) SHALL NOT BE PRESENT.
- SOIL MEDIA SHALL HAVE A SANDY-LOAM TO LOAM TEXTURE PER USDA TEXTURAL TRIANGLE. CLAY CONTENT SHALL NOT EXCEED 5%. TOPSOIL MIXTURE SHALL BE 60%-70% SANDY-LOAM (GRADATION PER ASTM D 422) AND 30%-40% COMPOST BY VOLUME (ORGANIC MATTER CONTENT OF 5%-10% BY WEIGHT). THE SOIL SHALL BE A UNIFORM MIX, FREE OF STONES, STUMPS, OR OTHER SIMILAR OBJECTS LARGER THAN TWO INCHES.
- SUBSOILS BELOW THE TOPSOIL LAYER SHALL BE SCARIFIED TO 4" WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS. (THE INTENT IS TO PROVIDE A LOOSE PLANTING MEDIUM WITH TOTAL DEPTH OF LOOSENED SOIL THAT VARIES BASED ON THE SUBGRADE AND PREVIOUS LAND USE TYPE. SEE SOIL PREPARATION SPECIFICATIONS 32-9400 (UNLESS OTHERWISE NOTED ON THE LANDSCAPE PLANS).
- TOPSOIL AND LOOSENED SUBSOIL DEPTH OF 12" AS SHOWN IN IMAGE TO LEFT IS MINIMUM AND IS REQUIRED TO BE GREATER THAN 12" WHEN PREVIOUS/EXISTING SUBGRADE IS EITHER COMPACTED, GLACIAL TILL, CLAY, OR PURE GRAVEL OR PIT-RUN.
- COMPOST OR OTHER MATERIAL USED FOR SOIL AMENDMENTS (ORGANIC MATTER CONTENT) SHALL BE "COMPOSTED MATERIALS" IN WAC 173-350-220. THE COMPOST MUST ALSO HAVE ORGANIC MATTER CONTENT 35% TO 65% AND A CARBON TO NITROGEN RATIO BELOW 25:1 OR 35:1.

(F) TOPSOIL AND SOIL PREPARTION SPECIFICATIONS (DOE MANUAL BMP T5.13)
NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT
SCOTT CHRISTOPHER RIGGINS
CERTIFICATE NO. 1254

ABC RECYCLING
LANDSCAPE DETAILS AND NOTES
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: SCR
CHECKED BY: SCR
ISSUE DATE: 10-23-2023

L3
OF: L1-L3

Stormwater Management Report

ABC Recycling

October 21, 2023

3426 Barret Road, Suite A103
Ferndale, WA 98248

Scott Goodall, MS, PE
Principal
scott@bold-impact.com
360-389-8138

Prepared for:
Andy Anthony
Vice President
735 Cornwall Ave.
Bellingham, WA 98225
360-622-1682

Let's Build Your Vision Together

Engineer’s Declaration

I, Scott Goodall, a Professional Engineer registered in the State of Washington as a Civil Engineer, do hereby declare that this stormwater site plan was prepared by, or under my personal supervision, and that this report was prepared in accordance with generally accepted engineering practices. I hereby affirm that, to the best of my knowledge, information and belief, this report was prepared in full compliance with the 2019 Washington State Department of Ecology Stormwater Management Manual for Western Washington (2019 DOE SWMM), City of Ferndale Development Standards, and all Technical Standards adopted thereunder.

Respectfully Sealed and Signed,

10-21-2023

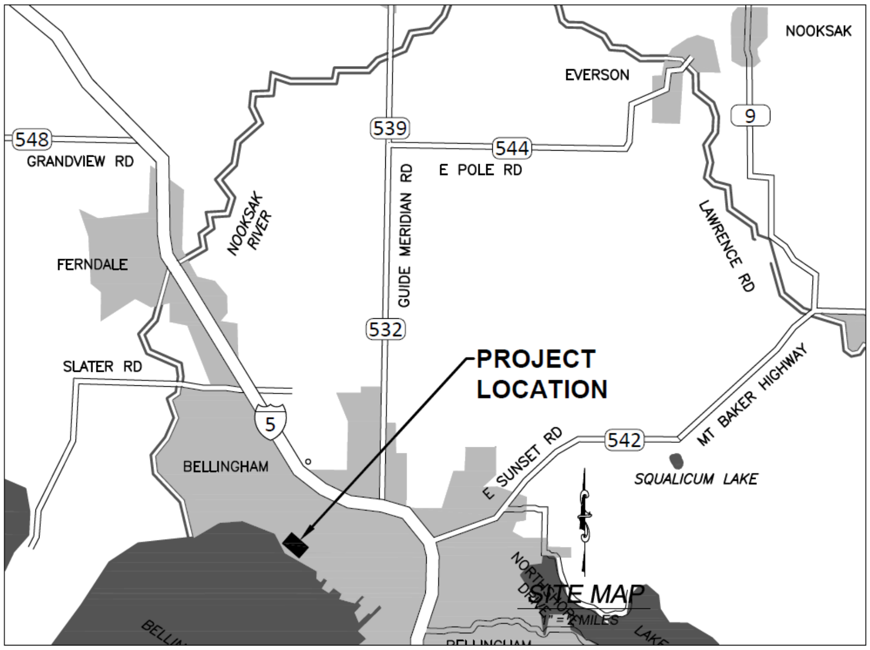
Scott Goodall, MS, PE
Impact Design LLC

Original document on-file at Impact Design, LLC

Table of Contents — Stormwater Site Plan

Appendix Stormwater Site Plan

Section	Contents
A	ABC Recycling Construction Plans
B	Hydrologic and Hydraulic Analysis
	Basin Maps
	WWHM 2012 Modeling
C	Conveyance Calculations
D	Water Quality System Calculations
E	Geotechnical Information
F	ABC Recycling Operations and Maintenance Manual



Regional Vicinity Map

Local Vicinity Map

Existing Conditions: The project is located in Whatcom County on the SW side of 741 Marine Drive just outside of the City limits of Bellingham, Washington. This places the site between 500-feet and 750-feet NE of Bellingham Bay, 2.5-street miles NW of the Whatcom County Court House, 1 street-mile NW of the active Bellingham waterfront, 3-street miles south of the Bellingham International Airport and 2.1-street miles SW of the "Northwest" (257) exit of Interstate 5 freeway. The site is bounded on all sides by active railway lines and shares a driveway with the (now abandoned) cement plant of Lehigh Concrete Company. The site is physically located at 48.76747420, -122.52265920.

Existing Conditions Site Photos (10/19/2023)

The steepest slope of the property is approximately 5 percent at the northeast property boundary near the Marine Drive right-of-way. Shallow soils at the site consist of mostly uncontrolled fill overlying glacial outwash sand overlying glaciomarine drift clay.

Proposed Conditions: The facility will accept for purchase obsolete metal material, subject to an inbound Source Control Program, primarily post-consumer depolluted automobiles and kitchen appliances, with all fluids thereof previously removed, and process the metal material through the proposed metal shredder. Ferrous metal produced from the process would be delivered to the Port of Bellingham by truck or railcar and loaded on to ocean going vessels to its ultimate destination. Non-ferrous metal produced from the process would be delivered to the Port of Seattle by truck and loaded on to ocean going vessels to its ultimate destination. These ferrous and non-ferrous metal products are manufactured for purchase on the secondary metal industries market, which reduces global mining and use of virgin materials. The project includes erection of various pre-manufactured steel buildings. Metal processing equipment of various designs will also be installed onsite, largely located inside buildings. A rail spur will be installed on the south side of the site; in addition, truck scales, concrete and asphalt paved areas for storage and movement of trucks and rolling stock will be installed. Here is a summary of the proposed buildings:

- **BUILDING 1 OFFICE/SHOP**

- **BUILDING 2 SEPARATION**
- **BUILDING 3 RECLAMATION**
- **BUILDING 5 TWITCH**

Basin Map Figure 1 shows the Post-Developed land use for the entire property. The pre-developed land use for the entire property for the purpose of stormwater modeling to size the pond is considered C, Forest, Flat per the 2019 WSDOE Manual. While the majority of the property is existing gravel fill, no existing stormwater management system is currently constructed for flow control or stormwater treatment.

WWHM2012 MODEL EXISTING CONDITION			
BASIN SURFACE	**WWHM2012 ELEMENT**	**AREA**	
		SF	**Acre**
Existing Condition	C, Forest, Flat	135,059	3.10
TOTAL		**135,059**	**7.18**

WWHM2012 MODEL PROPOSED CONDITION			
BASIN SURFACE	**WWHM2012 ELEMENT**	**AREA**	
		SF	**Acre**
Asphalt Surface	ROAD, FLAT	135,059	3.10
Concrete Surface	SIDEWALK, FLAT	90,650	2.08
Buildings	ROOFTOPS, FLAT	52,000	1.19
Gravel	DRIVEWAY, FLAT	13,226	0.30
Detention Pond	POND	21,766	0.51
TOTAL		**312,701**	**7.18**

The following guidelines and design criteria were used to determine the project's stormwater requirements and design criteria.

Development Standards:

A. Whatcom County Code (WCC) Title 20.80.630

B. Washington State Department of Ecology 2019 Stormwater Management Manual for Western Washington (WSDOE Manual)

3.1 Governing Guidelines: The land use intensity per "Land Use Intensity for Stormwater Management Table" in WCC 20.80.630 (1) (e) identifies this development as a High Land Use because it is an industrial use. This project is outside the NPDES Phase II Permit Area, the Lake Whatcom Watershed Overlay District, and the Stormwater Special District. Therefore, this project is subject to the WSDOE Manual requirements.

The *2019 Stormwater Management Manual for the Western Washington* (DOE Manual) will be used to design the On-Site Stormwater Management BMP's, Stormwater Runoff Treatment and Flow Control measures for this project. **This project disturbs more than one acre, so a General Construction NDPES permit will be required.** This permit will be applied for prior to construction but is not necessary for vesting under a building permit application, as WSDOE is the governing body for this permit, not Whatcom County.

3.2 Design Criteria: The existing site does not consist of impervious surfaces covering more than 35% of the site; therefore, as specified by the DOE Manual, the proposed project meets the definition of new development. Because the area of new development is greater than 5,000 square feet, the project must meet all minimum requirements for stormwater management as specified in the DOE Manual. See Flowchart for the Determining Requirements for New Development on the next page of this report for this Minimum Requirements flow chart determination. All minimum requirements will apply to both new and replaced impervious surfaces.

In accordance with the requirements of the DOE Manual, the site's hydrologic analysis was performed using the Western Washington Hydrologic Model (WWHM), version 2012, a continuous simulation hydrologic model developed by the DOE.

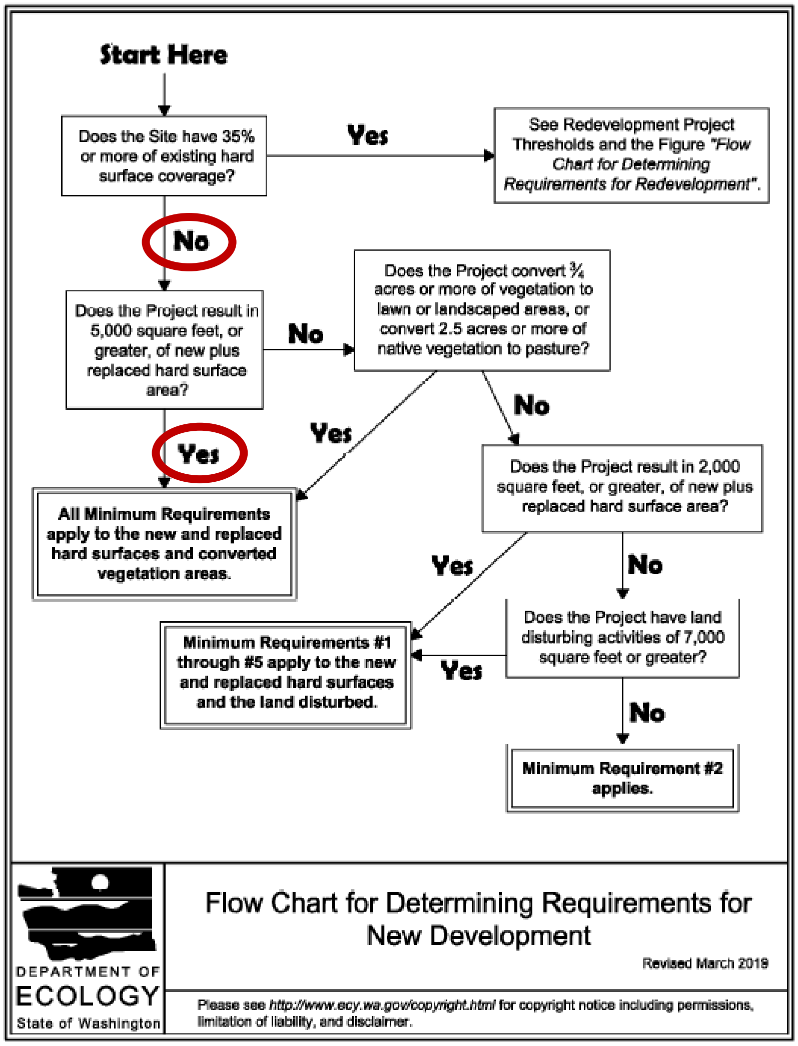
3.3 Design Assumptions:

On-Site Stormwater Management – On-site stormwater management for hard surfaces will be required as is outlined in the DOE Manual, under minimum requirement #5. Due to the high groundwater table, no LID techniques will be employed on this project.

Stormwater Treatment: Stormwater treatment for new pollution hard generating surfaces will be required as is outlined in the DOE Manual, under minimum requirement #6. This will be met by using a Stormwater Treatment Wetland. See Minimum Requirement #6: Runoff Treatment of this report for further information.

Stormwater Detention and Flow Control: Stormwater detention and flow control for new hard surfaces will be required as outlined in the DOE Manual, under minimum requirement #7. This will be accomplished by using a stormwater treatment wetland. See the Minimum Requirement #7: Flow Control of this report for further information.

Figure I-3.1: Flow Chart for Determining Requirements for New Development



4.1 Soils:

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey reports that the soil unit is Hydrologic Soil Group C: 172—Urban land-Whatcom-Labounty complex, 0 to 8 percent slopes. The Phase 2 Environmental Assessment Report (Anchor QEA August 2023) is attached. Here is an expert from their report:

"2.1.1 Test Pits
Anchor QEA, with support from subcontractor Anderson Environmental Contracting, collected samples from TP-4 through TP-12 and TP-16 via excavator. Anchor QEA collected samples from TP-1 through TP-3, TP-13 through TP-15, and TP-17 via hand auger, as access was not able to be cleared for the excavator to enter the wooded portions of the site. Test pit sampling details are summarized in Table 1. Test pits were used for observation of soil conditions, and for collection of surficial and subsurface soil samples. Sample intervals were collected following the procedures in the SAP (Anchor QEA 2020b) and were based on visual observations of the soils and through discussions with ABC Recycling and the project team. Sample material from the selected sample interval(s) was characterized before placement in sample jars. Each test pit was filled in, compacted with the excavator bucket, and surface graded by the excavator to the extent practicable following sampling. Test pit logs are included in Appendix E.

3.1 Physical Features
The samples collected from the wooded area on the northern side of the Property were generally composed of moist, fine-grained soils, with the exception of TP-3 (Figure 1). Unique soil characteristics identified at TP-3 are detailed below.

- *TP-3 was selected to document conditions in a mound of fill in the woods noted during the September 30 site walk. The mound was composed of fine, limestone-like material. Debris were present on the mound and within the surrounding area. The majority of samples collected from the yard were composed of dry, compacted gravel material that makes up the surface backfill of the yard. Native material was encountered in the yard between 4.5 and 5 feet bgs. Samples with unique soil characteristics are detailed below.*

- *TP-4 is along the northeastern edge of the yard and is the only location in the yard area to have native material at surface through to the depth of the bottom of the test pit (4 feet bgs). Material in this test pit contained brown grey fine-grained soil at the surface and contained more clayey soil with trace organics (wood pieces) towards the bottom of the test pit. Material from the surficial layer (0 to 0.5 feet bgs) was sampled and analyzed.*

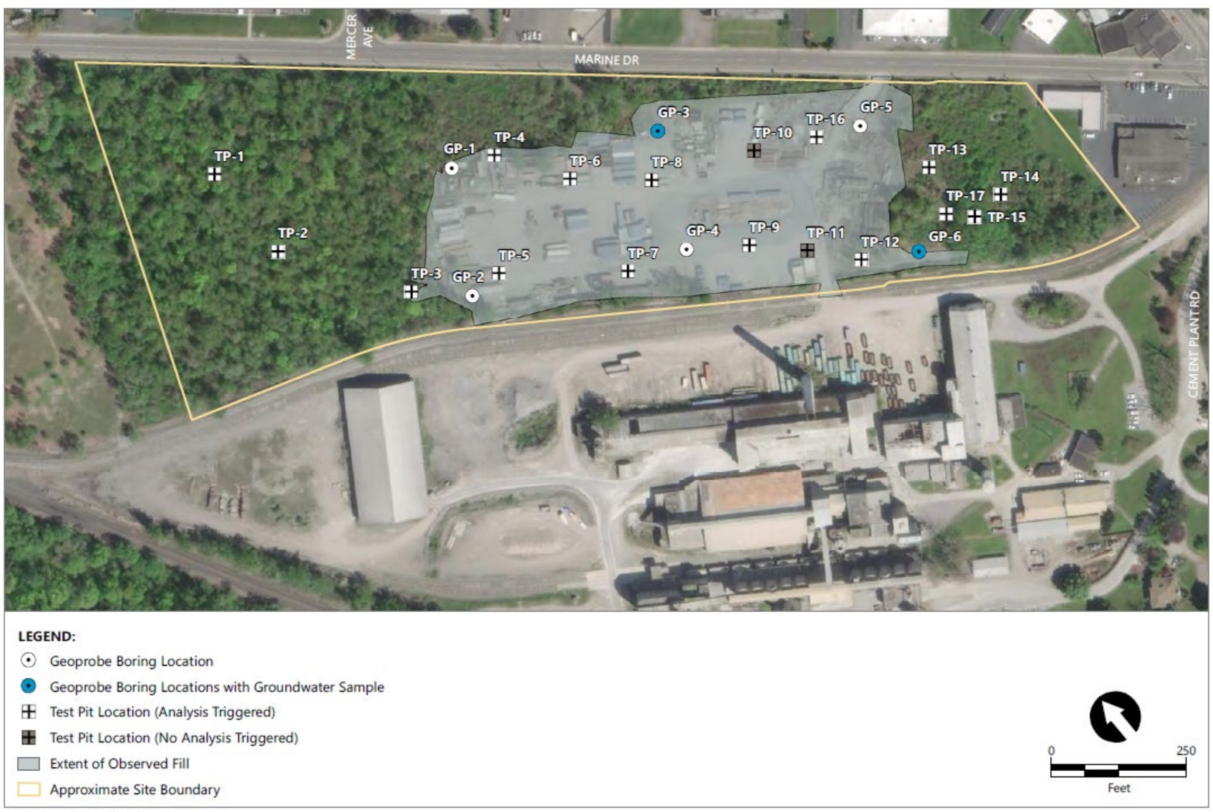
- *TP-5 is located near the northwestern corner of the yard and was chosen for sampling based on observations of creosote-treated debris and creosote odor noted during the September 30 site walk. Surficial material from TP-5 (0 to 0.5 feet bgs) was sampled and analyzed.*
- *TP-6 is located near TP-4 on the northeastern side of the yard. This test pit was unique in that a slight metallic sheen was noted in the darkly colored fine-grained soil in the top 0 to*

0.5 feet. Anthropogenic debris (e.g., hose, tarp, and fabric) was also observed compacted within the material along the test pit sidewall. The unique surficial layer was sampled and analyzed.

- *TP-7 is located on the northwestern side of the yard. Native material was encountered at 4.5 feet and the 4.5- to 5-foot interval was sampled and submitted for analysis.*

- *TP-16 is a location added to the sampling scheme based on field observations. Surficial material was wet, and dark brown in color with coarse-grained soil, as opposed to the fine-grained soil found in surficial samples elsewhere around the yard. Native material was also encountered at this test pit starting at 5 feet bgs. The unique surficial layer and native layer were sampled and the native layer was analyzed.*

Samples collected from the wooded area on the southern side of the Property typically consisted of dry to moist fine-grained soil underneath a surficial layer of leaves and organic matter. No test pits from this portion of the Property had significant variations, and there were no test pits with unique materials or debris observed.



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ANCHOR QEA

Figure 1
Actual Sample Locations
Phase 2 Environmental Assessment Report
Marine Drive Property

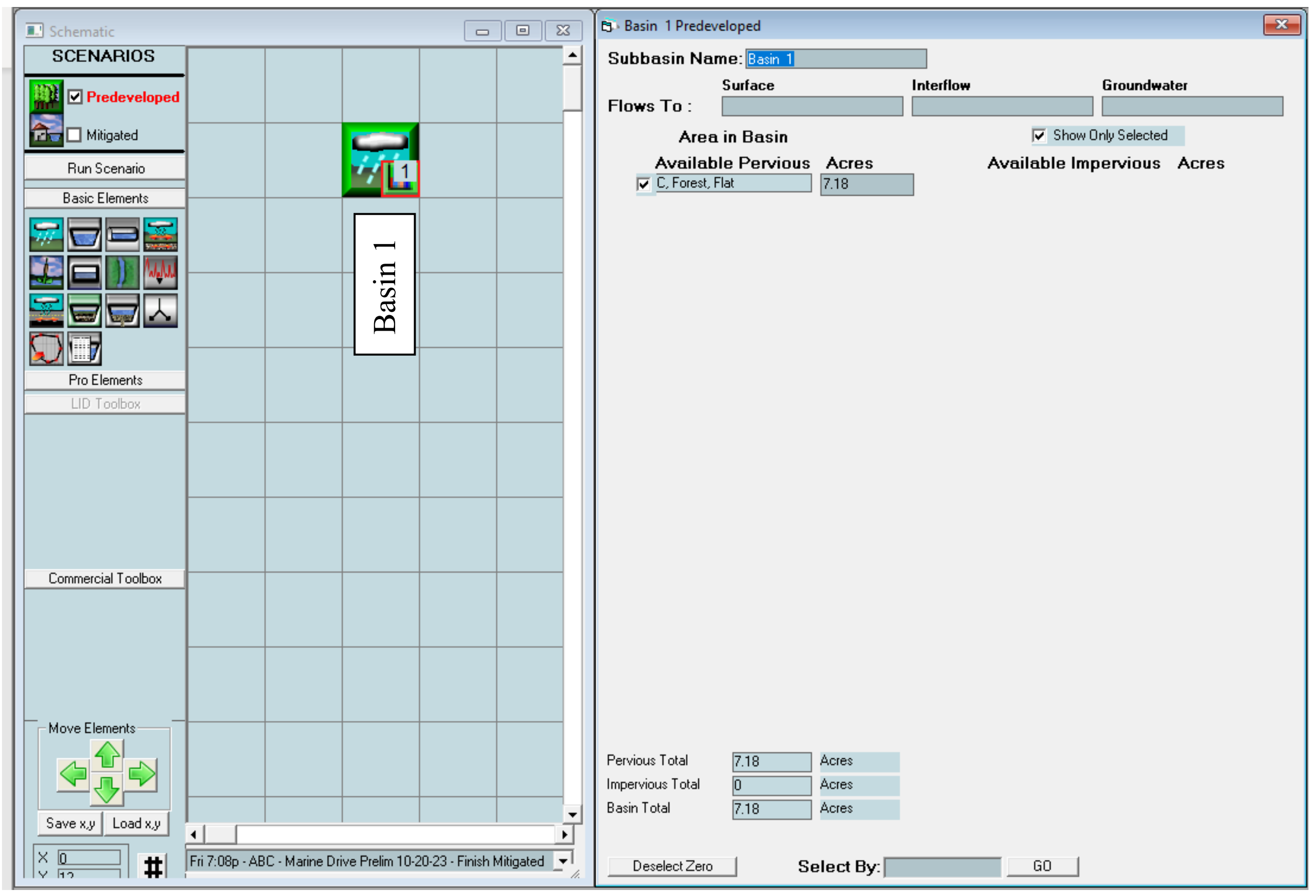
4.2 Pre-Developed Conditions: The site contains a gravel storage area with temporary storage on-site. Wetlands and forested conditions also exist on the site. The pre-developed land use in the WWHM2012 model is used as C, Forest, Flat.

4.3 Post-Developed Conditions: Appendix A of this report shows the proposed site development including the proposed buildings, hard surface replacement, expansion and other improvements.

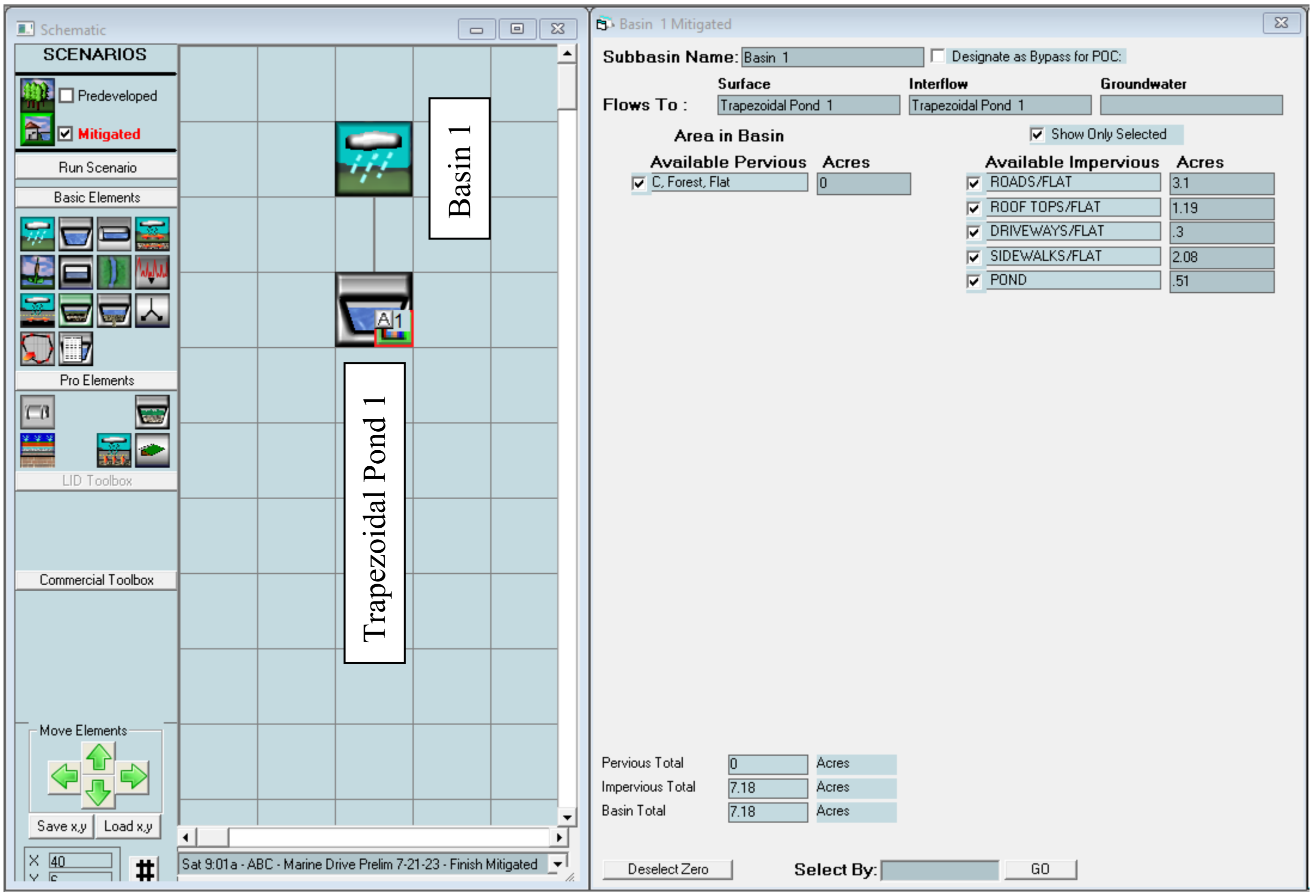
Appendix B shows the post-developed basin map. The pre-developed and post-developed flow rates calculated by WWHM2012 are shown below:

Flow (cfs)	Predeveloped	Mitigated
2 Year	0.139	0.075
5 Year	0.210	0.113
10 Year	0.248	0.144
25 Year	0.288	0.192
50 Year	0.313	0.234
100 Year	0.334	0.282

See Predeveloped WWHM2012 setup is shown below:

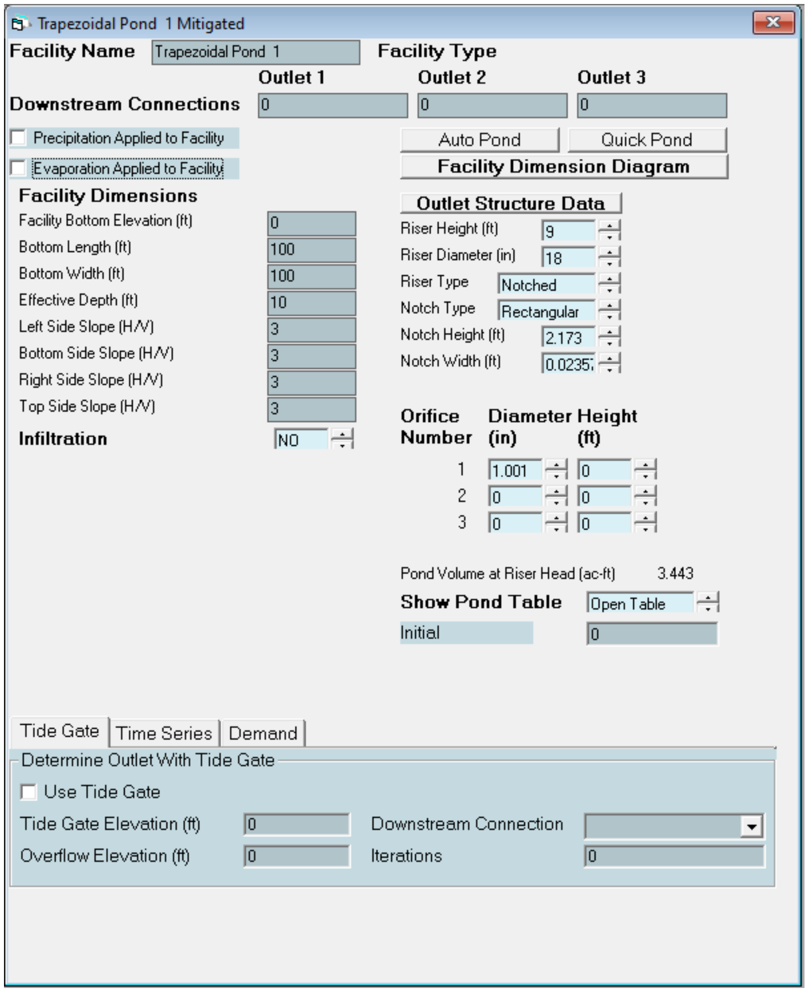


See Post-developed WWHM2012 setup is shown below:



WWHM 2012 Model Setup

The WWHM 2012 model was setup using one basin as shown above. A trapezoidal pond element was used to describe the stormwater treatment wetland. The WWHM2012 model is shown in Appendix B.



WWHM 2012 Model Setup

The WWHM 2012 model was setup using one basin as shown above. A trapezoidal pond element was used to describe the stormwater treatment wetland. The WWHM2012 model is shown in Appendix B.

4.4 Downstream Analysis:

Marine Drive Stormwater System

On October 4, 2023 a field investigation was conducted at the ABC Recycling site at 741 Marine Dr. to document the flowpath of stormwater leaving the property.

After inspecting the perimeter of the location, it was determined that stormwater runoff flows to the southeast corner of the property where it meets the City of Bellingham storm drain line. Two sewer-grade, green PVC culverts, 12" and 18" respectively, feed stormwater from the site to catch basins in the Marine Dr. right-of-way.

The city storm drain line uses 24" green PVC and 18" concrete pipe to move water in a southeasterly direction in the Marine Dr. right-of-way toward Little Squalicum Creek. The city storm drain network of catch basins and pipes were all observed to be functioning, including the connection of stormwater from the site to the city system.

At 1,760 feet from the connection to the city storm drain line at the southeast corner of the property, Marine Dr. intersects Little Squalicum Creek. Following the flowpath of the city storm drain line, two 36" concrete pipes were observed to be discharging stormwater runoff into Little Squalicum Creek.

From the outfall at the intersection of Marine Dr. and Little Squalicum Creek stormwater runoff flows 700 feet to the Little Squalicum Estuary where it discharges into Bellingham Bay.

Marine Drive Outfall

Marine Drive Open Channel

Little Squalicum Creek

4.5 Emergency Overflow: A gravity overflow system is in place for the stormwater treatment wetland. The gravity overflow pipe is an 18 inch CPP pipe laid at 0.5% slope. This pipe is capable of managing a flow of 8.6 cfs. The 100-year unmitigated flowrate of the site is 5.6 cfs as shown in the Unmitigated WWHM2012 model in Appendix B. Therefore, the pipe size is adequately. Calculations to confirm the 18-inch riser is capable of managing the 5.6 cfs 100-year unmitigated flowrate are also provided in Appendix B. The spillway calculations are also included for the 2.8 cfs flowrate.

The following sections describe how the project meets the minimum requirements for stormwater management as specified in the DOE Manual.

Minimum Requirement #1: Preparation of a Stormwater Site Plan: This project is required to prepare a Stormwater Site Plan, as defined by the DOE Manual

Stormwater Site Plans are prepared for local government review. Stormwater Site Plans shall use site-appropriate development principles, as required and encouraged by local development codes, to retain native vegetation and minimize impervious surfaces to the extent feasible. Stormwater Site Plans shall be prepared in accordance with the DOE Manual.

> **Drainage Report:** A guiding document prepared with associated site testing, engineering analysis, site planning, supporting calculations, and supporting documentation defining a permanent stormwater control plan for the subject site.
>
> **SWPPP Plan:** Construction Stormwater Pollution Prevention Plan consists of the preparation of a Temporary Erosion and Sediment Control Plan (TESC). Please see the attached project plans for the TESC plan. This is just an initial plan. The plan must be monitored and modified for field conditions by a Certified Erosion and Sedimentation Control Lead (CESCL) throughout the duration of the project construction phase.
>
> **SPCC Plan:** A Spill Prevention, Control and Counter Measures Plan (SPCC) will be provided by the Contractor.

Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPP) This project is required to prepare SWPP Plan, as defined by thresholds in the DOE Manual.

A Stormwater Pollution Prevention Plan (SWPP Plan) has been prepared as part of the construction drawings for the proposed site improvements, which are included in Appendix A of this report. This plan provides erosion and sediment control information, locations where Best Management Practices (BMPs) shall be implemented, and requirements that the contractor must follow throughout construction. See the Construction Plans for a copy of the SWPP Site Plan, SWPP Notes, and BMP details.

During construction, the contractor shall maintain a copy of the SWPP Plan on site and shall update or modify the SWPP Plan as necessary for the current conditions of the site. The contractor's schedule and available crew, equipment, and materials will be determined prior to construction. Accordingly, some BMPs that have been specified may not be necessary, while other additional BMPs may be required.

Construction stormwater prevention is documented in the SWPP Plan that has been prepared for this project.

Element 1: Preserve Vegetation / Mark Clearing Limits

A. Before beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area.
B. Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum degree practicable.

Additional Guidance For Element 1

- Plastic, metal, fabric fence, or other physical barriers may be used to mark the clearing limits. Note the difference between the practical use and proper installation of BMP C233: silt fence and the proper use and installation of BMP C103: high-visibility fence.
- If it is not practical to retain the duff layer in place, then stockpile it on site, cover it to prevent erosion, and replace it immediately when you finish disturbing the site.
-

Suggested BMPs For Element 1

- BMP C233: Silt Fence

Element 2: Establish Construction Access

A. Limit construction vehicle access and exit to one route, if possible.
B. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking of sediment onto public roads.
C. Locate wheel wash or tire baths on site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.
D. If sediment is tracked off site, clean the affected roadway(s) thoroughly at the end of each day, or more frequently as necessary (for example, during wet weather). Remove sediment from roads by shoveling, sweeping, or picking up and transporting the sediment to a controlled sediment disposal area.
E. Conduct street washing only after sediment is removed in accordance with 2.d (above).
F. Control street wash wastewater by pumping back on site, or otherwise prevent it from discharging into systems tributary to waters of the state.

Additional Guidance For Element 2

Minimize construction site access points along linear projects, such as roadways. Street washing may require local jurisdiction approval.

Suggested BMPs For Element 2

- BMP C105: Stabilized Construction Access

Element 3: Control Flow Rates

A. Protect properties and waterways downstream of development sites from erosion and the associated discharge of turbid waters due to increases in the velocity and peak volumetric flow rate of stormwater runoff from the project site.

B. Where necessary to comply with 3.a (above), construct stormwater infiltration or detention BMPs as one of the first steps in grading. Assure that detention BMPs function properly before constructing site improvements (e.g., impervious surfaces).
C. If permanent infiltration BMPs are used for temporary flow control during construction, protect these BMPs from siltation during the construction phase.

Additional Guidance For Element 3

- Conduct a downstream analysis if changes in flows could impair or alter conveyance systems, streambanks, bed sediment, or aquatic habitat. See iii-3.2 preparing a stormwater site plan for off-site analysis guidelines.
- Even gently sloped areas need flow controls such as BMP C235: wattles or other energy dissipation / filtration structures. Place dissipation facilities closer together on steeper slopes. These methods prevent water from building higher velocities as it flows downstream within the construction site.
- Control structures designed for permanent detention BMPs are not appropriate for use during construction without modification. If used during construction, modify the control structure to allow for long-term storage of runoff and enable sediment to settle. Verify that the BMP is sized appropriately for this purpose. Restore BMPs to their original design dimensions, remove sediment, and install a final control structure at completion of the project.
- Erosion has the potential to occur because of increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site. The local permitting agency may require infiltration or detention BMP designs that provide additional or different stormwater flow control than the designs detailed in this manual. These requirements may be necessary to address local conditions or to protect properties and waterways downstream.
- Velocity of water leaving the site should not exceed 3 feet/second, if the discharge is to a stream or ditch. Install velocity dissipation, such as BMP C207: check dams or BMP C202: riprap channel lining to ensure reduction of the flow velocity to a non-erosive level.
- If the discharge from a project site is to a municipal storm drainage system, the allowable discharge rate may be limited by the capacity of the public system. It may be necessary to clean the municipal storm drainage system prior to the start of the discharge to prevent scouring solids from the drainage system. Obtain permission from the owner of the collection system before discharging to it. Ensure that no downstream pipes are surcharged as a result of increased flows from the project site.
- If the discharge from a project site is directly to a flow control exempt receiving water listed in appendix I-A: Flow Control Exempt Receiving Waters or to an infiltration system, there is no discharge flow limit.

Suggested BMPs For Element 3

- BMP C207: Check Dams

Element 4: Install Sediment Controls

A. Construct sediment control BMPs (sediment ponds, traps, filters, etc.) As one of the first steps in grading. These BMPs must be functional before other land disturbing activities take place.

B. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.
C. Direct stormwater runoff from disturbed areas through BMP C241: sediment pond (temporary) or other appropriate sediment removal BMP, before the runoff leaves a construction site or before discharge to an infiltration facility. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must control flow rates per element 3: control flow rates.
D. Locate BMPs intended to trap sediment on site in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages.
E. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.
F. Where feasible, design outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Additional Guidance For Element 4

- Outlet structures that withdraw impounded stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column are for the construction period only. If installing a floating pump structure, include a stopper to prevent the pump basket from hitting the bottom of the pond.
- If a sediment trapping BMP utilizes a control structure that will also be used in a permanent detention BMP application, the control structure construction must be finalized for the permanent BMP application upon project completion.
- Install sediment controls in a manner that protects the sensitive areas and their buffers marked in accordance with element 1: preserve vegetation / mark clearing limits.
- Where feasible, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration.
- Seed and mulch earthen structures such as dams, dikes, and diversions according to the timing indicated in element 5: stabilize soils.
- Full stabilization includes concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or vegetative cover in a manner that will fully prevent soil erosion.
- The local permitting authority may inspect and approve areas fully stabilized by means other than pavement or quarry spalls.

Suggested BMPs For Element 4

- BMP C233: Silt Fence

Element 5: Stabilize Soils

A. Stabilize exposed and unworked soils by application of effective BMPs that prevent erosion. Applicable BMPs include, but are not limited to: temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (pam), the early application of gravel base on areas to be paved, and dust control.

B. Control stormwater volume and velocity within the site to minimize soil erosion.
C. Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
D. Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion:
    a. During the dry season (May 1 - September 30): 7 days
    b. During the wet season (October 1 - April 30): 2 days
E. Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.
F. Stabilize soil stockpiles from erosion, protect with sediment trapping measures, and where possible, locate away from storm drain inlets, waterways and drainage channels.
G. Minimize the amount of soil exposed during construction activity.
H. Minimize the disturbance of steep slopes.
I. Minimize soil compaction and, unless infeasible, preserve topsoil.

Additional Guidance For Element 5

- Soil stabilization BMPs should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or ground water.
- Ensure that gravel base used for stabilization is clean and does not contain fines or sediment.

Suggested BMPs For Element 5

- BMP C120: Temporary And Permanent Seeding
- BMP C121: Mulching
- BMP C140: Dust Control

Element 6: Protect Slopes

A. Design and construct cut-and-fill slopes in a manner to minimize erosion. Applicable practices include, but are not limited to, reducing continuous length of slope with terracing and diversions, reducing slope steepness, and roughening slope surfaces (for example, track walking).
B. Divert off-site stormwater (run-on) or ground water away from slopes and disturbed areas with interceptor dikes, pipes and/or swales. Off-site stormwater should be man- aged separately from stormwater generated on site.
C. At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains must be sized to convey the flow rate calculated by one of the following methods:
    a. Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm.

    OR

    b. Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step.

D. The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydro- logy Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped" area.
E. Place excavated material on the uphill side of trenches, consistent with safety and space considerations.
F. Place check dams at regular intervals within constructed channels that are cut down a slope.

Additional Guidance for Element 6

- Consider soil type and its potential for erosion.
- Stabilize soils on slopes, as specified in Element 5: Stabilize Soils.
- BMP combinations are the most effective method of protecting slopes with disturbed soils. For example, use both BMP C121: Mulching and BMP C122: Nets and Blankets in combination.

Suggested BMPs for Element 6

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching

Element 7: Protect Drain Inlets

A. Protect all storm drain inlets made operable during construction so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.
B. Clean or remove and replace inlet protection devices when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Additional Guidance for Element 7

Protect all existing storm drain inlets so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

- Keep all approach roads clean. Do not allow sediment and street wash water to enter storm drains without prior and adequate treatment (as defined above) unless treatment is provided before the storm drain discharges to waters of the State.
- Inlets should be inspected weekly at a minimum and daily during storm events.

Suggested BMPs for Element 7

- BMP C220: Inlet Protection

Element 8: Stabilize Channels and Outlets

A. Design, construct, and stabilize all on-site conveyance channels to prevent erosion from the flow rate calculated by one of the following methods:

   a. Single Event Hydrograph Method: The peak volumetric flow rate calculated using a 10-minute time step from a Type 1A, 10-year, 24-hour frequency storm.
      OR
   b. Continuous Simulation Method: The 10-year peak flow rate, as determined by an approved continuous runoff model with a 15-minute time step.

   The hydrologic analysis must use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis must use the temporary or permanent project land cover condition, whichever will produce the highest flow rates. If using the Western Washington Hydro- logy Model (WWHM) to predict flows, bare soil areas should be modeled as "landscaped" area.
B. Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches at the outlets of all conveyance systems.

Additional Guidance for Element 8

The best method for stabilizing channels is to completely line the channel with BMP C122: Nets and Blankets first, then add BMP C207: Check Dams as necessary to function as an anchor and to slow the flow of water.

Suggested BMPs for Element 8

- BMP C207: Check Dams

Element 9: Control Pollutants

Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. The project proponent must:

A. Handle and dispose of all pollutants, including waste materials and demolition debris that occur on site in a manner that does not cause contamination of stormwater.
B. Provide cover, containment, and protection from vandalism for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. On-site fueling tanks must include secondary containment. Secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. Double-walled tanks do not require additional secondary containment.
C. Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.
D. Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, or to the sanitary sewer, with local sewer district approval.
E. Apply fertilizers and pesticides in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturers' label requirements for application rates and procedures.
F. Use BMPs to prevent contamination of stormwater runoff by pH-modifying sources. The sources for this contamination include, but are not limited to: recycled concrete stockpiles,

bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.

G. Adjust the pH of stormwater if necessary to prevent violations of water quality standards.
H. Assure that washout of concrete trucks is performed off site or in designated concrete washout areas only. Do not wash out concrete truck drums or concrete handling equipment onto the ground, or into storm drains, open ditches, streets, or streams. Washout of small concrete handling equipment may be disposed of in a formed area awaiting concrete where it will not contaminate surface or ground water. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge directly to ground water or surface waters of the State is prohibited. Do not wash out to formed areas awaiting infiltration BMPs.
I. Obtain written approval from Ecology before using chemical treatment other than CO2, dry ice, or food grade vinegar to adjust pH.
J. Uncontaminated water from water-only based shaft drilling for construction of building, road, and bridge foundations may be infiltrated provided the wastewater is managed in a way that prohibits discharge to surface waters. Prior to infiltration, water from water-only based shaft drilling that comes into contact with curing concrete must be neutralized until pH is in the range of 6.5 to 8.5 (su).

Additional Guidance for Element 9

- Wheel wash and/or tire bath wastewater can be combined with wastewater from concrete washout areas if the wastewaters will be properly disposed of at an offsite location or treatment facility.
- Do not use upland land applications for discharging wastewater from concrete washout areas.
- Woody debris may be chopped and spread on site.
- Conduct oil changes, hydraulic system drain down, solvent and degreasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff using spill prevention measures, such as drip pans.
- Clean contaminated surfaces immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle.

Suggested BMPs for Element 9

- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- BMP C153: Material Delivery, Storage, and Containment

Element 10: Control Dewatering

A. Discharge foundation, vault, and trench dewatering water, which have similar characteristics to stormwater runoff at the site, into a controlled conveyance system before discharge to BMP C240: Sediment Trap or BMP C241: Sediment Pond (Temporary).
B. Discharge clean, non-turbid dewatering water, such as well-point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Element 8: Stabilize

Channels and Outlets, provided the dewatering flow does not cause erosion or flooding of receiving waters. Do not route clean dewatering water through stormwater sediment BMPs. Note that "surface waters of the State" may exist on a construction site as well as off site; for example, a creek running through a site.

C. Handle highly turbid or otherwise contaminated dewatering water separately from stormwater.
D. Other dewatering treatment or disposal options may include:
    a. Infiltration.
    b. Transport off site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
    c. Ecology-approved on-site chemical treatment or other suitable treatment technologies.
    d. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
    e. Use of a sedimentation bag that discharges to a ditch or swale for small volumes of localized dewatering.

Additional Guidance for Element 10

- Channels must be stabilized, as specified in Element 8: Stabilize Channels and Outlets.
- Construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam can create highly turbid or contaminated dewatering water.
- Discharging sediment-laden (muddy) water into waters of the State likely constitutes violation of water quality standards for turbidity. The easiest way to avoid discharging muddy water is through infiltration and preserving vegetation.
- Dewatering water from contaminated sites must be handled separately from stormwater. Direct contaminated stormwater to a sanitary sewer where allowed by the local sewer authority, or to other approved treatment.

Suggested BMPs for Element 10

- BMP C236: Vegetative Filtration

Element 11: Maintain BMPs

A. Maintain and repair all temporary and permanent erosion and sediment control BMPs as needed to assure continued performance of their intended function in accordance with BMP specifications.
B. Remove all temporary erosion and sediment control BMPs within 30 days after achieving final site stabilization or after the temporary BMPs are no longer needed.

Additional Guidance for Element 11

- Some temporary erosion and sediment control BMPs are biodegradable and designed to remain in place following construction. BMP C122: Nets and Blankets is an example of a BMP with biodegradable options.
- Provide protection to all BMPs installed for the permanent control of stormwater from sediment and compaction. All BMPs that are to remain in place following completion of construction shall be examined and placed in full operating conditions. If sediment enters the BMPs during construction, it shall be removed and the facility shall be returned to the conditions specified in the construction documents.

- Remove or stabilize trapped sediment on site. Permanently stabilize disturbed soil resulting from removal of BMPs or vegetation.
-

Suggested BMPs for Element 11

- BMP C160: Certified Erosion and Sediment Control Lead

Element 12: Manage the Project

A. Phase development projects to the maximum degree practicable and take into account seasonal work limitations.
B. Inspect, maintain and repair all BMPs as needed to assure continued performance of their intended function. Projects regulated under the Construction Stormwater General Permit (CSWGP) must conduct site inspections and monitoring in accordance with Special Condition S4 of the CSWGP.
C. Maintain, update, and implement the Construction SWPPP.
D. Projects that disturb one or more acres must have site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites disturbing less than one acre may have a CESCL or a person without CESCL certification conduct inspections. By the initiation of construction, the Construction SWPPP must identify the CESCL or inspector, who must be present on site or on-call at all times.

Additional Guidance for Element 12

The project manager must ensure that the project is built in such a way to comply with all Construction SWPPP Elements, as detailed in this section. Considerations for the project manager include, but are not limited to:

- Construction Phasing
- Seasonal Work Limitations
- Coordination With Utilities And Other Contractors
- Inspection
- Monitoring
- Maintaining An Updated Construction SWPPP

<u>Phasing of Construction</u>

Phase development projects where feasible in order to prevent soil erosion and transporting of sediment from the site during construction. Revegetate exposed areas and maintain that vegetation as an integral part of the clearing activities for any phase.

Clearing and grading activities for developments shall be permitted only if conducted using an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. Minimize removing trees and disturbing or compacting native soils when establishing permitted clearing and grading areas. Show on the site plans and the development site permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions.

Inspection

All BMPs must be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections must be conducted by a person knowledgeable in the principles and practices of erosion and sediment control. The person must have the skills to 1) assess the site conditions and construction activities that could impact the quality of stormwater, and 2) assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

For construction sites one acre or larger that discharge stormwater to surface waters of the state, a CESCL must be identified in the construction SWPPP; this person must be on-site or on-call at all times. Certification must be obtained through an approved training program that meets the erosion and sediment control training standards established by Ecology. See BMP C160: Certified Erosion and Sediment Control Lead.

Appropriate BMPs or design changes shall be implemented as soon as possible whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of /or potential to discharge a significant amount of any pollutant.

The CESCL or inspector must examine stormwater visually for the presence of suspended sediment, turbidity, discoloration, and oil sheen. They must evaluate the effectiveness of BMPs and determine if it is necessary to install, maintain, or repair BMPs to improve the quality of stormwater discharges.

Based on the results of the inspection, construction site operators must correct the problems identified by:

- Reviewing the Construction SWPPP for compliance with the 13 elements and making appropriate revisions within 7 days of the inspection.
- Immediately beginning the process of fully implementing and maintaining appropriate source control and/or treatment BMPs as soon as possible, addressing the problems no later than within 10 days of the inspection. If installation of necessary treatment BMPs is not feasible within 10 days, the construction site operator may request an extension within the initial 10- day response period.
- Documenting BMP implementation and maintenance in the site log book (applies only to sites that have coverage under the Construction Stormwater General Permit).

The CESCL or inspector must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharge points at least once every calendar week and within 24 hours of any discharge from the site. (For purposes of this condition, individual discharge events that last more than one day do not require daily inspections. For example, if a stormwater pond discharges continuously over the course of a week, only one inspection is required that week.) The CESCL or inspector may reduce the inspection frequency for temporary stabilized, inactive sites to once every calendar month

Maintaining an Updated Construction SWPPP

Retain the Construction SWPPP on-site or within reasonable access to the site.

Modify the Construction SWPPP whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

The Construction SWPPP must be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the Construction SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater dis- charges from the site. Modify the Construction SWPPP as necessary to include additional or modified BMPs designed to correct problems identified. Complete revisions to the Construction SWPPP within seven (7) days following the inspection.

Suggested BMPs for Element 12

- BMP C160: Certified Erosion and Sediment Control Lead

Element 13: Protect Low Impact Development BMPs

The primary purpose of On-Site Stormwater Management is to reduce the disruption of the natural site hydrology through infiltration. BMPs used to meet I-3.4.5 MR5: On-Site Stormwater Management (often called LID BMPs) are permanent facilities.

A. Protect all LID BMPs (including, but not limited to BMP T7.30: Bioretention, BMP T5.14: Rain Gardens, and BMP T5.15: Permeable Pavements) from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the LID BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/Rain Garden soils, and replacing the removed soils with soils meeting the design specification.
B. Maintain the infiltration capabilities of LID BMPs by protecting against compaction by construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.
C. Control erosion and avoid introducing sediment from surrounding land uses onto BMP T5.15: Permeable Pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements or base materials.
D. Permeable pavement fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures in accordance with this manual or the manufacturer’s procedures.
E. Keep all heavy equipment off existing soils under LID BMPs that have been excavated to final grade to retain the infiltration rate of the soils.

Additional Guidance for Element 13

See Chapter 5: Precision Site Preparation, Construction & Inspection of LID Facilities in the LID Technical Guidance Manual for Puget Sound (Hinman and Wulkan, 2012) for more detail on protecting LID integrated management practices.

Note that the LID Technical Guidance Manual for Puget Sound (Hinman and Wulkan, 2012) is for additional informational purposes only. You must follow the guidance within this manual if there are any discrepancies between this manual and the LID Technical Guidance Manual for Puget Sound

Suggested BMPs for Element 13

- There are no LID elements on the site as described in Minimum Requirement #5

Minimum Requirement #3: Source Control of Pollution: This project is required to have pollution source controls, as defined by thresholds in the DOE Manual.

Pollutant sources of concern for the project include the proposed roadways and parking areas. Pollution will be controlled at the source to maximize extent possible. All known, available and reasonable source control BMPs have been applied to the design and layout of the site and stormwater plans.

These Operational and Structural Source Control BMPs (as specified in the DOE Manual) should be implemented upon construction completion and remain in place for the operational life of the facility:

S406 BMPs for Streets / Highways
S411 BMPs for Landscaping and Lawn / Vegetation Management
S415 BMPs for Maintenance of Public and Private Utility Corridors and Facilities
S416 BMPs for Maintenance of Roadside Ditches
S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems

Refer to Appendix F: Operations and Maintenance of this report for a full description of how each of these Operational and Structural Source Control BMPs may be fully implemented.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls: This project is required to preserve natural drainage system and outfalls, as defined by thresholds in the DOE Manual. This project will continue to outfall to the existing stormwater conveyance channel on the northeast corner of the site.

Minimum Requirement #5: On-Site Stormwater Management: This project is required to have on-site stormwater management, as defined by thresholds in the DOE Manual.

Lawn and Landscape Areas:

BMP T5.13: Post-Construction Soil Quality and Depth
This project includes lawn or landscaped area. Therefore, the application of BMP T5.13 as outlined in the DOE Manual, is feasible and will be implemented for this project, for all areas subject to clearing and grading that have not been covered by impervious surfaces, and at project completion these areas will demonstrate the following:

> *A topsoil layer with a minimum organic matter of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.*

BMP T5.13 will be met using soils identified in the Soils Report in Section 3 to be on site in the upper two feet below ground surface. These soils may be amended as prescribed in the WDOE 2019 Manual to enhance their treatment capacity. Treatment for all PGIS will be achieved using existing or amended soils beneath pervious concrete pads and natural vegetation and landscaping.

BMP T5.13: Post-Construction Soil Quality and Depth

Stormwater Management Manual for Western Washington

Excerpted from the Washington State Department of Ecology's *Stormwater Management Manual for Western Washington*, Vol. V: Runoff Treatment BMPs

Purpose and Definition

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition. These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal topsoil and sod. Not only are these important stormwater functions lost, but such landscapes themselves become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Establishing soil quality and depth regains greater stormwater functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Applications and Limitations

Establishing a minimum soil quality and depth is not the same as preservation of naturally occurring soil and vegetation. However, establishing a minimum soil quality and depth will provide improved on-site management of stormwater flow and water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, biosolids, and forest product residuals. It is important that the materials used to meet the soil quality and depth BMP be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

This BMP can be considered infeasible on till soil slopes greater than 33 percent.

Design Guidelines

- **Soil retention.** Retain, in an undisturbed state, the duff layer and native topsoil to the maximum extent practicable. In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public
- **Soil quality.** All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:
  1. A topsoil layer with a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed soil. The topsoil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.
  2. Mulch planting beds with 2 inches of organic material
  3. Use compost and other materials that meet these organic content requirements:
     a. The organic content for "pre-approved" amendment rates can be met only using compost meeting the compost specification for BMP T7.30: Bioretention Cells, Swales, and Planter Boxes, with the exception that the compost may have up to 35% biosolids or manure.

        The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1.

        The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region.

     b. Calculated amendment rates may be met through use of composted material meeting (a.) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220.

resources and critical areas, to be reapplied to other portions of the site where feasible.

The resulting soil should be conducive to the type of vegetation to be established.

- **Implementation Options**: The soil quality design guidelines listed above can be met by using one of the methods listed below:
  1. Leave undisturbed native vegetation and soil, and protect from compaction during construction.
  2. Amend existing site topsoil or subsoil either at default “pre-approved” rates, or at custom calculated rates based on tests of the soil and amendment.
  3. Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default “pre-approved” rate or at a custom calculated rate.
  4. Import topsoil mix of sufficient organic content and depth to meet the requirements.

  More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Local governments are encouraged to adopt guidelines and procedures similar to those recommended in Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington. This document is available at: http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf

Maintenance

- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant vegetation and mulch the amended soil area after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

Runoff Model Representation

Areas meeting the design guidelines may be entered into approved runoff models as “Pasture” rather than “Lawn.”

Flow reduction credits can be taken in runoff modeling when BMP T5.13: Post-Construction Soil Quality and Depth is used as part of a dispersion design under the conditions described in:

- BMP T5.10B: Downspout Dispersion Systems
- BMP T5.11: Concentrated Flow Dispersion
- BMP T5.12: Sheet Flow Dispersion
- BMP T5.18: Reverse Slope Sidewalks
- BMP T5.30: Full Dispersion (for public road projects)

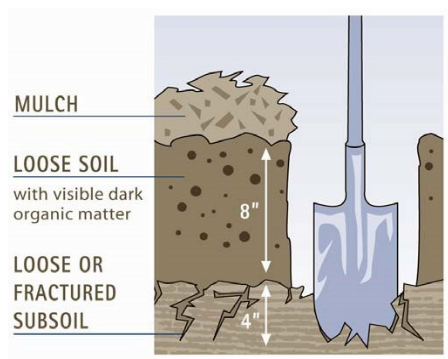


Figure 5.3.3 – Planting Bed Cross-Section (NTS)

Surface Type - Roofs:

BMP T5.30: Full Dispersion

Due to the geometry of the site there is not an adequate dispersion area on-site to meet the requirements of T5.30.

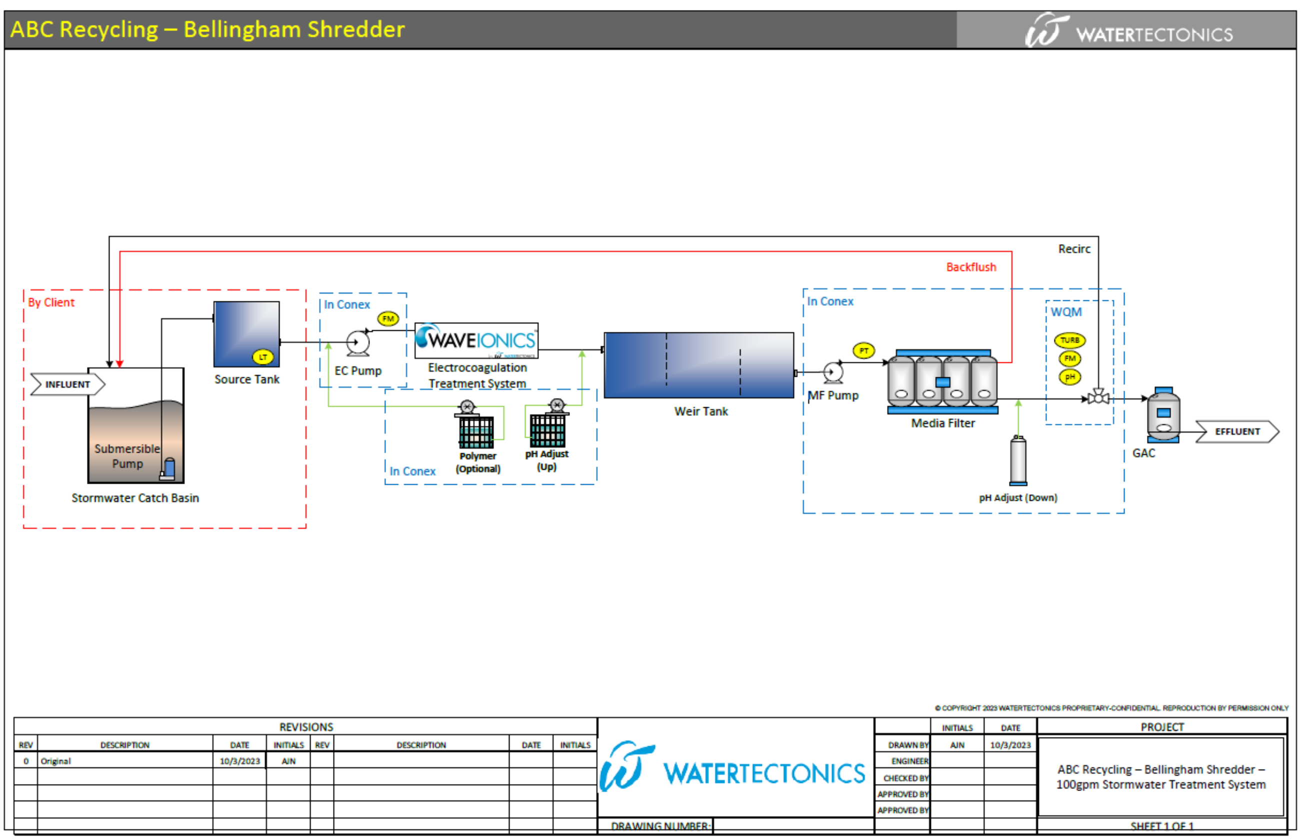
BMP T5.10A: Downspout Full Infiltration, BMP T7.30: Bioretention, BMP T5.10B: Downspout Dispersion Systems and BMP T5.10C: Perforated Sub-out Connections
All infiltration systems are considered infeasible on the site due to the fill soils present on the site and lack of 3 feet of separation to an impermeable layer.

Surface Type – Other Hard Surfaces:

BMP T5.30: Full Dispersion, BMP T5.12 Sheet Flow Dispersion, BMP T5.11 Concentrated Flow Dispersion, BMP T5.15: Permeable Pavements, BMP T7.30: Bioretention
All infiltration systems are considered infeasible on the site due to the fill soils present on the site and lack of 3 feet of separation to an impermeable layer.

Minimum Requirement #6: Runoff Treatment: This project is required to meet runoff treatment requirements, as defined by thresholds in the DOE Manual. This project is considered an industrial site by its use. As a result, it is subject to enhanced treatment. The full two year release rate was used per DOE Manual Volume Ill Section 111- 2.6. This flowrate is 0.075 cfs as shown in Section 4.

Runoff treatment for pollution generating hard surfaces will be obtained by utilizing a Site Specific 100gpm Stormwater Treatment System including a WaveIonics Electrocoagulation Treatment System. A memo describing the function of the system is provided in Appendix D. This treatment system will meet the stormwater requirements of Whatcom County and the Washington State Department of Ecology Industrial Stormwater General Permit.

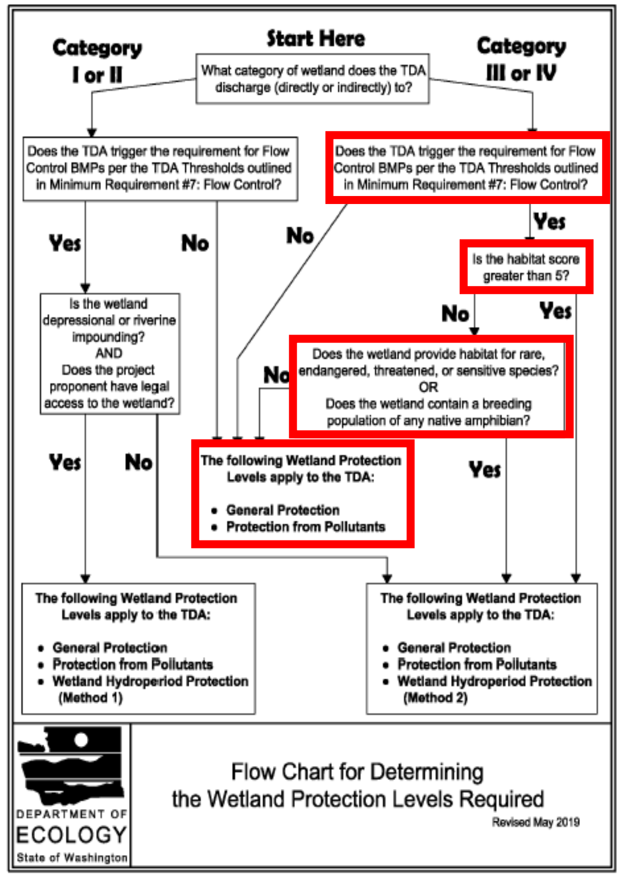


Water Quality Schematic Drawing

Minimum Requirement #7: Flow Control: This project is required to Flow Control, as defined by thresholds in the DOE Manual. This project will attenuate runoff to meet flow control requirements using the BMP D.1: Detention Pond. See Section 4 for details for flow control compliance.

Minimum Requirement #8: Wetlands Protection: This project is required to protect wetlands, as defined by thresholds in the DOE Manual. This project outfalls to a Category IV Wetland with a habitat score of less than 5 per the Whatcom County Code. It does not contain a rare, threatened or endangered species. Therefore, only the General Protection and Protection from Pollutants requirements are needed for this project for Minimum Requirement #8. See flowchart below. This project is required to meet the General Protection and Protection form Pollutants. This is accomplished by meeting the requirements of the 2019 WSDOE Manual including a SWPPP as provided.

Figure I-3.5: Flow Chart for Determining Wetland Protection Level Requirements



Minimum Requirement #9: Operation and Maintenance: This project is required to have an operation and maintenance manual, as defined by thresholds in the DOE Manual.

The property owner(s) will be responsible for operating and maintaining these proposed facilities as required to meet City and State requirements. The Operation and Maintenance Manual included in Appendix F of this report contains applicable information needed to maintain the stormwater facilities constructed by this project, as well as relevant operational and structural source control BMPs.

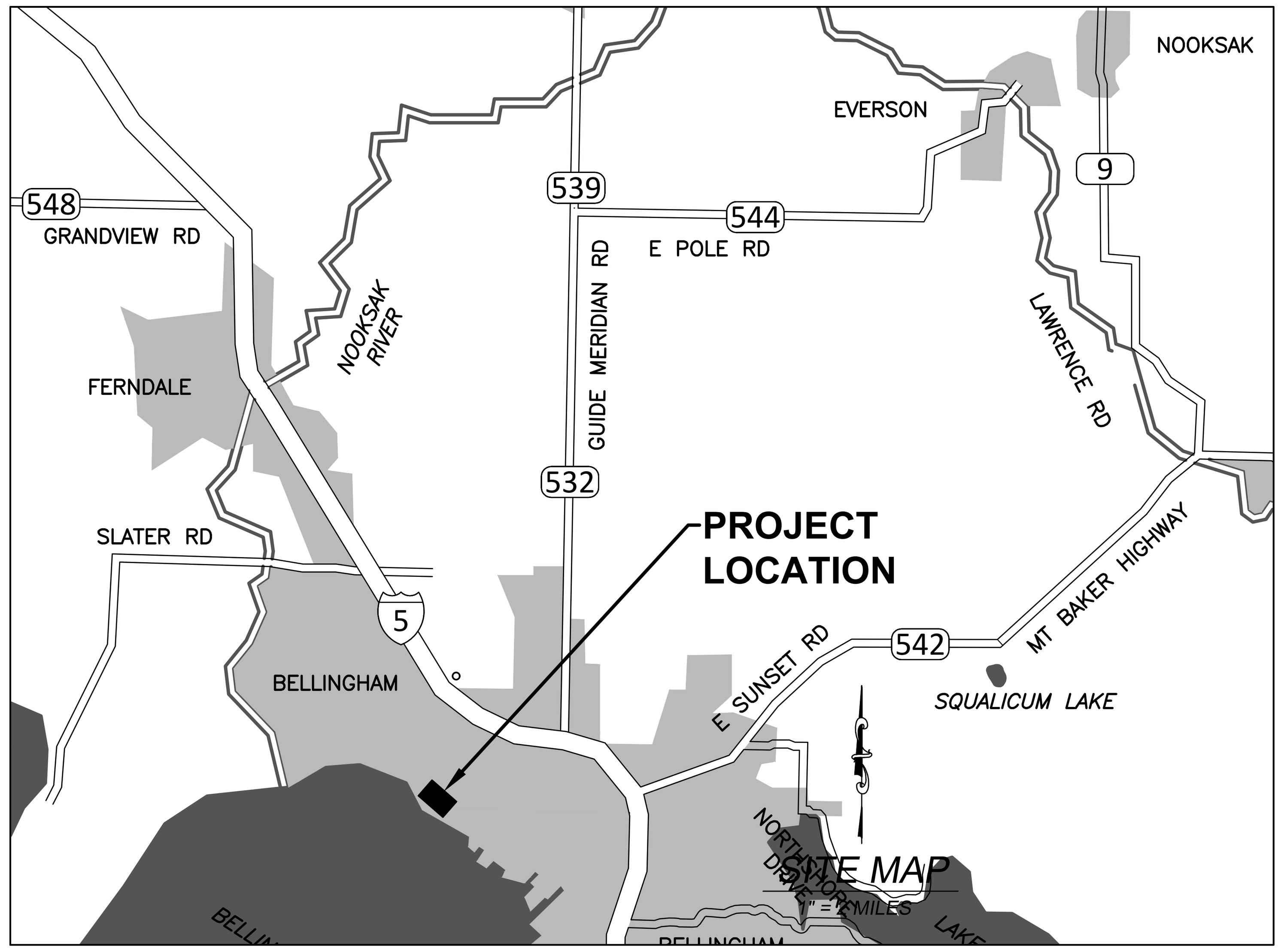
The facility will accept for purchase obsolete metal material, subject to an inbound Source Control Program, primarily post-consumer depolluted automobiles and kitchen appliances, with all fluids thereof previously removed, and process the metal material through the proposed metal shredder. Ferrous metal produced from the process would be delivered to the Port of Bellingham by truck or railcar and loaded on to ocean going vessels to its ultimate destination. Non-ferrous metal produced from the process would be delivered to the Port of Seattle by truck and loaded on to ocean going vessels to its ultimate destination. These ferrous and non-ferrous metal products are manufactured for purchase on the secondary metal industries market, which reduces global mining and use of virgin materials. The project includes erection of various pre-manufactured steel buildings. Metal processing equipment of various designs will also be installed onsite, largely located inside buildings. A rail spur will be installed on the south side of the site; in addition, truck scales, concrete and asphalt paved areas for storage and movement of trucks and rolling stock will be installed.

This analysis is based on data and records either supplied to or obtained by Impact Design. These documents are referenced within the text of this report and included in the figures and/or appendices of this report.

Section	Contents
A	ABC Recycling Construction Plans
B	Hydrologic and Hydraulic Analysis
	Basin Maps
	WWHM 2012 Modeling
C	Conveyance Calculations
D	Water Quality System Calculations
E	Geotechnical Information
F	ABC Recycling Operations and Maintenance Manual

ABC RECYCLING COVER SHEET

VICINITY MAP



SHEET INDEX

ABBREVIATIONS

FOR SURVEY ABBREVIATIONS SEE TOPOGRAPHIC SURVEY PAGE 2

1'/1"	ONE FOOT/ONE INCH
AC	ACRE
AF#	AUDITORS FILE NUMBER
APPROX	APPROXIMATE
ASB/AB	AS–BUILT
ASPH	ASPHALT
BLDG	BUILDING
BMP	BEST MANAGEMENT PRACTICE
BNDRY	BOUNDARY
BVCS	BEGINNING OF VERTICAL CURVE STATION
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
C	COMPACT PARKING STALL
CC	CURB CUT
CB	CATCH BASIN
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CNTRL	CONTROL
CO	CLEANOUT
COR	CORNER
CPP	CORRUGATED POLYETHYLENE PIPE
CONC	CONCRETE
CSTC	CRUSHED SURFACING TOP COURSE
CULV	CULVERT
ø	DIAMETER
DEMO	DEMOLITION
DI	DUCTILE IRON
DWGS	DRAWINGS
E	EAST
EA	EACH
EL/ELEV	ELEVATION
ENC	REVOCABLE ENCROACHMENT PERMIT
EP/EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EVCS	END OF VERTICAL CURVE STATION
EVCE	END OF VERTICAL CURVE ELEVATION
EX/EXIST	EXISTING
FDC	FIRE DEPARTMENT CONNECTION
FFE/FF	FINISH FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HYDRANT
FND	FOUND
GND	GROUND
GUTT	GUTTER
HP	HIGH POINT
INV	INVERT
IE/I.E.	INVERT ELEVATION
IRRIG	IRRIGATION
LF	LINEAR FOOT
L.S.	LAND SURVEYOR
MAX	MAXIMUM
MIN	MINIMUM
MON	MONUMENT
NIC	NOT IN CONTRACT
N	NORTH
No./#	NUMBER
O.C.	ON CENTER
PC	POINT OF CURVATURE
PCL	PARCEL
PERF	PERFORATED
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
POB	POINT OF BEGINNING
PP	POWER POLE
PROP	PROPERTY
K	LENGTH OF VERTICAL CURVE PER PERCENT GRADE DIFFERENCE
PT/POT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INFLECTION
PWR	POWER
R	RADIUS
R/C	REBAR WITH CAP
RCP	REINFORCED CONCRETE PIPE
RET	RETAINING
RIM	RIM
R/W	RIGHT–OF–WAY (R.O.W.)
RPP	REDUCED PRESSURE PRINCIPAL
S	SOUTH
SAN	SANITARY
SCH	SCHEDULE
SD	STORM DRAIN
SDCB	STORM DRAIN CATCH BASIN
SDCO	STORM DRAIN CLEANOUT
SDMH	STORM DRAIN MAN HOLE
SERV	SERVICE
STND/STD	STANDARD
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
ST	STREET
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TEL/TELE	TELEPHONE
TESC	TEMPORARY EROSION & SEDIMENTATION CONTROL
TP	TOP OF PAVEMENT
TS	TOP OF SIDEWALK
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
VC	VERTICAL CURVE
VEG	VEGETATION
W	WEST
WA	WATER
W/IN	WITHIN
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WHATCOM COUNTY GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT WSDOT/APWA STANDARD SPECIFICATIONS, WHATCOM COUNTY DEVELOPMENT STANDARDS (WCDS), AND SHALL BE SUBJECT TO APPROVAL BY WHATCOM COUNTY PUBLIC WORKS DEPARTMENT – ENGINEERING DIVISION – PUBLIC WORKS ENGINEERING SERVICES (PWES).
2. DEVELOPER/CONTRACTOR/CONSULTING ENGINEER SHALL SCHEDULE A PRE–CONSTRUCTION CONFERENCE WITH THE PUBLIC WORKS ENGINEERING SERVICES PROJECT MANAGER A MINIMUM OF 3 WORKING DAYS PRIOR TO BEGINNING ANY WORK.
3. NORMAL WORKING HOURS ARE 8:00 AM. TO 6:00 PM., MONDAY THROUGH FRIDAY. WORK DURING HOLIDAYS, WEEKENDS, AND OUTSIDE THE NORMAL WORK HOURS REQUIRES PRIOR ARRANGEMENTS AND APPROVAL.
4. SIGHT DISTANCE REQUIRED AT ALL INTERSECTIONS PER WCDS CHAPTER 5.
5. A REVOCABLE ENCROACHMENT PERMIT SHALL BE OBTAINED PRIOR TO COMMENCING ANY WORK WITHIN COUNTY MAINTAINED ROAD RIGHTS–OF–WAY.
6. THE CONTRACTOR SHALL CONTACT UTILITY LOCATION SERVICE 48 HOURS PRIOR TO STARTING WORK AT (800)424–5555 OR 811.
7. A COPY OF THE COUNTY–APPROVED DRAWINGS MUST BE ON THE JOB SITE WHENEVER WORK IS IN PROCESS.
8. WHATCOM COUNTY RESERVES THE RIGHT TO INSPECT ALL WORK. THE CONTRACTOR SHALL CALL THE CONSULTING ENGINEER AND THE PUBLIC WORKS ENGINEERING SERVICES PROJECT MANAGER AT (360)778–6220 AT LEAST 24 HOURS IN ADVANCE OF THE FOLLOWING WORK ITEMS:
   - A. PLACEMENT OF TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES.
   - B. PLACEMENT OF WATER, SANITARY SEWER, AND STORM DRAINAGE LINES AND BACKFILLING OF THESE LINES WITHIN COUNTY MAINTAINED ROAD RIGHTS–OF–WAY.
   - C. PLACEMENT OF UNDERGROUND UTILITIES AND BACKFILLING WITHIN COUNTY MAINTAINED ROAD RIGHTS–OF–WAY.
   - D. ROADWAY GRADING AT THE COMPLETION OF THE SUBGRADE, BALLAST, AND OF CRUSHED SURFACING.
   - E. POURING OF CURB/GUTTER AND SIDEWALK.
   - F. ASPHALT PAVING, AT THE BEGINNING OF PAVING.
   - G. PRIOR TO PAVEMENT MARKING.
   - H. OVERALL INSPECTION OF FINISHED SHOULDERS, DITCHES, PERMANENT SEEDING, ROAD SIGNAGE, MONUMENT PLACEMENT, CLEANING OF DRAINAGE SYSTEM AND CONSTRUCTION DEBRIS.
   - I. ALL WORK REQUIRED TO RELEASE OF ANY POSTED SECURITY.
9. ALL TESTING REQUIRED FOR THE WORK SHALL BE THE RESPONSIBILITY OF THE OWNER AND SHALL BE IN CONFORMANCE WITH WCDS WITH RESPECT TO THE CONSULTING ENGINEER.
10. THE CONTRACTOR SHALL RIP RAP ALL CULVERT INLETS AND OUTLETS.
11. THE CONTRACTOR SHALL RESTORE ALL PRIVATE AND PUBLIC PROPERTY DISTURBED BY THE WORK IMMEDIATELY AFTER CONSTRUCTION. THE CONTRACTOR SHALL NOT LEAVE ANY PART OF THE ROAD USED BY OTHERS UN–PASSABLE WITHOUT NOTIFICATIONS AND AGREEMENT OF OTHER USERS.
12. ALL CUT AND FILL SLOPES SHALL BE MULCHED AND SEEDED FOR EROSION CONTROL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SLOPE EROSION UNTIL VEGETATION IS FIRMLY ESTABLISHED.
13. CONTRACTOR SHALL SWEEP AND REMOVE ALL DEBRIS TRACKED ONTO EXISTING ROADS DURING ALL PHASES OF CONSTRUCTION.
14. ANY TREE, WHERE 1/3 OF THE ROOT SYSTEM IS DAMAGED BY WORK, SHALL BE REMOVED.
15. THE CONTRACTOR SHALL INFORM THE CONSULTING ENGINEER AND OBTAIN APPROVAL FROM WHATCOM COUNTY ENGINEERING DIVISION OF ANY PROPOSED CHANGES IN PLANS PRIOR TO IMPLEMENTATION OF THE CHANGE. THE CONTRACTOR SHALL KEEP RECORDS OF DEVIATIONS AND FORWARD TO THE ENGINEER OF RECORD AND WHATCOM COUNTY ENGINEERING DIVISION.
16. TRAFFIC CONTROL IS TO BE MAINTAINED IN ACCORDANCE WITH WSDOT/APWA STANDARD SPECIFICATIONS.
17. THE DEVELOPER/CONTRACTOR SHALL POST A WARRANTY SECURITY AS REQUIRED BY THE WHATCOM COUNTY DEVELOPMENT STANDARDS.
18. AN ENGINEER SHALL PROVIDE RECORD DRAWINGS PER WCDS 507.D.

PROPOSED PLANS LEGEND

- EXISTING WETLANDS
- PROPOSED STORM PIPE
- PROPOSED WATER EASEMENT
- PROPOSED WATER LINE
- POND BOTTOM ELEVATION 74.0'
- POND FILL TO DAYLIGHT
- PROPOSED PARKING
- PROPOSED GRAVEL
- EXISTING PROPERTY LINE
- EXISTING RIGHT OF WAY
- EXISTING RIGHT OF WAY
- EXISTING RAILROAD
- EXISTING ASPHALT
- EXISTING WATER LINE
- EXISTING CURB
- EXISTING STORM LINE
- EXISTING EASEMENT
- PROPOSED BUILDINGS
- PROPOSED CONCRETE
- AQ Delineated Extent Fill
- PROPOSED VEGETATION PLANTINGS
- 50' & 100' SETBACKS
- FIRELANE
- PROPOSED PAVEMENT
- AQ Wetland Delineation Buffers

SURVEY LEGEND

SEE TOPOGRAPHIC SURVEY PAGE 2
SIZE & SCALE MAY VARY

- = RIGHT–OF–WAY
- = RIGHT–OF–WAY CENTERLINE
- = PROPERTY BOUNDARY
- = EASEMENT
- = EXISTING GRAVEL EDGE
- = EXISTING ASPHALT EDGE
- = EXISTING CONCRETE EDGE
- = EXISTING BUILDING
- = EXISTING BUILDING OVERHANG
- = EXISTING CULVERT
- = EXISTING FENCE
- = EXISTING BURIED POWER LINE
- = EXISTING AERIAL POWER LINE
- = EXISTING STORM DRAIN
- = EXISTING SANITARY SEWER
- = EXISTING BURIED FIBER OPTIC/COMM
- = EXISTING GAS LINE
- = EXISTING WATER LINE
- = EXISTING DITCH CENTERLINE
- = EXISTING TREE OR SHRUB LINE
- = FOUND PROPERTY CORNER
- = FOUND BRASS DISK
- = TEMPORARY BENCH MARK
- = TRAVERSE POINT
- = EXISTING POWER VAULT
- = EXISTING UTILITY POLE
- = EXISTING POWER JUNCTION BOX
- = EXISTING TELE/COMM JUNCTION BOX
- = EXISTING WATER VALVE
- = EXISTING WATER METER
- = EXISTING FIRE HYDRANT
- = EXISTING SIGN
- = EXISTING BOULDER
- = EXISTING STORM DRAIN CATCH BASIN
- = EXISTING SANITARY SEWER MANHOLE
- = EXISTING CONIFEROUS TREE
- = EXISTING DECIDUOUS TREE

CONTROL NOTES

SEE TOPOGRAPHIC SURVEY PAGE 2

HORIZONTAL DATUM:
WASHINGTON STATE PLANE, NORTH ZONE NAD83/98

BASIS OF COORDINATES: COORDINATION AND MENSURATION ARE LOCAL GROUND VALUES, BASED UPON HOLDING THE PUBLISHED NAD83/98 POSITION FOR THE BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF TIMPSON WAY AND THE NORTH MARGIN OF MARINE DRIVE , PUBLISHED AS CITY OF BELLINGHAM CONTROL POINT #2998. SAID MONUMENT HAS THE FOLLOWING PUBLISHED POSITION:

NORTHING = 649,056.361 USFT
EASTING = 1,234,329.448 USFT

BASIS OF BEARINGS: BEARINGS ARE NAD83/98, BASED UPON HOLDING THE PUBLISHED POSITIONS MONUMENTED BY CITY OF BELLINGHAM CONTROL POINTS #2998 AND #2995, BEING A BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF LOCUST AVENUE AND THE NORTH MARGIN OF MARINE DRIVE.

THE DERIVED INVERSE BETWEEN SAID MONUMENTS #2998 AND #2995 IS **NORTH 48° 45' 36" WEST**, AT A DISTANCE OF **3,467.47 USFT**. THE PUBLISHED POSITION FOR MONUMENT #2995 IS:

NORTHING = 651,342.168 USFT
EASTING = 1,231,722.071 USFT

VERTICAL DATUM:
NAVD88

BASIS OF ELEVATIONS: ELEVATIONS ARE NAVD88 VALUES, BASED UPON HOLDING THE PUBLISHED ELEVATION FOR CITY OF BELLINGHAM BENCHMARK #5848, BEING A BRASS DISK MONUMENT AT THE TOP OF THE HEADWALL AT THE NORTHWEST END OF THE ELDRIDGE AVENUE BRIDGE OVER LITTLE SQUALICUM CREEK. SAID MONUMENT HAS THE FOLLOWING PUBLISHED NAVD88 ELEVATION:
ELEVATION = 67.42 FEET

SURVEY NOTES

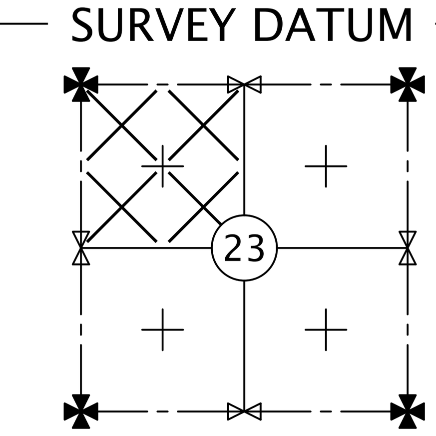
SEE TOPOGRAPHIC SURVEY PAGE 2

1. THIS TOPOGRAPHIC SURVEY WAS PERFORMED FOR A.B.C. RECYCLING REALTY CORP. IN APRIL OF 2021.
2. BASIS OF BEARINGS IS NAD83/98 PER TIES TO CITY OF BELLINGHAM CONTROL NETWORK, PER THAT RECORD OF SURVEY RECORDED UNDER WHATCOM COUNTY AFN 2071002449.
3. MONUMENTATION SHOWN HEREON WAS RECOVERED DURING THE COURSE OF THIS SURVEY, UNLESS OTHERWISE NOTED.
4. ANGULAR AND LINEAR MEASUREMENTS WERE COLLECTED USING A COMBINATION OF GPS AND CONVENTIONAL METHODOLOGIES. PRIMARY CONTROL WAS COLLECTED USING A TRIMBLE R10 SURVEY-GRADE GPS RECEIVER OPERATING IN NETWORKED RTK MODE. FROM GPS CONTROL, A TRIMBLE S-6 ROBOTIC TOTAL STATION WAS USED TO TIE SECONDARY CONTROL POINTS AND COLLECT TOPOGRAPHIC DATA. ORTHO-RECTIFIED PHOTOGRAPHY CAPTURED WITH AN UNMANNED AERIAL VEHICLE WAS USED TO DELINEATE CERTAIN FEATURES, INCLUDING THE EXTENTS OF STOCKPILES ON-SITE.
5. LOCATIONS OF UNDERGROUND UTILITIES DEPICTED HEREON ARE ACCORDING TO SURFACE MARKS PROVIDED BY OTHERS. WILSON CANNOT GUARANTEE THE CORRESPONDENCE BETWEEN THE MARKS AND THE EXTANT UTILITIES.
6. BARGAIN & SALE DEED NO. 2021-0404007: THIS DOCUMENT CONTAINS USE RESTRICTIONS AND AN ENVIRONMENTAL RELEASE NOT DISCLOSED PER TITLE COMMITMENT NO. NCS-1028029.

LEGAL DESCRIPTION:

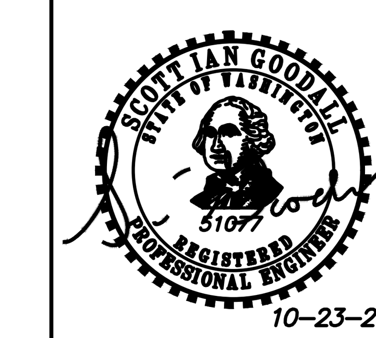
SEE TOPOGRAPHIC SURVEY PAGE 2

SURVEY DATUM



NW 1/4, SECTION 23
T. 38 N., R. 2 E. OF W.M.

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-399-8138 WWW.BOLD-IMPACT.COM



ABC RECYCLING
COVER SHEET
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

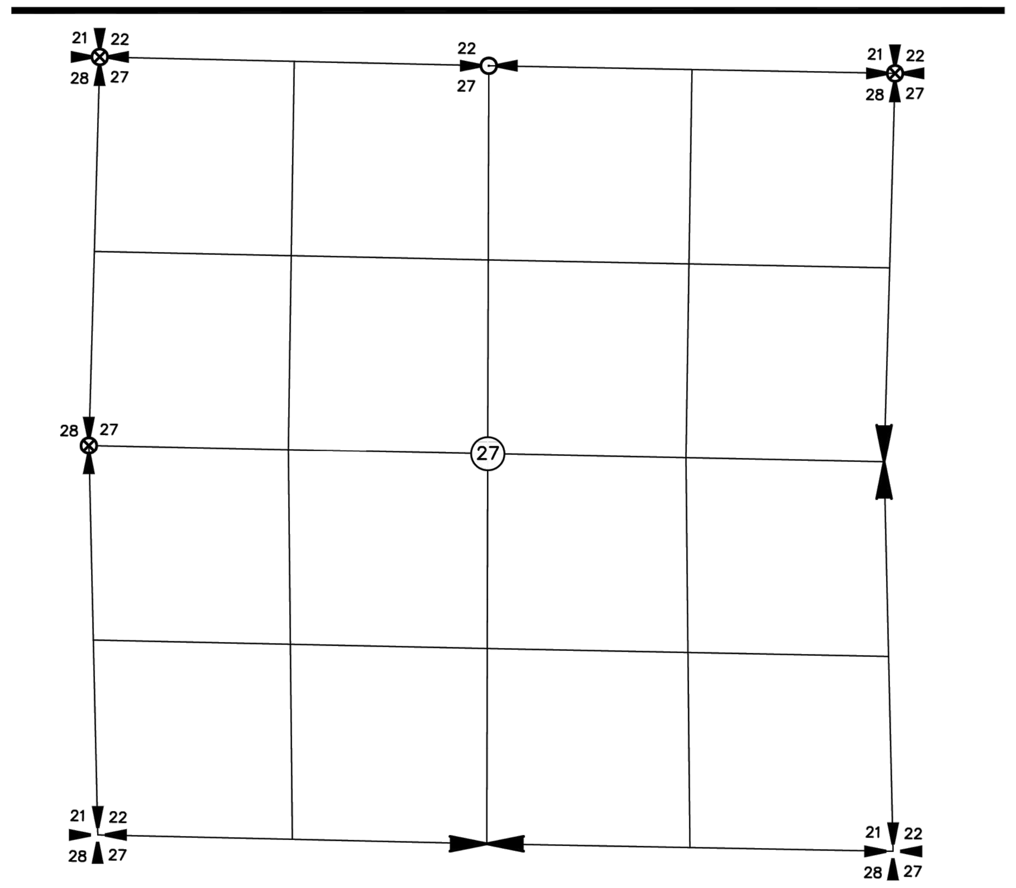
1 OF: 27

Z:\Shared\PROJECTS\21029 741 Marine Dr (ABC Recycling)\DWG\21029 – COVER SHEET.dwg Oct 23, 2023–5:20pm

ABC RECYCLING

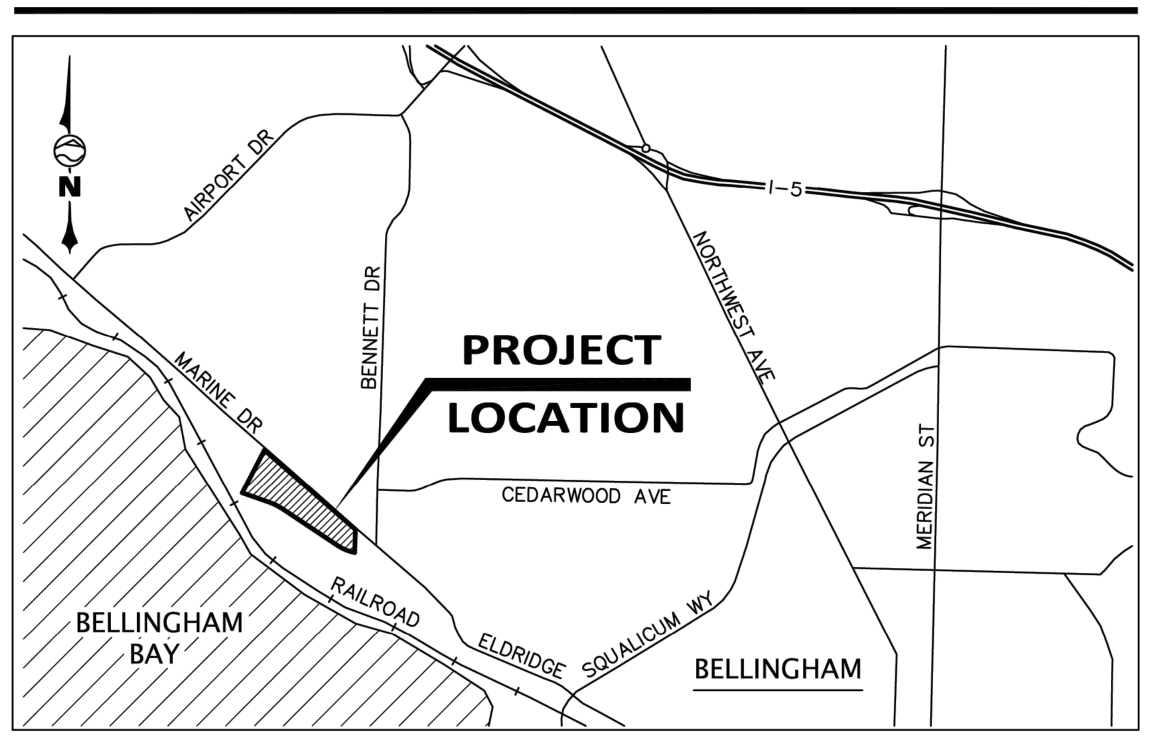
MARINE DRIVE PLANT
W.A.C. 332-130 COMPLIANCE SHEET

SECTIONAL INDEX DATA
NW 1/4, SEC. 23, T38N., R2E., W.M.



XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.
XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.
XX QTR - XX QTR, SEC. XX, TWNSHP XX NORTH, R XX EAST, W.M.

VICINITY MAP - NOT TO SCALE



INDEX TO DRAWINGS

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT I AM A LICENSED LAND SURVEYOR IN THE STATE OF WASHINGTON, THAT THIS MAP IS BASED ON AN ACTUAL FIELD SURVEY DONE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL DATA SHOWN HEREON ACTUALLY EXISTS IN THE LOCATIONS SHOWN AT THE TIME OF THIS SURVEY. THIS TOPOGRAPHIC MAP WAS DONE AT THE REQUEST OF ABC RECYCLING IN 2021.

JOHN THOMAS BREWSTER, P.L.S. NO. 44335 DATE 5-7-2021

LEGAL DESCRIPTION

A TRACT OF LAND LYING WITHIN THE COMPTON DONATION LAND CLAIM, SECTION 23, TOWNSHIP 38 NORTH,RANGE 2 EAST OF WILLAMETTE MERIDIAN IN WHATCOM COUNTY, STATE OF WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE BRASS SURFACE MONUMENT MARKING THE INTERSECTION OF LOCUST AVENUE WITH THE NORTH MARGIN OF MARINE DRIVE, SAID MONUMENT BEING THAT CADASTRAL SURVEY MONUMENT DESIGNATED NO. 2995, PER THAT RECORD OF SURVEY OF THE CITY OF BELLINGHAM 2005 HORIZONTAL CONTROL NETWORK, PER THE MAP THEREOF RECORDED UNDER WHATCOM COUNTY AUDITOR'S FILE NO. 2071002449; THENCE SOUTH 48°45'40" EAST, NOMINALLY ALONG SAID NORTH MARGIN OF MARINE DRIVE, 3467.57 FEET, TO THE BRASS-DISK MONUMENT MARKING THE INTERSECTION OF THE CENTERLINE OF WEST ILLINOIS STREET WITH THE NORTH MARGIN OF MARINE DRIVE, SAID MONUMENT BEING THAT CITY OF BELLINGHAM CADASTRAL SURVEY MONUMENT DESIGNATED NO. 2998, PER THE AFOREMENTIONED CONTROL NETWORK RECORD OF SURVEY; THENCE NORTH 48°44'10" WEST, ALONG SAID NORTH MARGIN AS CALCULATED IN RELIANCE UPON THAT CITY OF BELLINGHAM RECORD OF SURVEY OF MARINE DRIVE SEWER AND IMPROVEMENTS RECORDED AS RS-3308 IN THE RECORDS OF THE CITY OF BELLINGHAM, DATED MARCH 15, 2012, A DISTANCE OF 926.92 FEET; THENCE NORTH 48°44'11" WEST, CONTINUING ALONG THE NORTH MARGIN OF MARINE DRIVE PER SAID CITY OF BELLINGHAM RECORD OF SURVEY, 408.32 FEET; THENCE NORTH 48°46'35" WEST, CONTINUING ALONG THE NORTH MARGIN OF MARINE DRIVE PER SAID CITY OF BELLINGHAM RECORD OF SURVEY, 25.45 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE EAST BOUNDARY OF THE COMPTON DONATION LAND CLAIM, AND THE HERE COINCIDENT WEST BOUNDARY OF THE ELDRIDGE DONATION LAND CLAIM, PER SAID SURVEY;

THENCE SOUTH 01°47'30" WEST, ALONG SAID COINCIDENT COMPTON DONATION LAND CLAIM AND ELDRIDGE DONATION LAND CLAIM BOUNDARY, 77.70 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE SOUTH MARGIN OF MARINE DRIVE, SAID POINT BEING THE NORTH-MOST CORNER COMMON TO THE PARCEL ORIGINALLY CONVEYED ACCORDING TO STATUTORY WARRANTY DEED NO. 148000 AND TO THE PARCEL CONVEYED ACCORDING TO THAT QUIT CLAIM DEED RECORDED UNDER WHATCOM COUNTY AUDITOR'S FILE NO. 2111103174, SAID POINT BEING THE **TRUE POINT OF BEGINNING**;

THENCE SOUTH 01°47'30" WEST, CONTINUING ALONG SAID COINCIDENT COMPTON DONATION LAND CLAIM AND ELDRIDGE DONATION LAND CLAIM BOUNDARY, 336.98 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH AN OFFSET LINE PARALLEL AND/OR CONCENTRIC WITH, THE CENTERLINE OF AN EXTANT BURLINGTON-NORTHERN SANTA-FE (BNSF) SPUR-LINE RAILROAD TRACK, AS CONSTRUCTED, AND SAID POINT OF INTERSECTION BEING AT THE BEGINNING OF A NON-TANGENT CURVE, CONCAVE TO THE NORTH, HAVING A RADIUS OF 700.00 FEET, AND FROM SAID POINT OF INTERSECTION THE CURVE'S INITIAL RADIAL BEARS NORTH 10°41'48" EAST;

THENCE SOUTH AND WEST, ALONG SAID OFFSET LINE AND NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 22°59'14", AN ARC LENGTH OF 280.84, TO A POINT ON SAID OFFSET LINE FROM WHICH THE CURVE'S CLOSING RADIAL BEARS NORTH 33°41'02" EAST; THENCE NORTH 56°18'58" WEST, ALONG SAID OFFSET LINE, 972.62 FEET, TO A POINT AT THE BEGINNING OF A NONTANGENT CURVE, CONCAVE TO THE SOUTH, HAVING A RADIUS OF 810.00 FEET, AND FROM SAID POINT OF BEGINNING THE CURVE'S INITIAL RADIAL BEARS SOUTH 33°42'04" WEST;

THENCE WEST AND SOUTH, ALONG SAID OFFSET LINE AND NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 14°23'56", AN ARC LENGTH OF 203.56 FEET, TO A POINT FROM WHICH THE CURVE'S CLOSING RADIAL BEARS SOUTH 19°18'07" WEST;

THENCE NORTH 70°42'09" WEST, ALONG SAID OFFSET LINE, 431.39 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE BOUNDARY LINE COMMON TO THAT PORTION OF THE COMPTON DONATION LAND CLAIM ORIGINALLY CONVEYED AS THE RICKERSON AND BOOKER TRACT, PER WHATCOM COUNTY AUDITOR'S FILE NO. 56428, AND TO THAT PORTION OF SAID DONATION LAND CLAIM ORIGINALLY CONVEYED AS THE CHAMPION MCDONALD TRACT (JULY 20, 1909), AND SAID POINT OF INTERSECTION BEARS SOUTH 05°14'11" WEST, 928.84 FEET DISTANT, FROM THE CITY OF BELLINGHAM CADASTRAL CONTROL MONUMENT NO. 2995;

THENCE NORTH 27°16'09" EAST, ALONG SAID COMMON BOUNDARY, 712.59 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE SOUTH MARGIN OF MARINE DRIVE;

THENCE SOUTH 48°46'35" EAST ALONG SAID SOUTH MARGIN, 1782.27 FEET, TO A POINT AT THE INTERSECTION OF SAME WITH THE BOUNDARY COMMON TO THE COMPTON DONATION LAND CLAIM AND THE ELDRIDGE DONATION LAND CLAIM, SAID POINT BEING THE **TRUE POINT OF BEGINNING** AND **TERMINUS** OF THIS DESCRIBED ADJUSTED PARCEL OF LAND.

SITUATE IN WHATCOM COUNTY, WASHINGTON.

SURVEYOR'S NOTES

1. THIS TOPOGRAPHIC SURVEY WAS PERFORMED FOR A.B.C. RECYCLING REALTY CORP. IN APRIL OF 2021.

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6. BARGAIN & SALE DEED NO. 2021-0404007: THIS DOCUMENT CONTAINS USE RESTRICTIONS AND AN ENVIRONMENTAL RELEASE NOT DISCLOSED PER TITLE COMMITMENT NO. NCS-1028029.

NAVD88 DATUM

811 Call 811 two business days before you dig

CONTROL NOTES

HORIZONTAL DATUM:
WASHINGTON STATE PLANE, NORTH ZONE NAD83/98

BASIS OF COORDINATES: COORDINATION AND MENSURATION ARE LOCAL GROUND VALUES, BASED UPON HOLDING THE PUBLISHED NAD83/98 POSITION FOR THE BRASS DISK MONUMENT AT THE INTERSECTION OF THE CENTERLINE OF TIMPSON WAY AND THE NORTH MARGIN OF MARINE DRIVE , PUBLISHED AS CITY OF BELLINGHAM CONTROL POINT #2998. SAID MONUMENT HAS THE FOLLOWING PUBLISHED POSITION:

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VERTICAL DATUM:
NAVD88

BASIS OF ELEVATIONS: ELEVATIONS ARE NAVD88 VALUES, BASED UPON HOLDING THE PUBLISHED ELEVATION FOR CITY OF BELLINGHAM BENCHMARK #5848, BEING A BRASS DISK MONUMENT AT THE TOP OF THE HEADWALL AT THE NORTHWEST END OF THE ELDRIDGE AVENUE BRIDGE OVER LITTLE SQUALICUM CREEK. SAID MONUMENT HAS THE FOLLOWING PUBLISHED NAVD88 ELEVATION:
ELEVATION = 67.42 FEET

W.A.C. 332-130-145 REQUIRED DATA

1.E: THIS SURVEY WAS PREPARED UNDER THE DIRECT SUPERVISION OF:

J. THOMAS BREWSTER, WA PLS #44335
SURVEY MANAGER / PRINCIPAL
WILSON ENGINEERING LLC
805 DUPONT STREET, SUITE 7
BELLINGHAM, WA 98225
360-733-6100 (EXT. 231)
tbrewster@wilsonengineering.com

2.A: BASIS OF ELEVATIONS: ELEVATION VALUES AND CONTOURS DEPICTED ON THIS SURVEY ARE BASED UPON HOLDING AS FIXED THE NAVD88 DATUM, PER WSDOT BENCHMARK BM 29020-22, AS PUBLISHED BY THE WSDOT SURVEY MONUMENT ON-LINE DATABASE.

2.B: PURPOSE OF SURVEY: WILSON ENGINEERING PERFORMED THIS SURVEY DURING APRIL OF 2021, AT THE REQUEST OF ALPINE ENGINEERING AND ABC RECYCLING PURSUANT TO SITE IMPROVEMNT DESIGN. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT, AND THE DEPICTED PARCEL BOUNDARIES SHOULD NOT BE CONSIDERED TO BE COMPREHENSIVE.

2.C: SOURCE OF CONTOURS: THE CONTOURS DEPICTED ON THIS SURVEY WERE DERIVED BASED ON DIRECT FIELD OBSERVATIONS.

2.D: CONTOUR INTERVAL LABELING: MAJOR CONTOURS AT 5-FOOT INTERVALS HAVE BEEN EXPLICITLY LABELED.

2.E: DESCRIPTION OF BENCHMARKS SET PURSUANT TO THIS SURVEY: REFER TO THE ACCOMPANYING "CONTROL TABLE" FOR COORDINATES, ELEVATION, AND DESCRIPTION OF ON-SITE CONTROL SET PURSUANT TO THIS SURVEY.

2.F: ELEVATION AND/OR CONTOUR ACCURACY: IF CONTOURS HAVE BEEN DEPICTED ON THE FACE OF THIS SURVEY, IT IS ANTICIPATED THAT 90% OF ANY MEASURED ELEVATION VALUE, IF OBSERVED RELATIVE TO THE CONTROL POINTS SPECIFICALLY ENUMERATED IN THE ACCOMPANYING CONTROL TABLE, WILL BE, IN FACT, WITHIN ONE-HALF OF THE MINOR-CONTOUR INTERVAL DEPICTED HEREON. SPECIFIC ELEVATIONS DEPICTED HEREON, IF ANY, ARE EXPECTED TO BE WITHIN ONE INTEGRAL VALUE OF THE FINAL DEPICTED SIGNIFICANT FIGURE. THAT IS, 90% OF ELEVATIONS EXPRESSED TO THE TENTH-FOOT, SHOULD BE WITHIN 0.1 FEET OF THAT VALUE, IF OBSERVED RELATIVE TO THE SURVEY CONTROL SPECIFICALLY ENUMERATED IN THE ACCOMPANYING CONTROL TABLE. IF OFF-SITE CONTROL IS EMPLOYED, EVEN CONTROL PURPORTING TO BE ON THE SAME DATUM OR BASED ON THE SAME OFF-SITE BENCHMARK, THEN NO ABSOLUTE STATEMENT REGARDING THE ACCURACY OF THE DEPICTED POINTS CAN BE MADE, AND VALUES SO OBSERVED ARE OUTSIDE OF THIS SURVEY'S AUTHORITY OR INTEREST.

2.G: SOURCE OF CONTROLLING BOUNDARY INFORMATION: THE OWNERSHIP BOUNDARIES DEPICTED ON THIS SURVEY ARE BASED UPON SOME, OR ALL, OF THE DOCUMENTS ENUMERATED IN THE ACCOMPANYING "REFERENCE DOCUMENTS" AS THEREIN CHARACTERIZED. BEARINGS HAVE BEEN TRANSLATED AND/OR ROTATED FROM THE RECORD VALUES TO FIT MONUMENTATION FOUND DURING THE COURSE OF THIS SURVEY.

3.A: SOURCE OF DEPICTED UTILITY INFORMATION: UTILITY LINES DEPICTED ON THIS SURVEY ARE BASED UPON PAINT MARKS SET BY UTILITY-LOCATE PROFESSIONALS DISPATCHED BY THE WASHINGTON "ONE-CALL" UTILITY LOCATE CENTER.

3.B: ACCURACY OF DEPICTED UTILITY INFORMATION: WILSON ENGINEERING DOES NOT PROVIDE FOR-HIRE UTILITY LOCATION AND/OR MARKING SERVICES, AND CAN NOT INDEPENDENTLY ASCERTAIN THE ACCURACY OF ANY DEPICTED UTILITY THAT WAS NOT DIRECTLY OBSERVED IN THE COURSE OF THIS SURVEY.

3.C: STATEMENT OF LIMITATIONS REGARDING UTILITY-DEPICTION ACCURACY: ALPINE ENGINEERING AND ABC RECYCLING HAVE BEEN NOTIFIED THAT WILSON CAN NOT, AND DOES NOT, GUARANTEE THE ACCURACY, AT ANY LEVEL, OF DEPICTED UTILITIES BASED ON THIRD-PARTY PAINT MARKS OR RECORD INFORMATION.

ABBREVIATIONS USED

AF	= AUDITOR'S FILE
AFN	= AUDITOR'S FILE NUMBER
ASM	= ALUMINUM SURFACE MONUMENT
℄	= CENTERLINE
CONC	= CONCRETE
CPP	= CORRUGATED POLYETHYLENE PIPE
DLC	= DONATION LAND CLAIM
E	= EAST
ELEV	= ELEVATION
FND	= FOUND
INT	= INTERSECTION
INV	= INVERT
L	= LENGTH
MON	= MONUMENT
N	= NORTH
NE	= NORTHEAST
NW	= NORTHWEST
R	= RADIUS
R/W	= RIGHT-OF-WAY
S	= SOUTH
SE	= SOUTHEAST
SW	= SOUTHWEST
TYP	= TYPICAL
W	= WEST
WAC	= WASHINGTON CODE
WSE	= WILSON SURVEY/ENGINEERING

LEGEND - SIZE & SCALE MAY VARY

= RIGHT-OF-WAY
= RIGHT-OF-WAY CENTERLINE
= PROPERTY BOUNDARY
= EASEMENT
= EXISTING GRAVEL EDGE
= EXISTING ASPHALT EDGE
= EXISTING CONCRETE EDGE
= EXISTING BUILDING
= EXISTING BUILDING OVERHANG
= EXISTING CULVERT
X X = EXISTING FENCE
P P = EXISTING BURIED POWER LINE
OHP = EXISTING AERIAL POWER LINE
SD = EXISTING STORM DRAIN
S S = EXISTING SANITARY SEWER
FO = EXISTING BURIED FIBER OPTIC/COMM
G G = EXISTING GAS LINE
W W = EXISTING WATER LINE
= EXISTING DITCH CENTERLINE
= EXISTING TREE OR SHRUB LINE
= FOUND PROPERTY CORNER
= FOUND BRASS DISK
= TEMPORARY BENCH MARK
= TRAVERSE POINT
P = EXISTING POWER VAULT
= EXISTING UTILITY POLE
= EXISTING POWER JUNCTION BOX
= EXISTING TELE/COMM JUNCTION BOX
= EXISTING WATER VALVE
= EXISTING WATER METER
= EXISTING FIRE HYDRANT
= EXISTING SIGN
= EXISTING BOULDER
= EXISTING STORM DRAIN CATCH BASIN
= EXISTING SANITARY SEWER MANHOLE
2" = EXISTING 2" (ETC) CONIFEROUS TREE
2" = EXISTING 2" (ETC) DECIDUOUS TREE

WILSON ENGINEERING
WILSONENGINEERING.COM

JOHN THOMAS BREWSTER STATE OF WASHINGTON 44335 REGISTERED PROFESSIONAL LAND SURVEYOR 5-7-2021

DRAWN BY	CLM/JGS
CHECKED BY	JTB

ABC RECYCLING
BELLINGHAM WASHINGTON
MARINE DRIVE PLANT
W.A.C. 332.130.145 COMPLIANCE EXHIBIT

DATE	5-7-21
SCALE	AS SHOWN
JOB NUMBER	2021-043
SHEET	1
PAGE	1 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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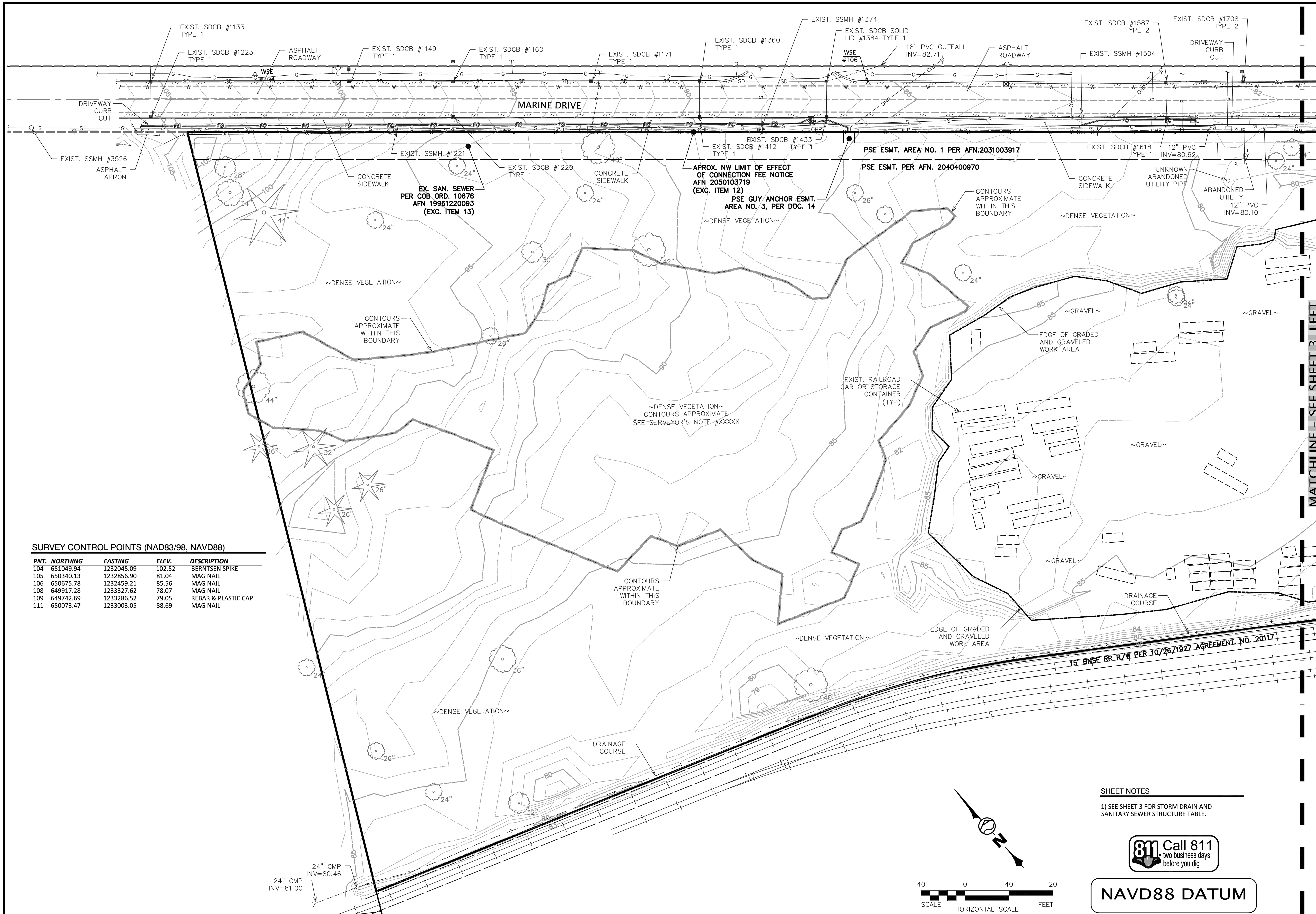

SURVEY CONTROL POINTS (NAD83/98, NAVD88)

PNT.	NORTHING	EASTING	ELEV.	DESCRIPTION
104	651049.94	1232045.09	102.52	BERNTSEN SPIKE
105	650340.13	1232856.90	81.04	MAG NAIL
106	650675.78	1232459.21	85.56	MAG NAIL
108	649917.28	1233327.62	78.07	MAG NAIL
109	649742.69	1233286.52	79.05	REBAR & PLASTIC CAP
111	650073.47	1233003.05	88.69	MAG NAIL

SHEET NOTES

1) SEE SHEET 3 FOR STORM DRAIN AND SANITARY SEWER STRUCTURE TABLE.

Call 811 two business days before you dig

NAVD88 DATUM

WILSON ENGINEERING
WILSONENGINEERING.COM

JOHN THOMAS BREWSTER
STATE OF WASHINGTON
PROFESSIONAL LAND SURVEYOR

ABC RECYCLING

MARINE DRIVE PLANT

TOPOGRAPHIC SURVEY

BELLINGHAM WASHINGTON

DRAWN BY	CLM/JGS
CHECKED BY	JTB
DATE	5-7-2021
SCALE	AS SHOWN
JOB NUMBER	2021-043
SHEET	2
PAGE	2 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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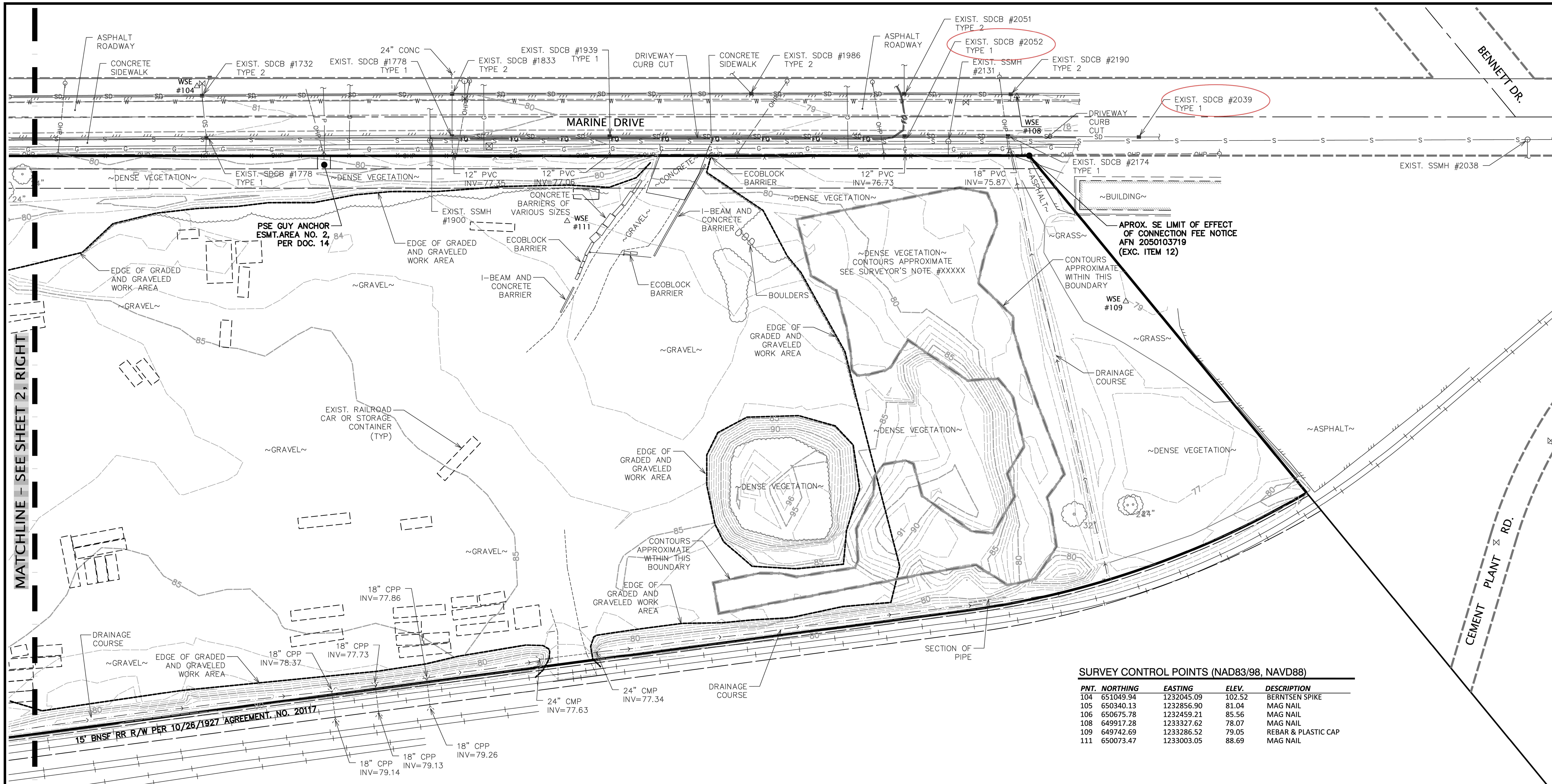

SURVEY CONTROL POINTS (NAD83/98, NAVD88)

PNT.	NORTHING	EASTING	ELEV.	DESCRIPTION
104	651049.94	1232045.09	102.52	BERNTSEN SPIKE
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111	650073.47	1233003.05	88.69	MAG NAIL

EXISTING STORM DRAIN AND SANITARY SEWER STRUCTURE TABLE

STORM DRAIN DIPS

EXIST. SDCB #1133
TYPE 1
RIM=105.22
NW 18" PVC INV=102.2
NE 6" PVC INV=102.6
SE 18" PVC INV=102.2
SW 12" PVC INV=102.2
SUMP=101.2

EXIST. SDCB #1149
TYPE 1
RIM=99.48
NW 18" PVC INV=96.0
NE 12" PVC INV=96.6
SE 18" PVC INV=96.0
SUMP=94.7

EXIST. SDCB #1160
TYPE 1
RIM=96.49
NW 18" PVC INV=92.2
NE 12" PVC INV=92.9
SE 18" PVC INV=92.2
SW 12" PVC INV=93.1
SUMP=91.6

EXIST. SDCB #1171
TYPE 1
RIM=92.49
NW 18" PVC INV=87.4
SE 18" PVC INV=86.9
SUMP=86.2

EXIST. SDCB #1220
TYPE 1
RIM=96.52
NE 12" PVC INV=93.5
SUMP=93.3

EXIST. SDCB #1223
TYPE 1
RIM=105.20
NE 12" PVC INV=102.7
SUMP=102.6

EXIST. SDCB #1360
TYPE 1
RIM=89.44
NW 18" PVC INV=85.1
SE 18" PVC INV=85.1
SW 12" PVC INV=85.6
SUMP=84.4

EXIST. SDCB #1384
TYPE SOLID RIM
RIM=86.32
NW 18" PVC INV=83.1
SE 18" PVC INV=83.1
SW 12" PVC INV=83.6
SUMP=81.7

EXIST. SDCB #1412
TYPE 1
RIM=89.33
NW 12" PVC INV=86.7
SUMP=86.6

EXIST. SDCB #1433
TYPE 1
RIM=86.24
NE 12" PVC INV=83.9
SUMP=82.6

EXIST. SDCB #1587
TYPE 2
RIM=82.11
NW. 30" CONC INV=76.9
SE 30" CONC INV=76.9
SW 12" PVC INV=78.2
SUMP=75.0

EXIST. SDCB #1618
TYPE 1
RIM=82.02
NE 12" PVC INV=79.3
SUMP=77.5

EXIST. SDCB #1708
TYPE 2
RIM=81.89
NW 30" CONC INV=76.5
NE 12" PVC INV=77.9
SE 30" CONC INV=76.5
SUMP=74.8

EXIST. SDCB #1732
TYPE 2
RIM=80.97
NW 30" CONC INV=76.0
NE 12" PVC INV=77.3
SE 30" CONC INV=76.0
SUMP=74.1

EXIST SDCB #1778
TYPE 1
RIM=80.82
SW 12" PVC INV=77.9
SUMP=76.2

EXIST. SDCB #1833
TYPE 2
RIM=80.02
NW 24" CONC INV=75.6
NE 12" CONC INV=75.6
SE 24" CONC INV=75.5
SW 18" PVC INV=77.0

EXIST. SDCB #1901
TYPE 1
RIM=79.92
NE 18" PVC INV=75.9
SE 18" PVC INV=75.8
SW 12" PVC INV=76.9
SUMP=75.0

EXIST. SDCB #1939
TYPE 1
RIM=79.43
NW INV=74.3
SE INV=74.3
SW 12" PVC INV=75.4
SUMP=75.5

EXIST. SDCB #1986
TYPE 2
RIM=78.97
NW 24" CONC INV=74.0
N 12" PVC INV=75.1
SE 24" CONC INV=74.0
SUMP=72.4

EXIST. SDCB #2051
TYPE 2
RIM=78.37
NW 24" CONC INV=74.2
NE 12" PVC INV=75.1
SE 24" CONC INV=74.1
SUMP=72.1

EXIST. SDCB #2052
TYPE 1
RIM=78.36
NW 18" PVC INV=74.0
SE 18" PVC INV=73.9
SW 12" PVC INV=74.4
SUMP=73.0

EXIST. SDCB #2174
TYPE 1
RIM=77.98
NW 18" PVC INV=73.7
SE 18" PVC INV=73.7
SW 18" PVC INV=73.7
SUMP=72.4

EXIST. SDCB #2190
TYPE 2
RIM=78.04
NW 24" CONC INV=73.7
SE 24" CONC INV=73.6
SW 12" INV=74.2

EXIST. SDCB #2039
TYPE 1
RIM=77.63
NW 18" PVC INV=73.4
SE 18" PVC INV=73.3
SUMP=70.9

SANITARY SEWER DIPS

EXIST. SSMH #1221
RIM=97.89
NW 18" PVC INV=90.6
SE 12" PVC INV=90.3

EXIST. SSMH #1374
RIM=87.88
NW 12" PVC INV=81.6
SE 18" PVC INV=81.3

EXIST. SSMH #1504
RIM=82.66
NW 18" PVC INV=75.5
SE 18" PVC INV=75.4
SW 8" PVC INV=75.5

EXIST. SSMH #1900
RIM=80.62
NW 18" PVC INV=71.8
NE 6" PVC INV=71.8
SE 18" PVC INV=71.7
SW 8" PVC INV=71.2

EXIST. SSMH #2038
RIM=78.87
NW 18" PVC INV=65.7
SE 18" PVC INV=65.7

EXIST. SSMH #2131
RIM=78.74
NW 18" PVC INV=68.6
SE 18" PVC INV=68.5
SW 8" PVC INV=68.6

EXIST. SSMH #3526
RIM=107.67
NW 18" PVC INV=94.2
SE 18" PVC INV=94.1

N

40 0 40 20
SCALE HORIZONTAL SCALE FEET

811 Call 811 two business days before you dig

NAVD88 DATUM

WILSON ENGINEERING
WILSONENGINEERING.COM

ABC RECYCLING
MARINE DRIVE PLANT
TOPOGRAPHIC SURVEY

DRAWN BY CLM/JGS
CHECKED BY JTB
WASHINGTON
BELLINGHAM
DATE 5-7-2021
SCALE AS SHOWN
JOB NUMBER 2021-043
SHEET 3
PAGE 3 OF 3

PLOT SETTINGS: Adobe PDF.pc3, 22x34, Portrait, 1:0.04, WE APWA_UNSCREENED.ctb
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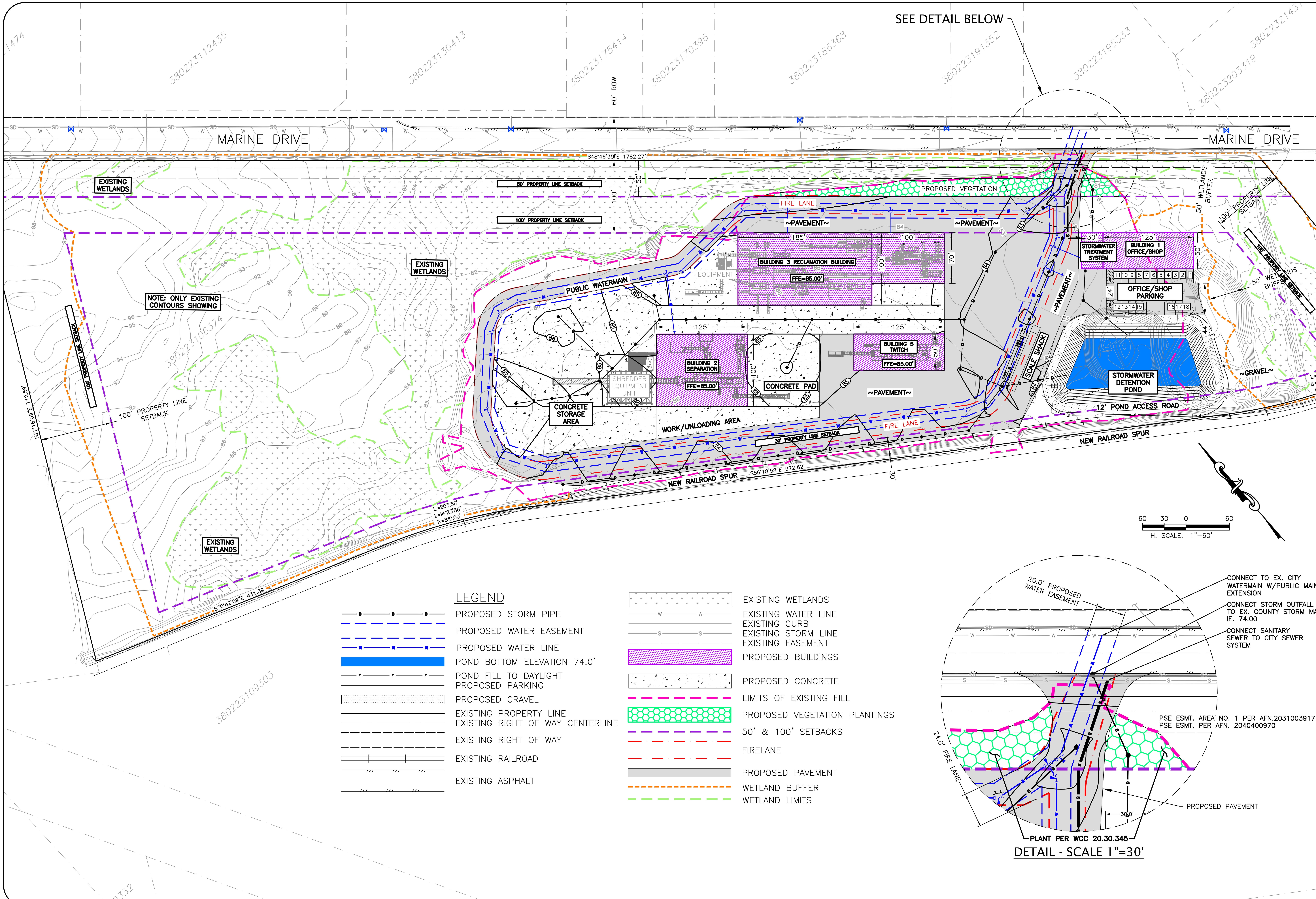


IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

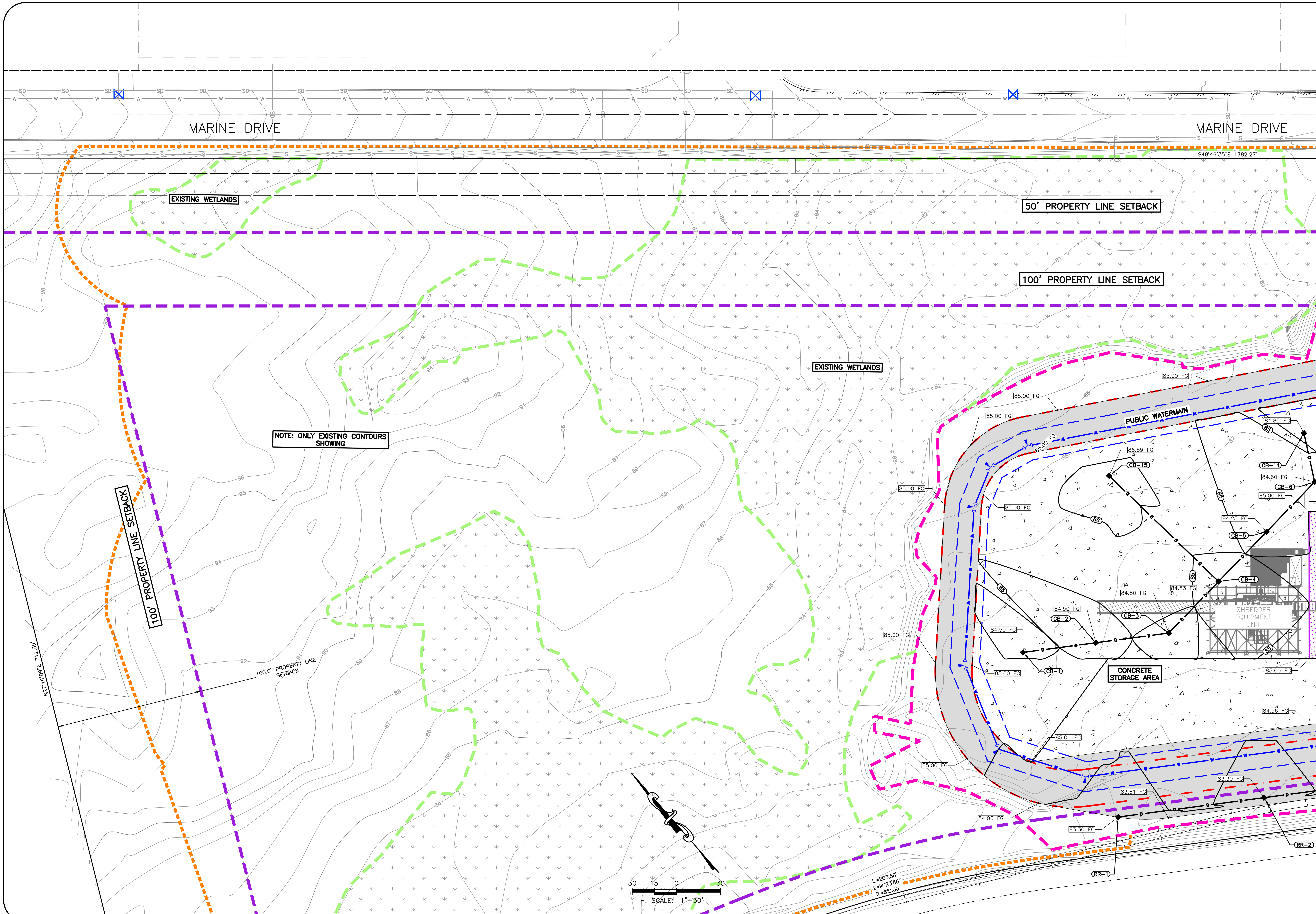
SCOTT IAN GOODALL
STATE OF WASHINGTON
51097
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 60 SCALE
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

5 OF: 27



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SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 30 SCALE-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

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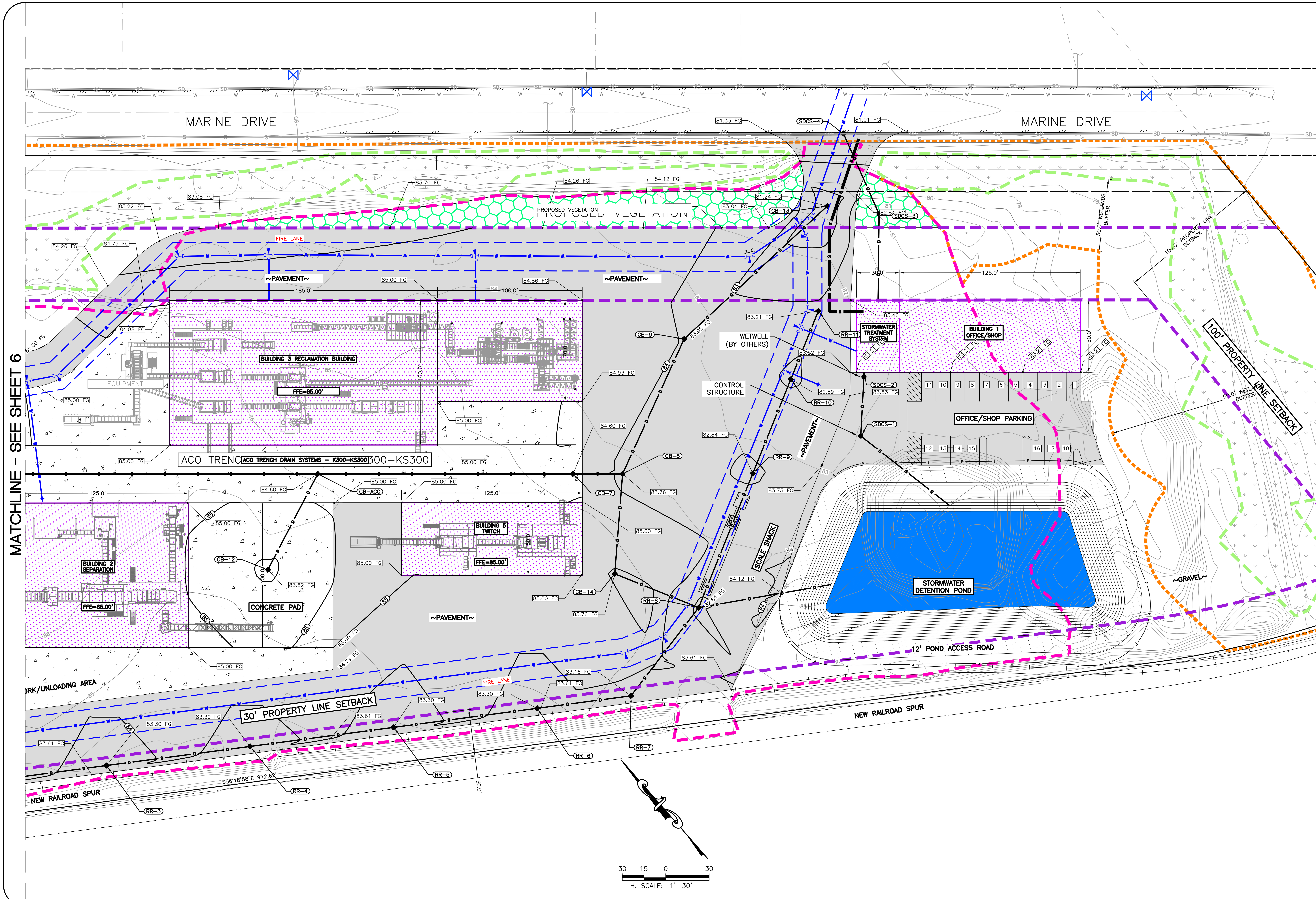

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360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 30 SCALE-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

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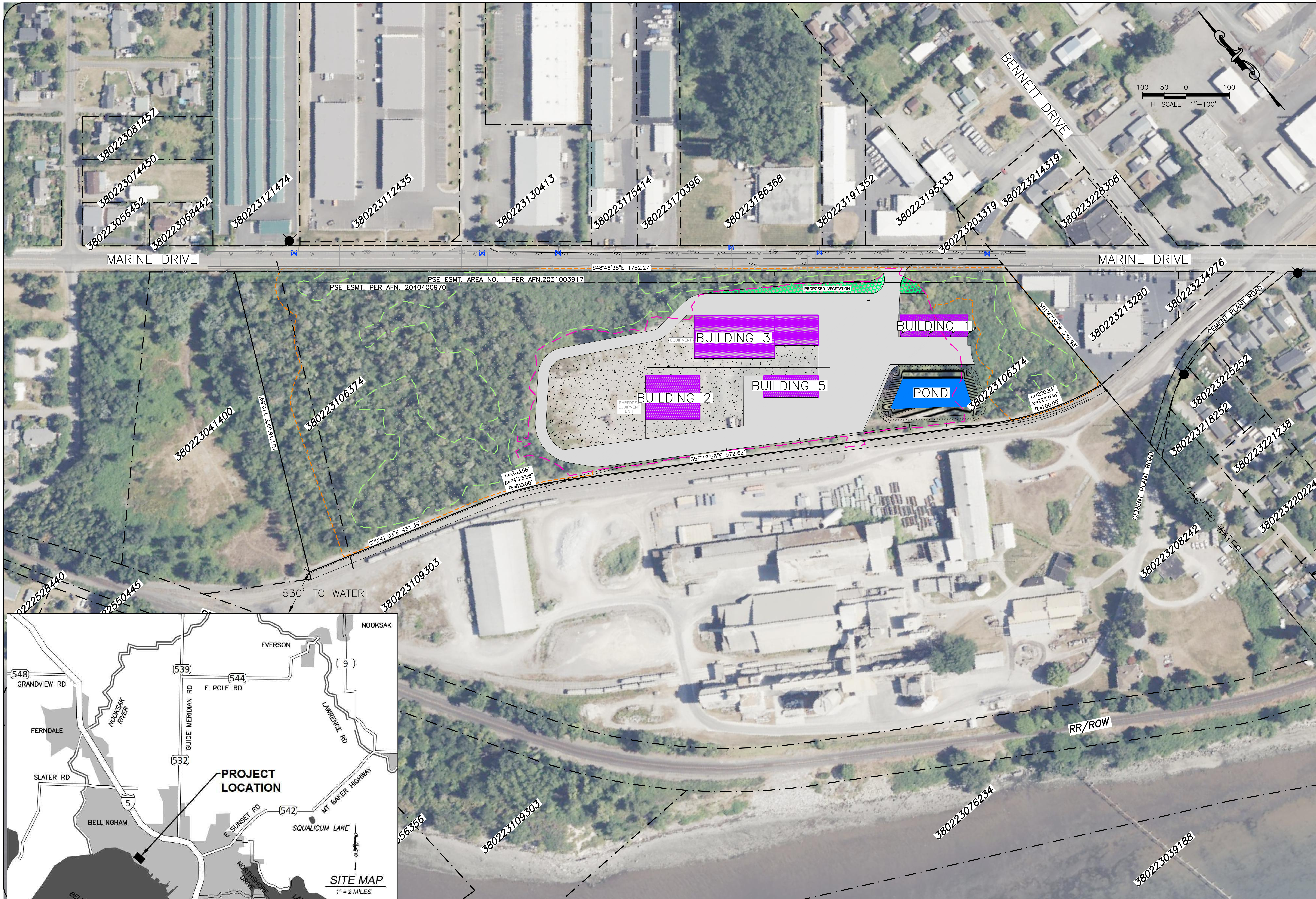
OF: 27



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360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
OVERALL SITE PLAN 100 SCALE
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

8 OF: 27

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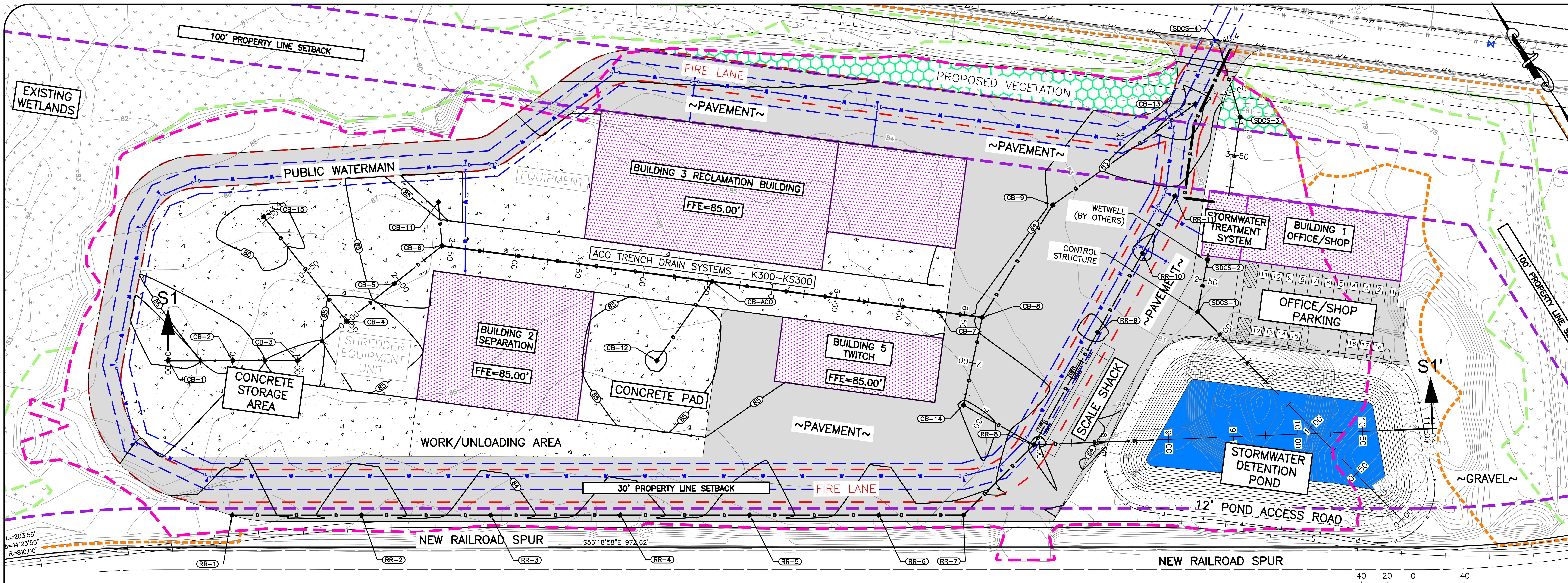
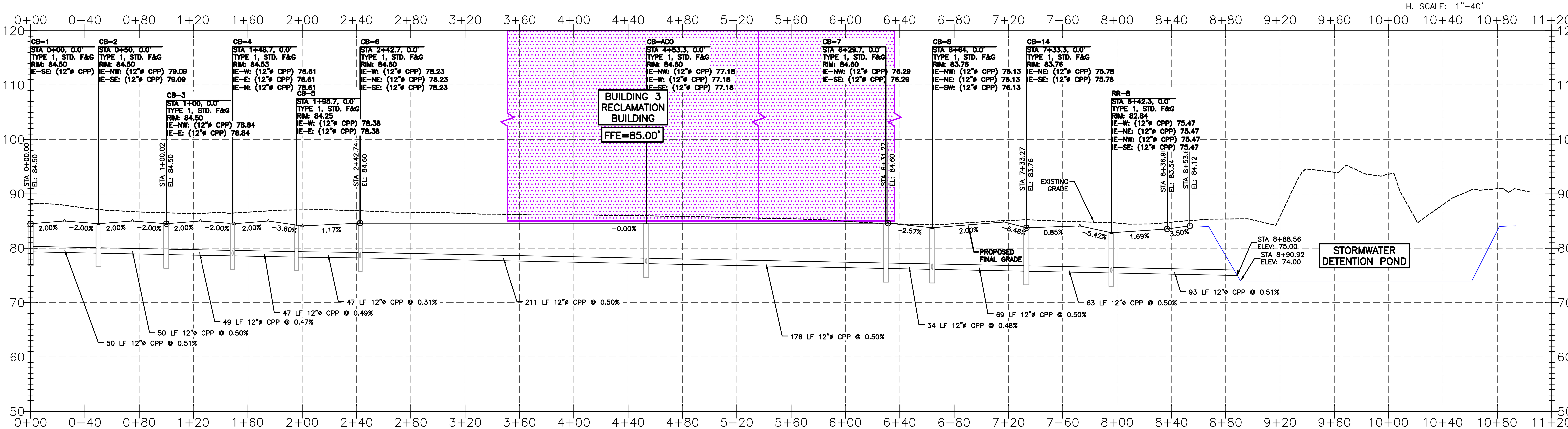




S1–S1' PROPOSED STORM 2 PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE STORM 2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

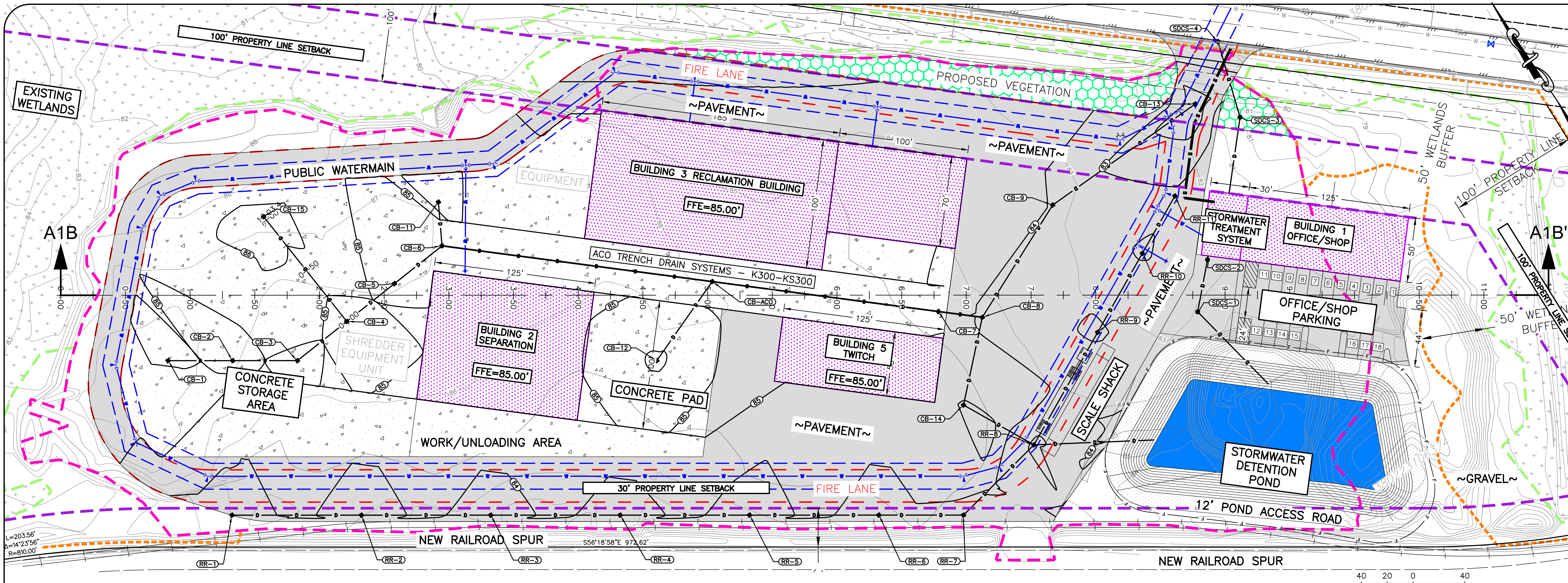
PROJECT NUMBER: 21029

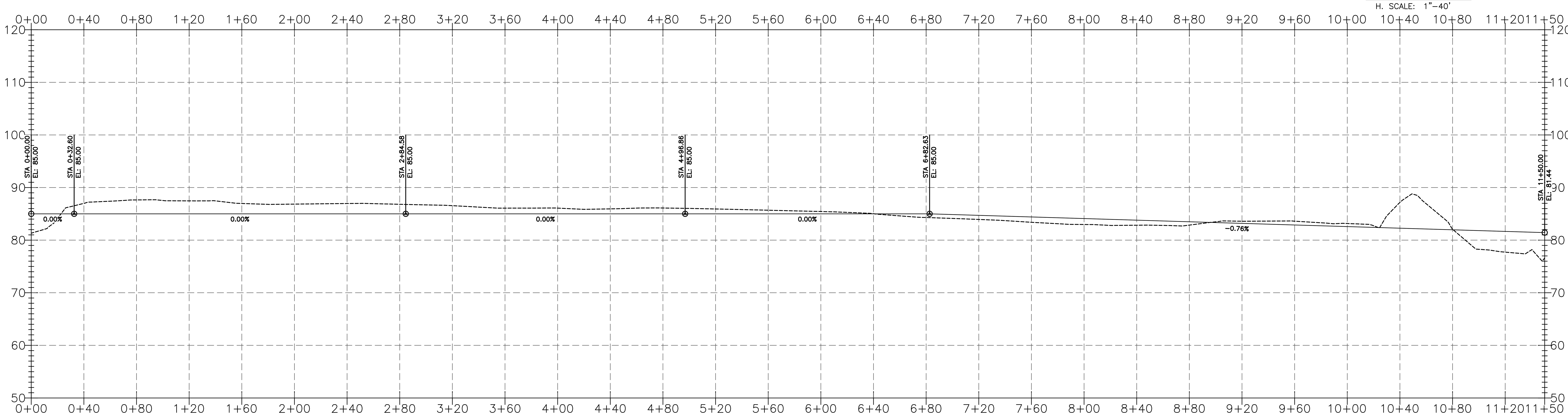
DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

9
OF: 27





A1B–A1B' PROFILE

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE - A1B-A1B'

PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

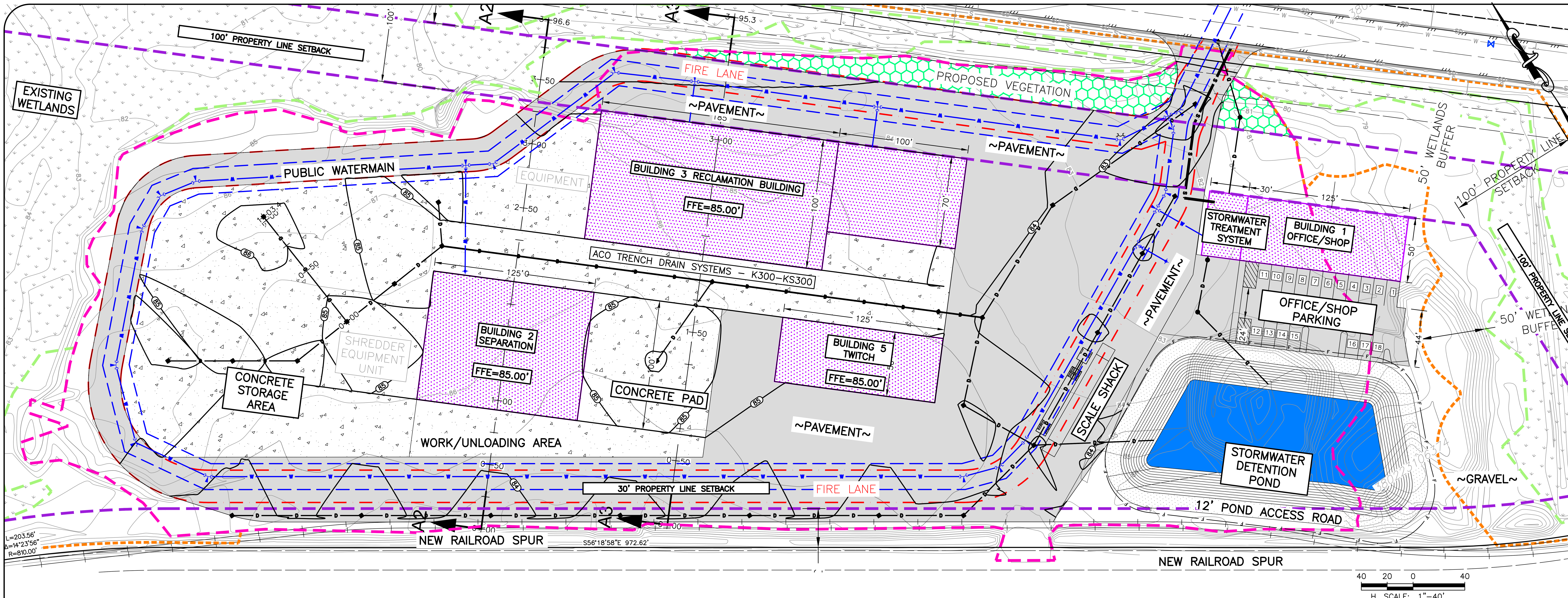
PROJECT NUMBER: 21029

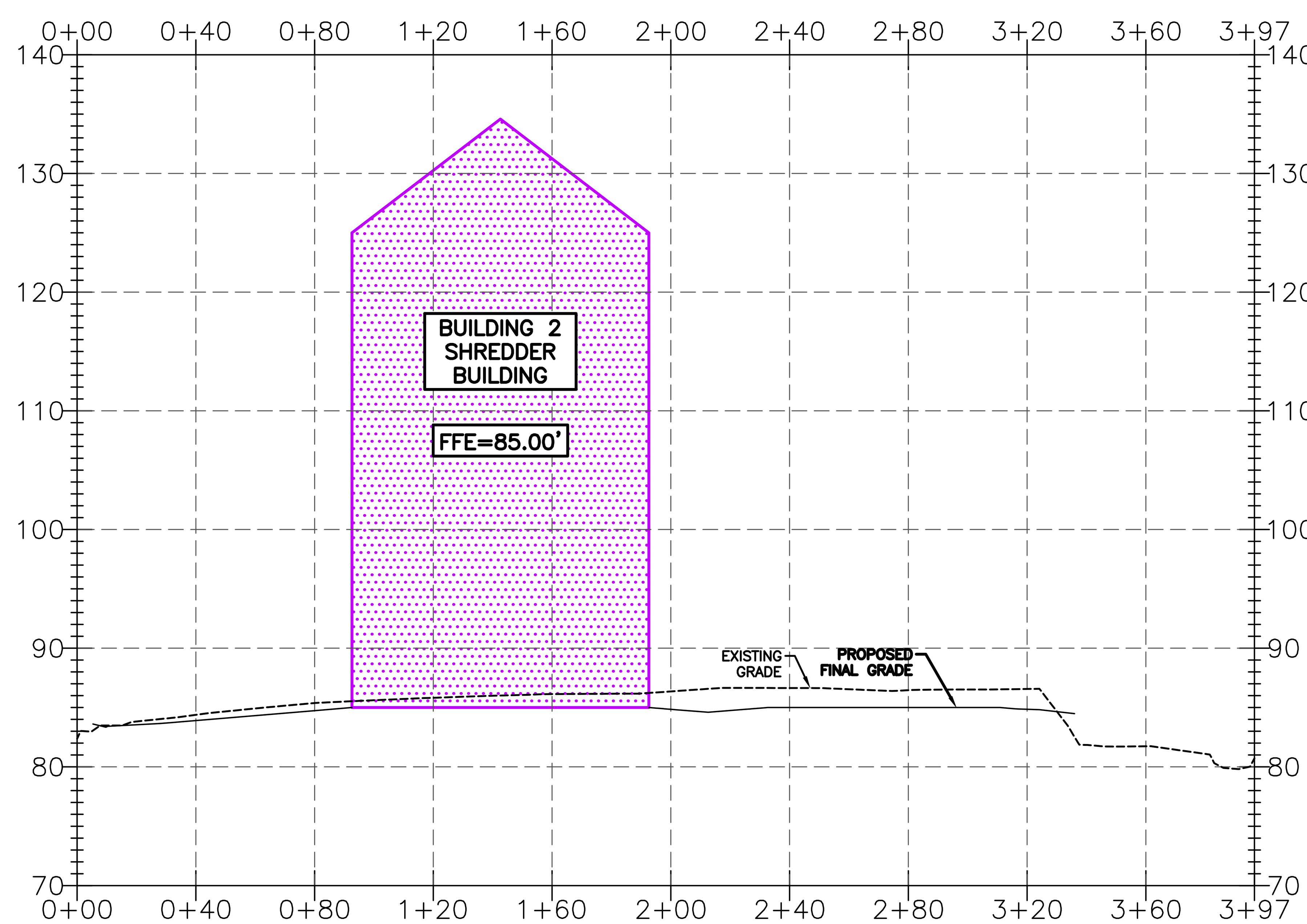
DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

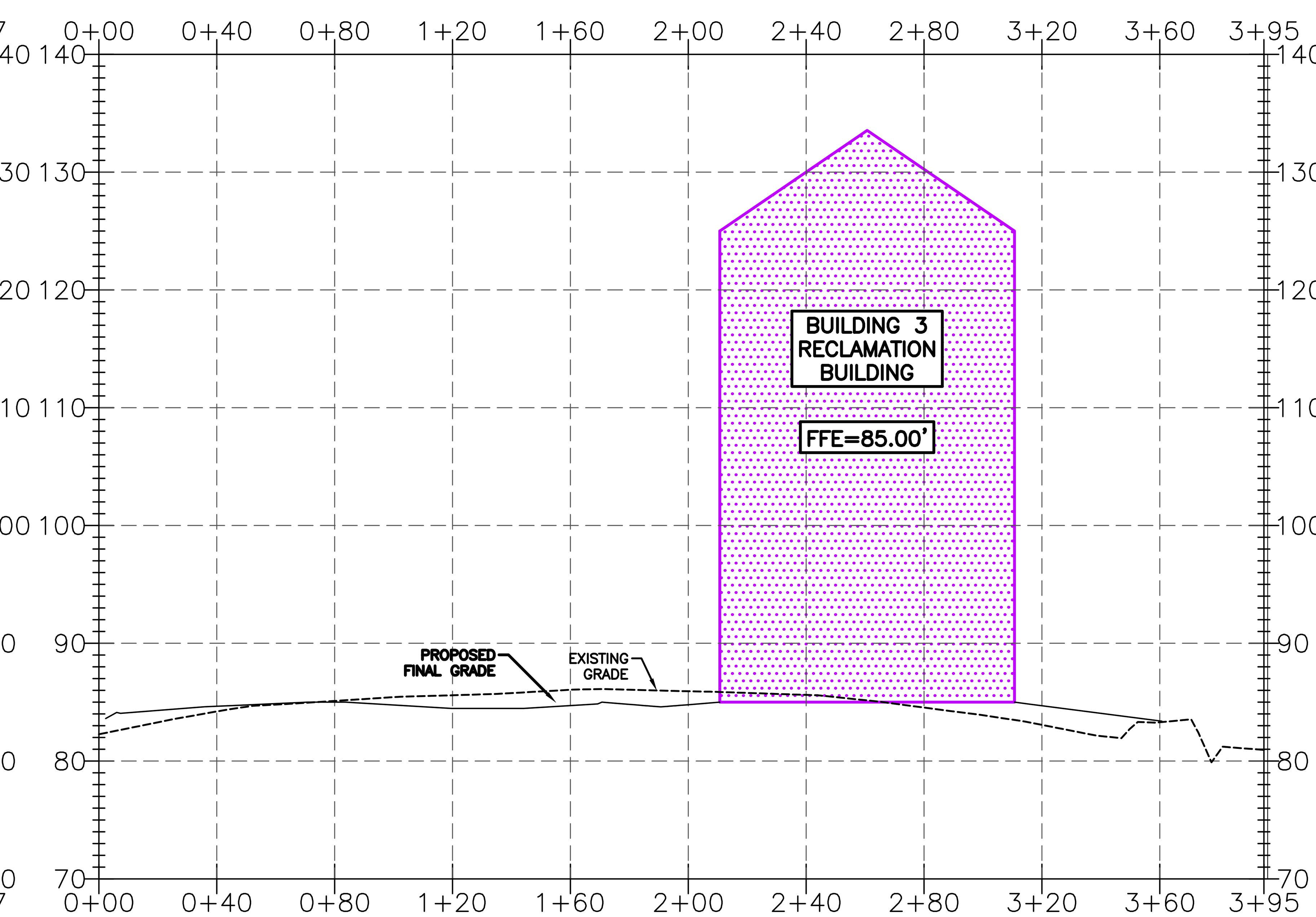
ISSUE DATE: 10-23-2023

10 OF: 27





A2–A2' PROFILE



A3–A3' PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE - A2-A2' & A3-A3'
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

11 OF: 27

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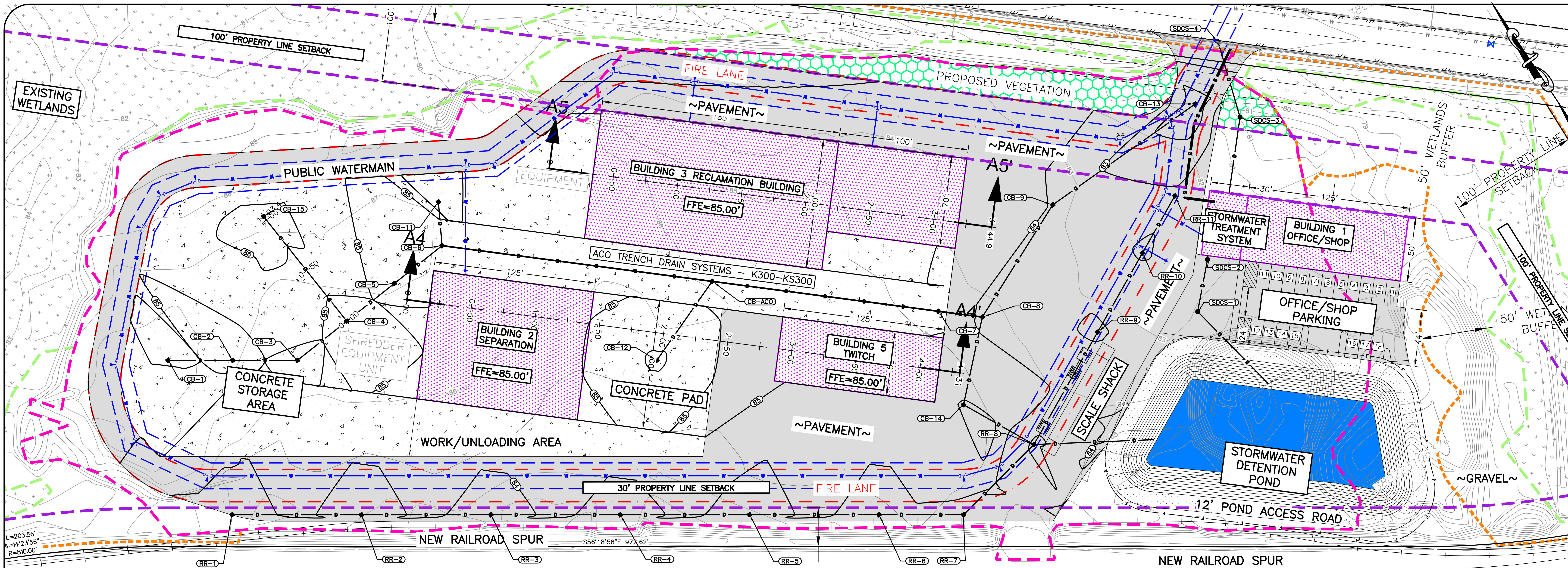
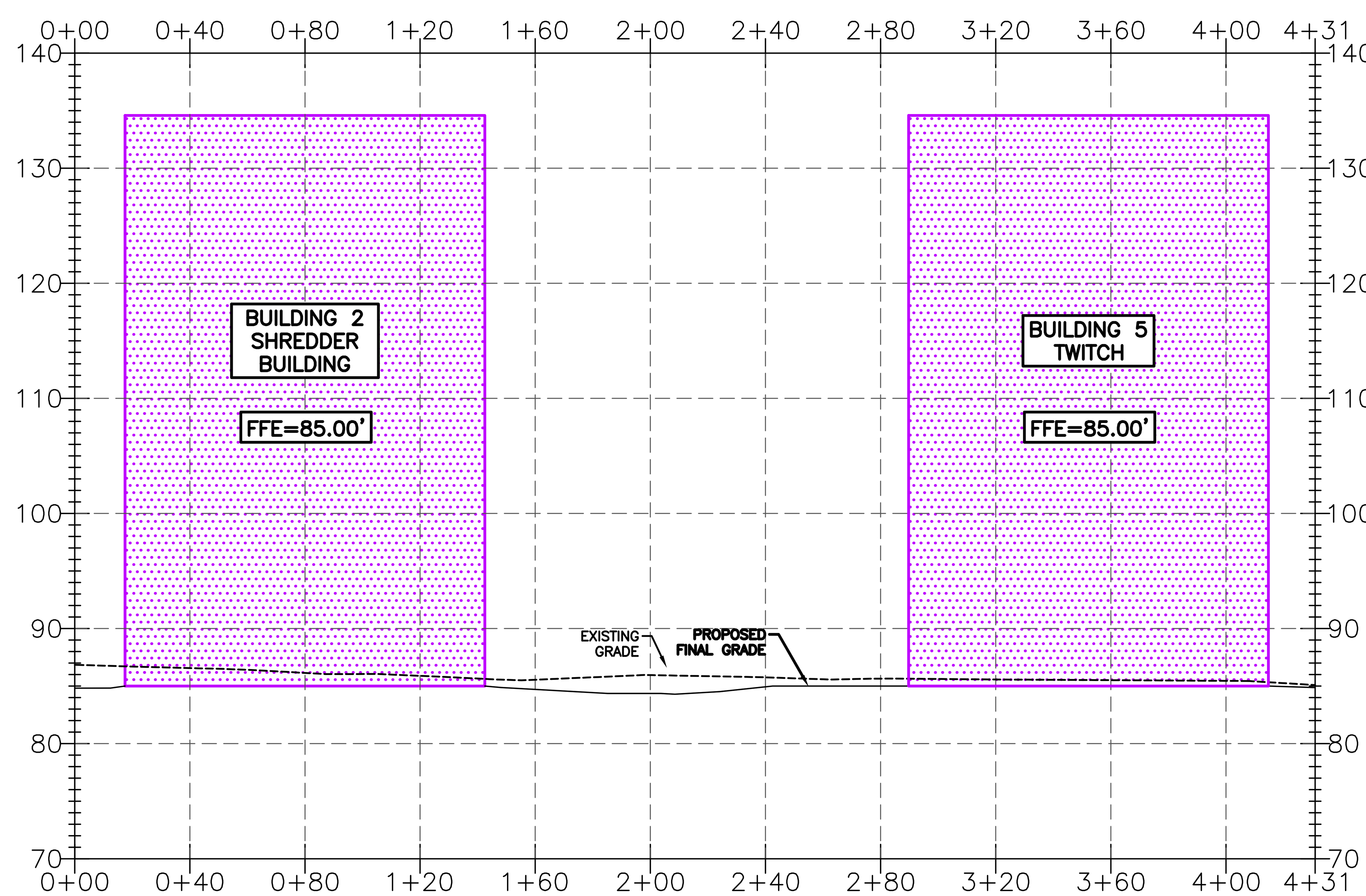
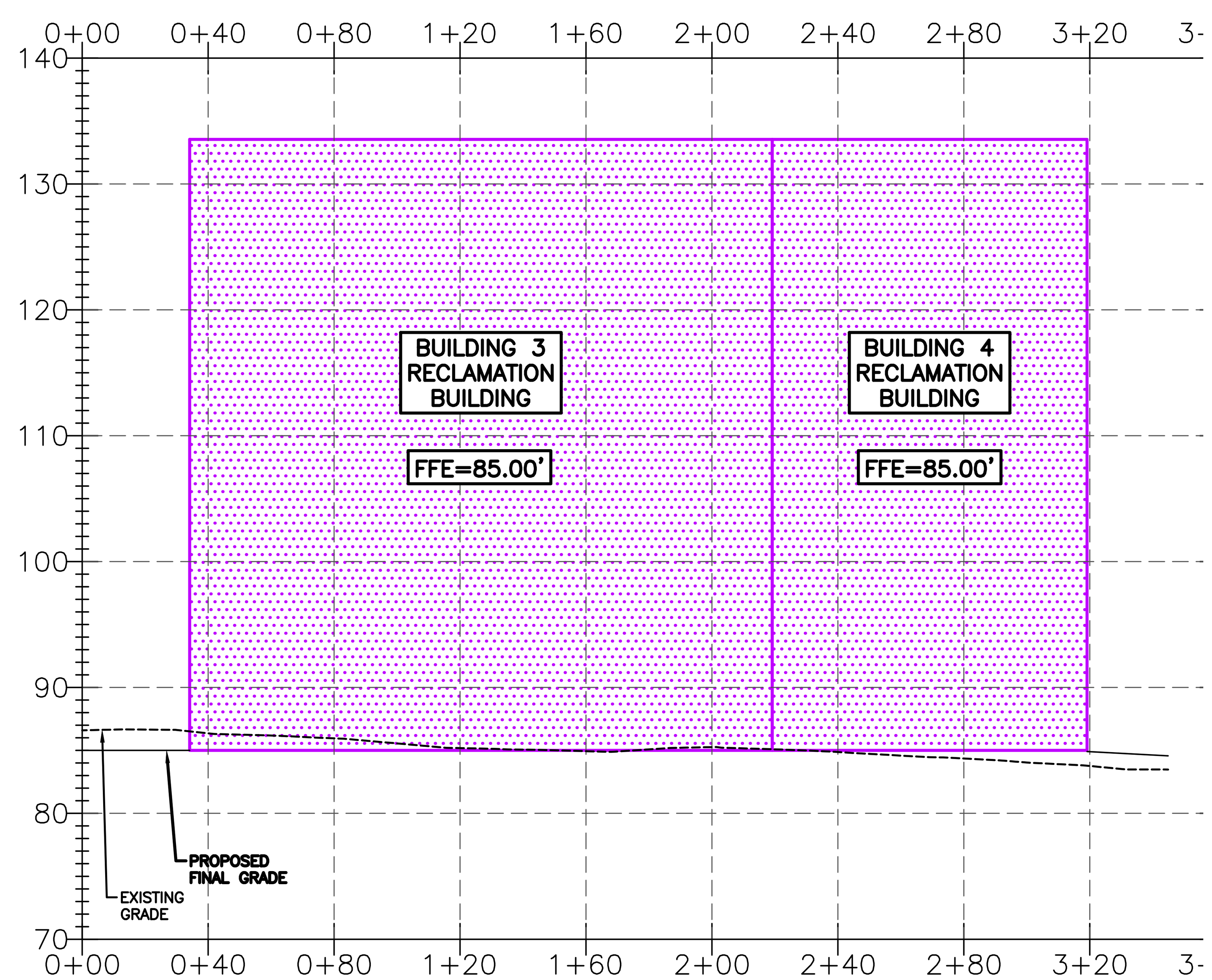




A4-A4' PROFILE



A5-A5' PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

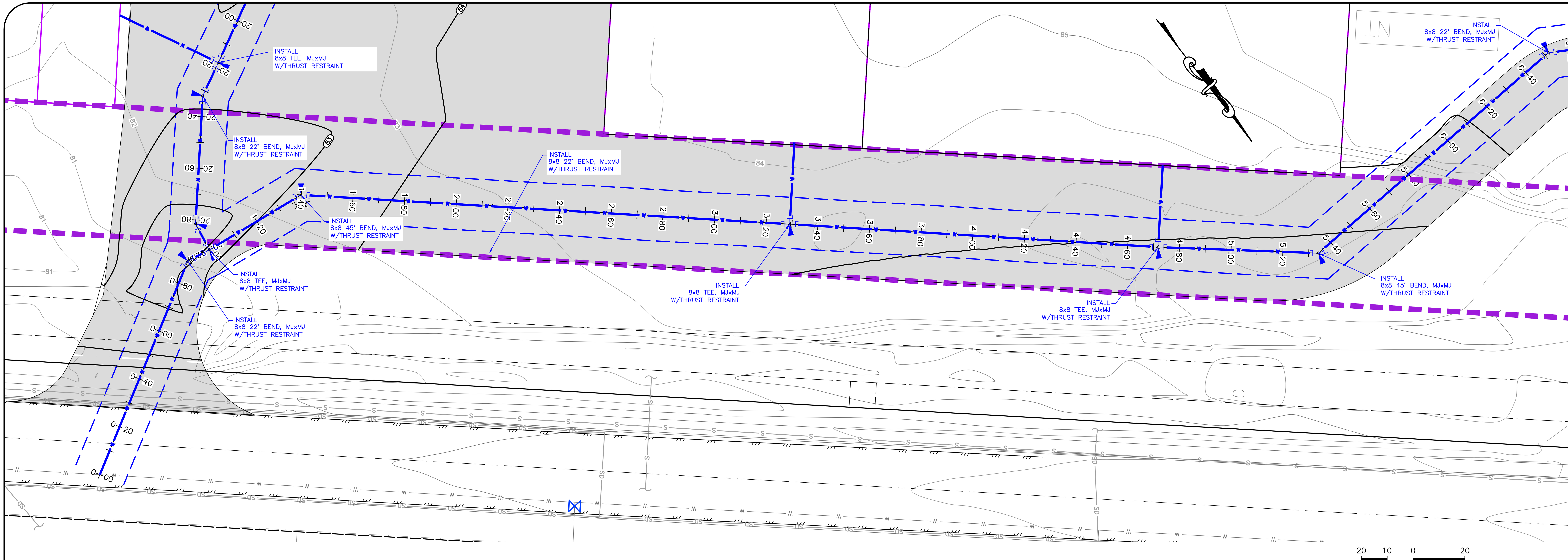
IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

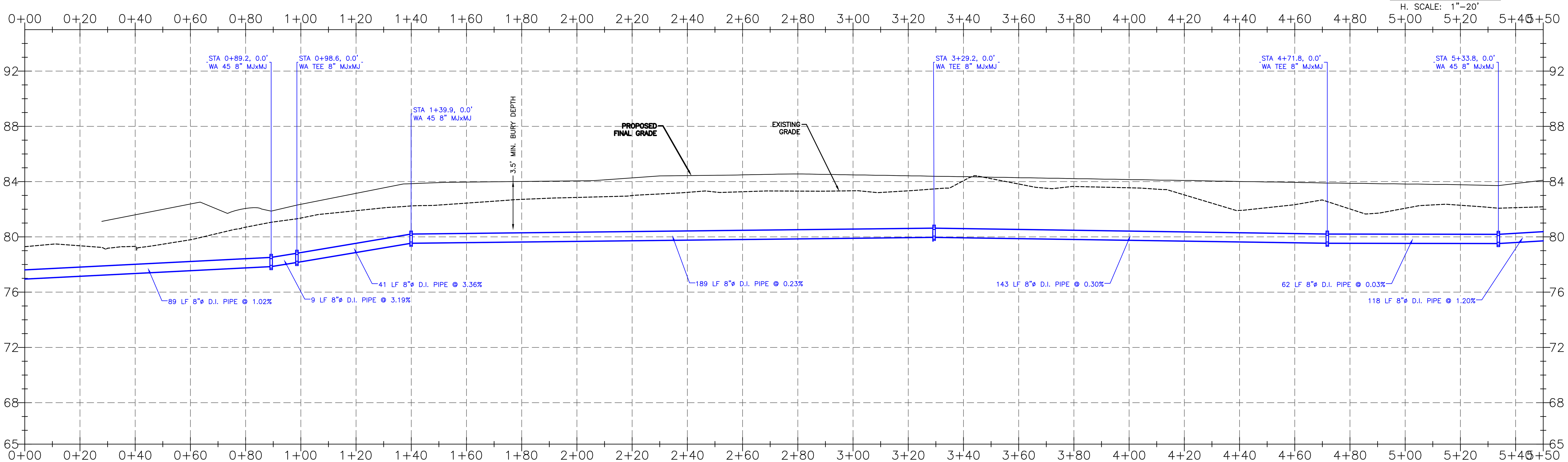
SCOTT IAN GOODALL, STATE OF WASHINGTON, 51077, REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE - A4-A4' & A5-A5'
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023





PROPOSED WATERMAIN PROFILE

20 10 0 20
H. SCALE: 1"=20'
V. SCALE: 1"=4'

IMPACT DESIGN
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SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

13
OF: 27

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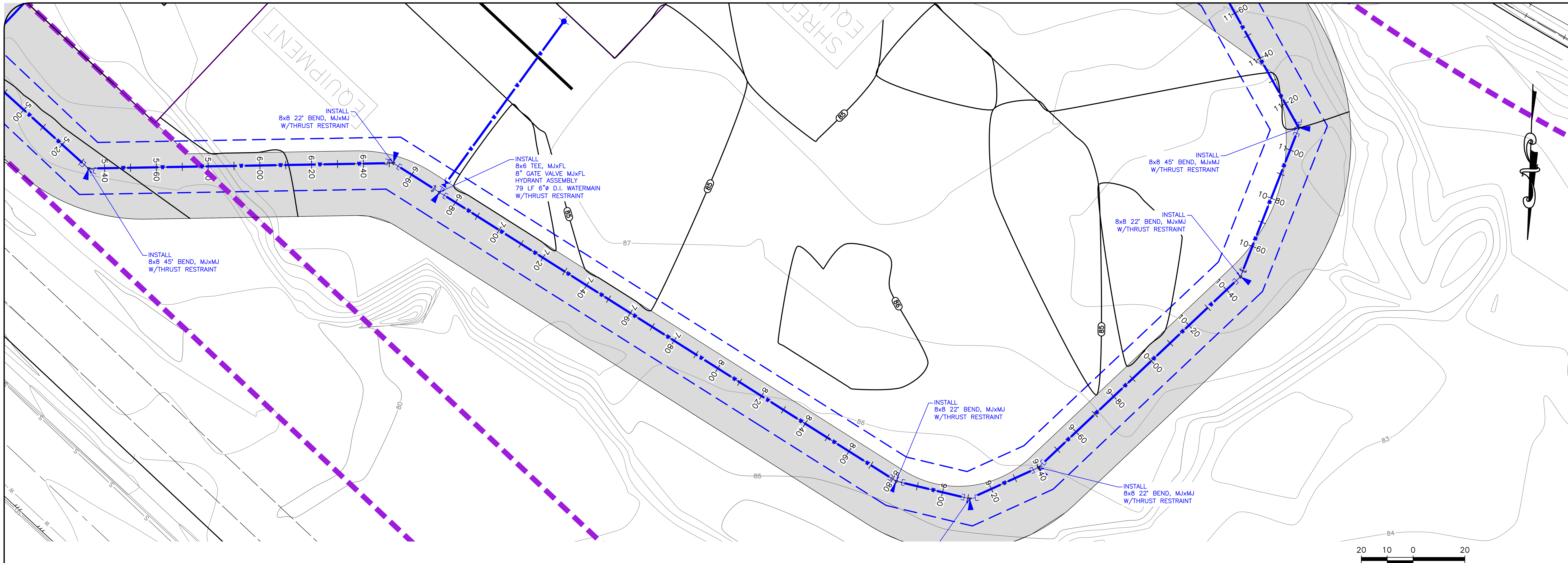

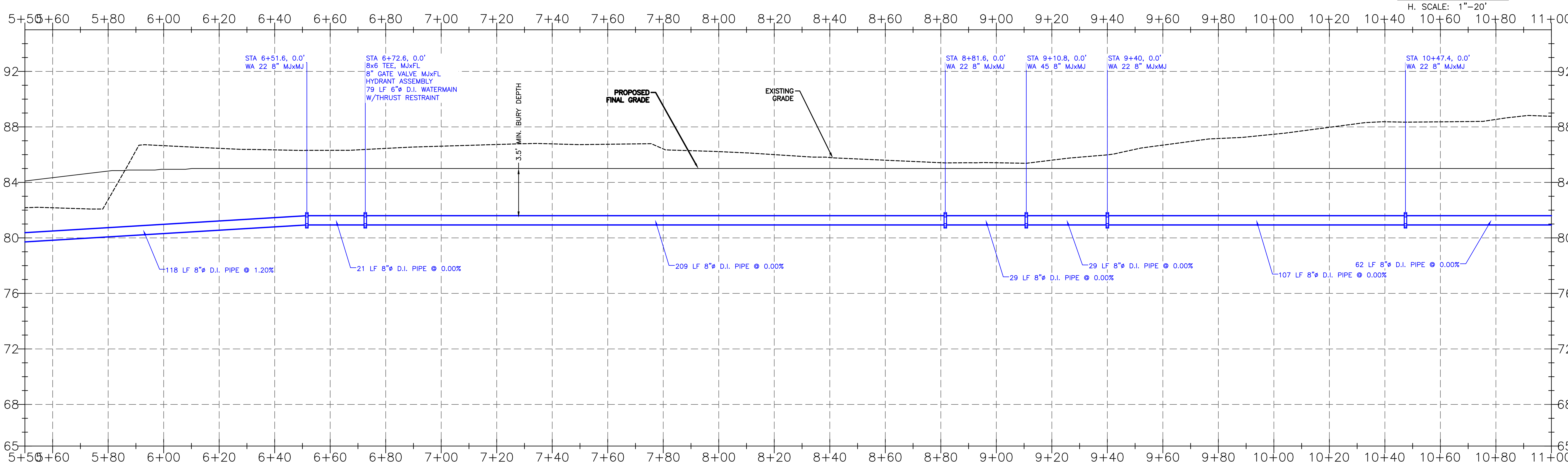

PROPOSED WATERMAIN PROFILE

H. SCALE: 1"=20'
V. SCALE: 1"=4'

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
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SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
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10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

14 OF: 27

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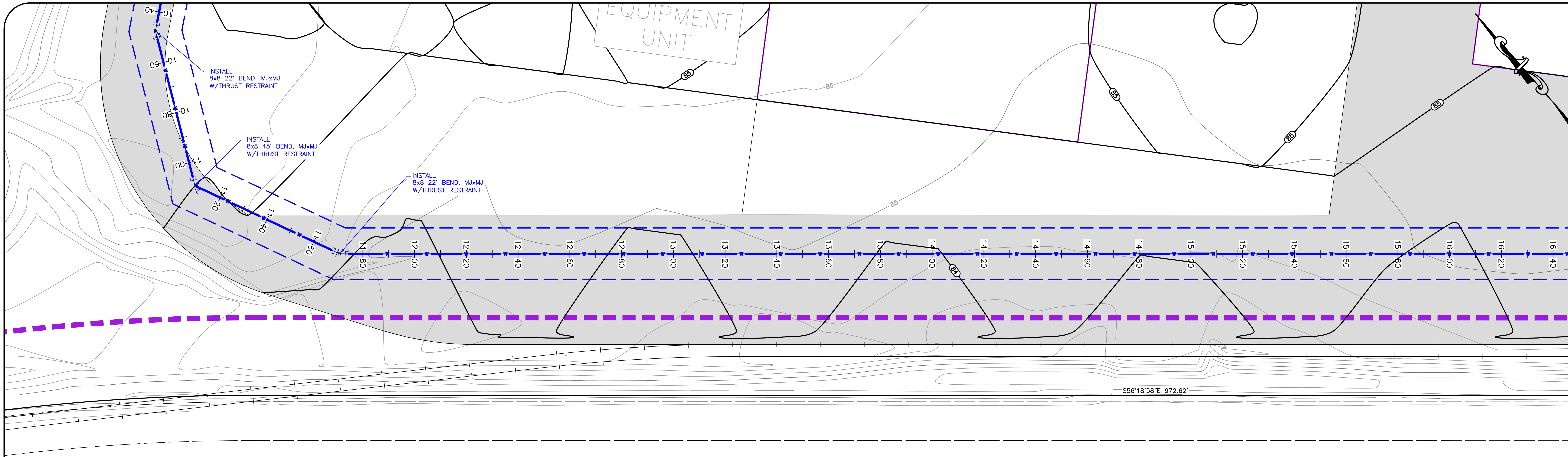

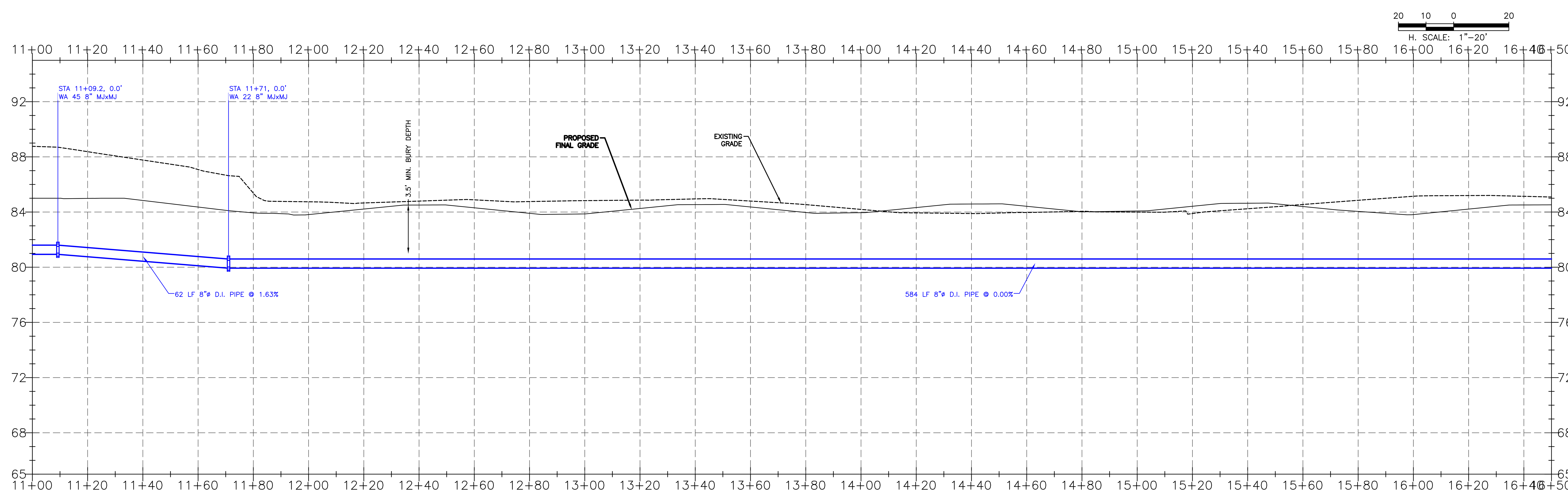

PROPOSED WATERMAIN PROFILE

20 10 0 20
H. SCALE: 1"=20'
V. SCALE: 1"=4'

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL, STATE OF WASHINGTON, 51077, REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-3
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

15
OF: 27

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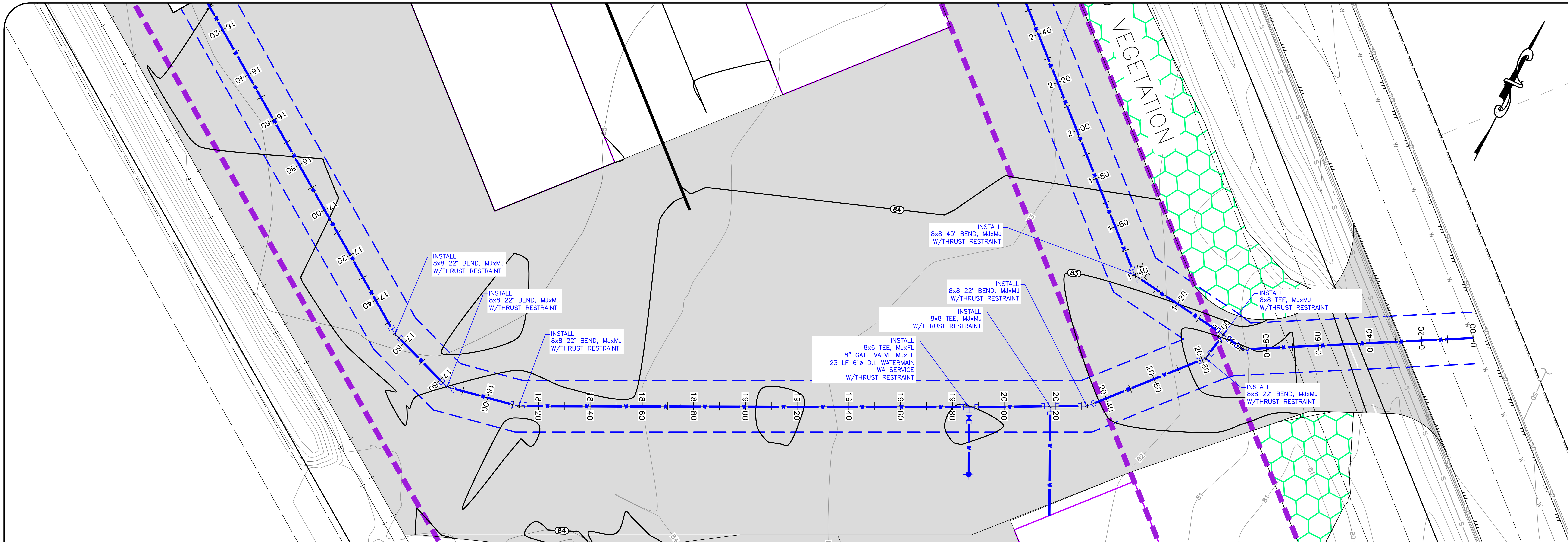

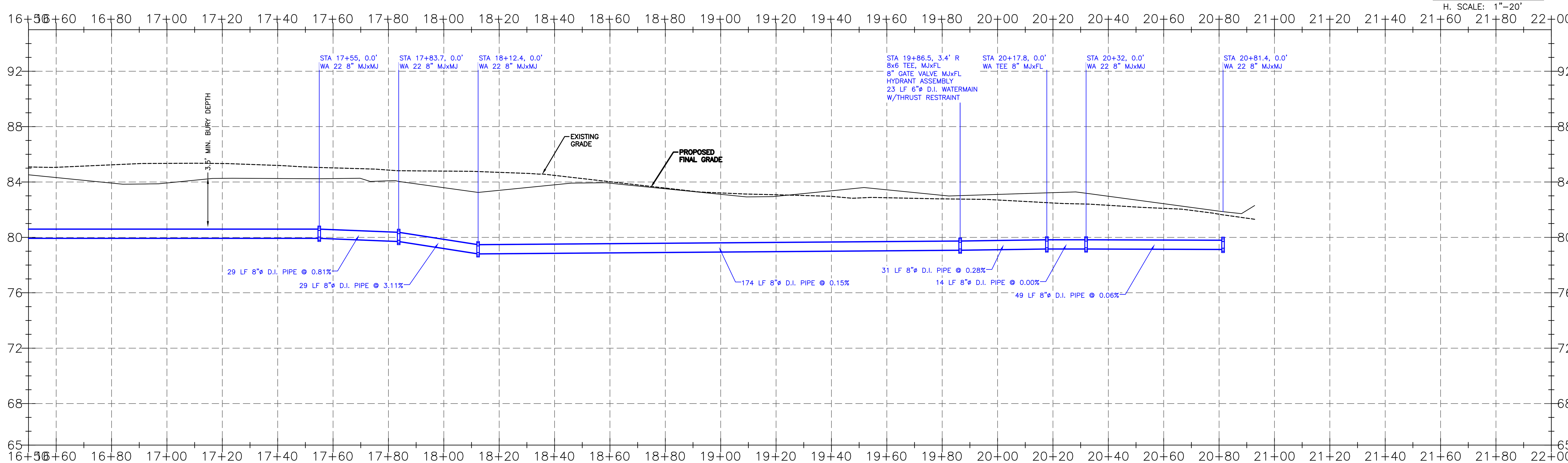

PROPOSED WATERMAIN PROFILE

20 10 0 20
H. SCALE: 1"=20'
V. SCALE: 1"=4'

IMPACT DESIGN
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360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PLAN & PROFILE WATER-4
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

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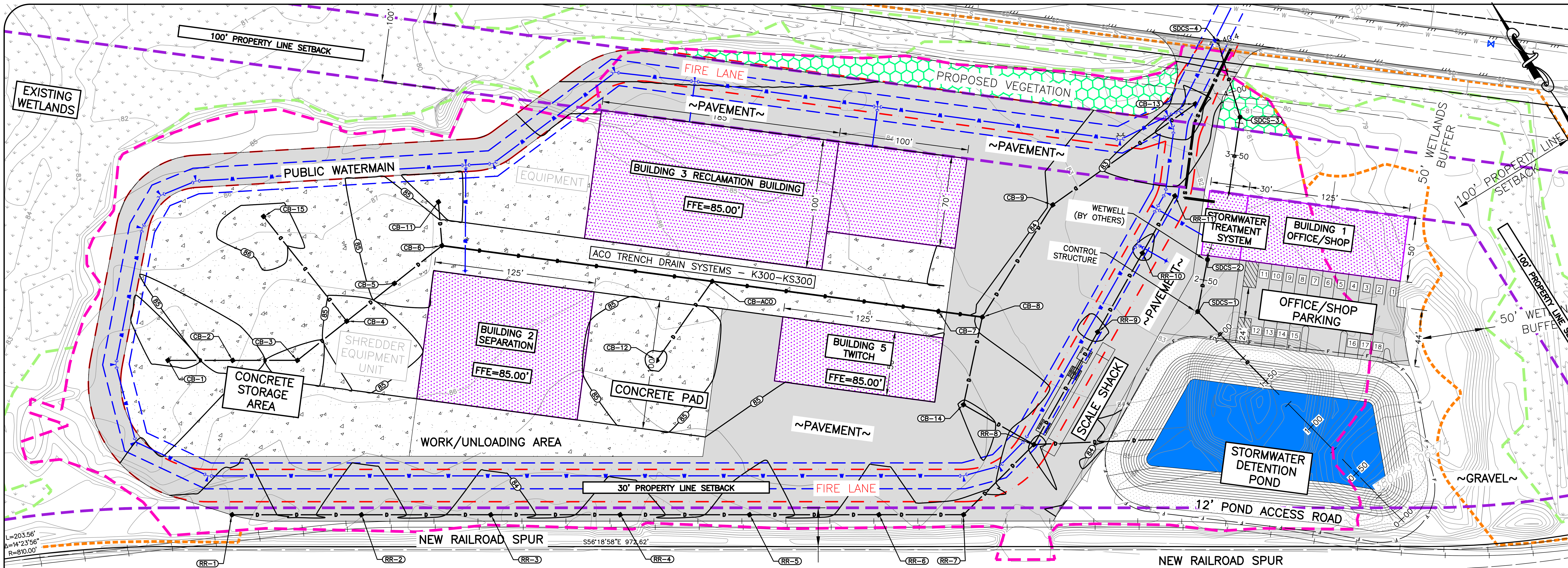
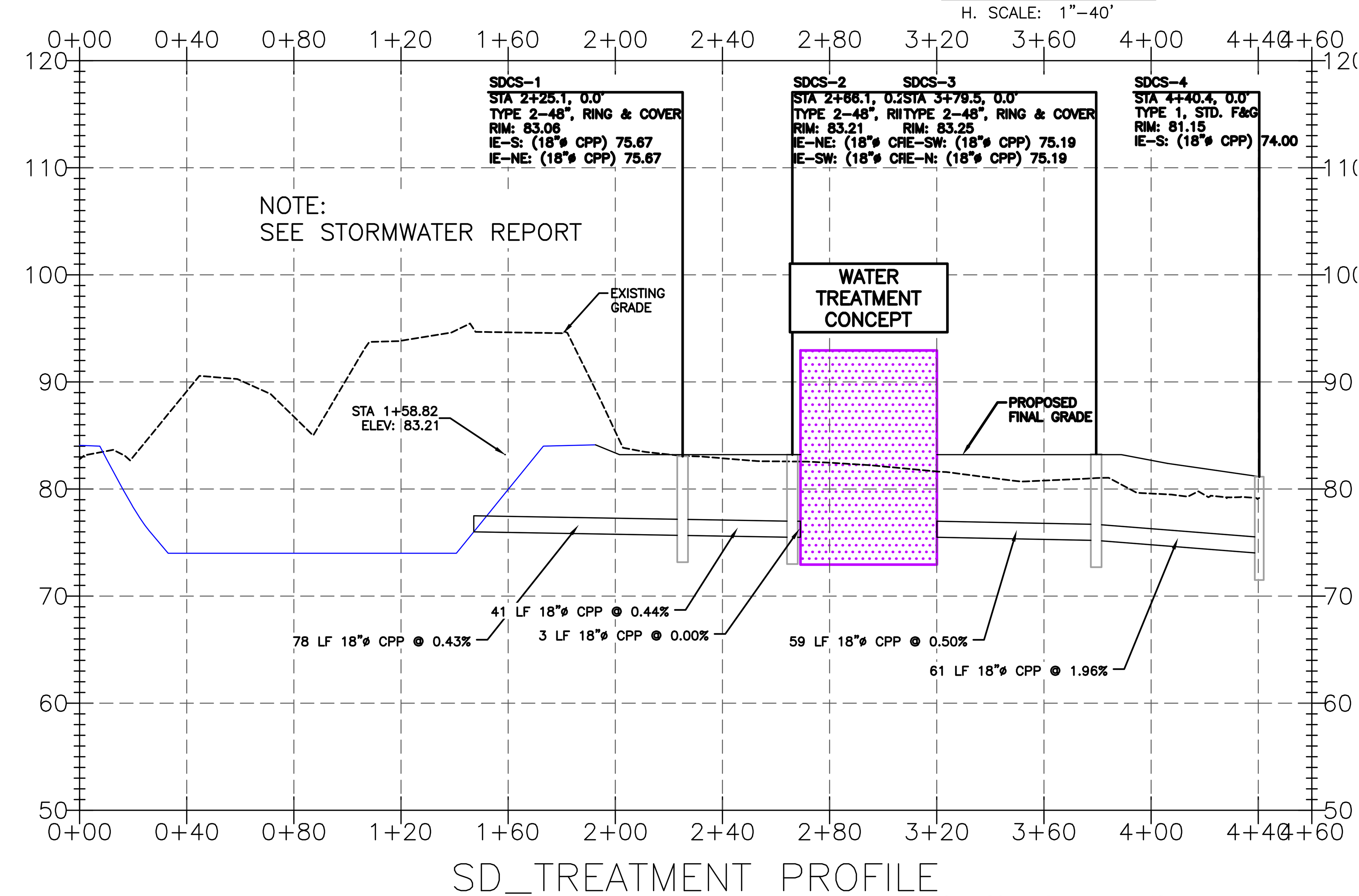
ISSUE DATE: 10-23-2023





SD_TREATMENT PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
PROPOSED STORM BLDG 1 & CONTROL STRUCTURES
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

17 OF: 27

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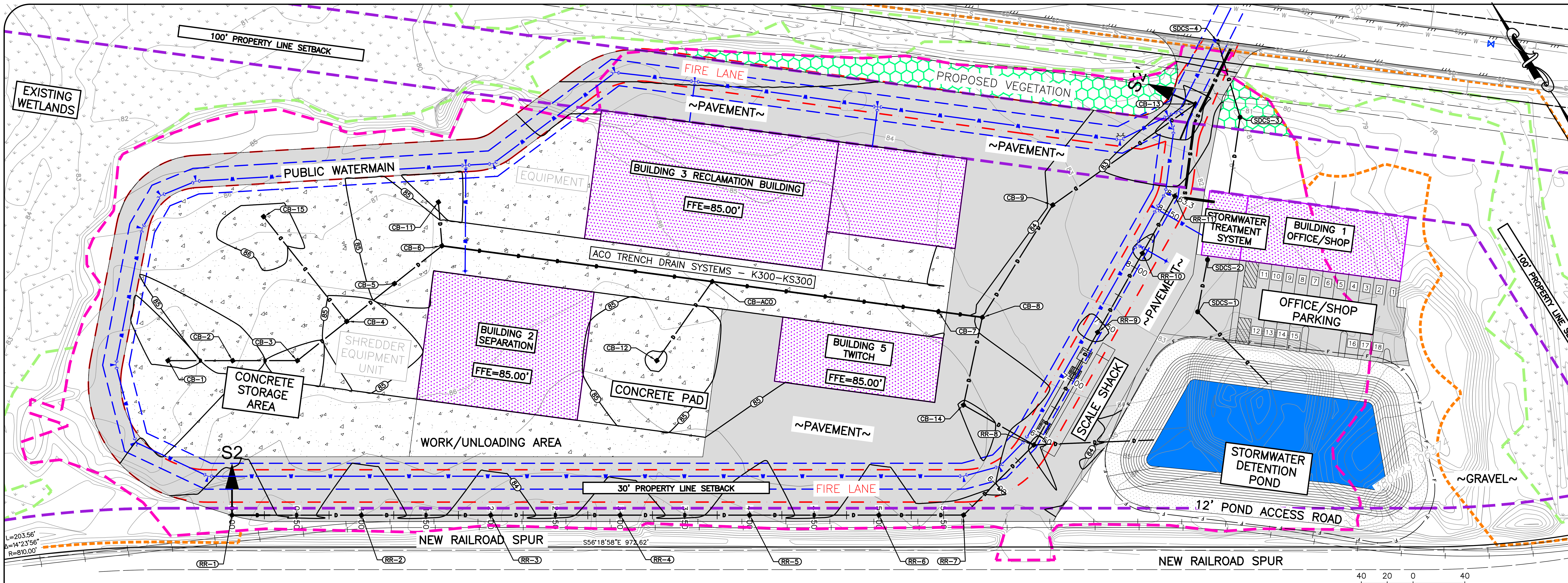
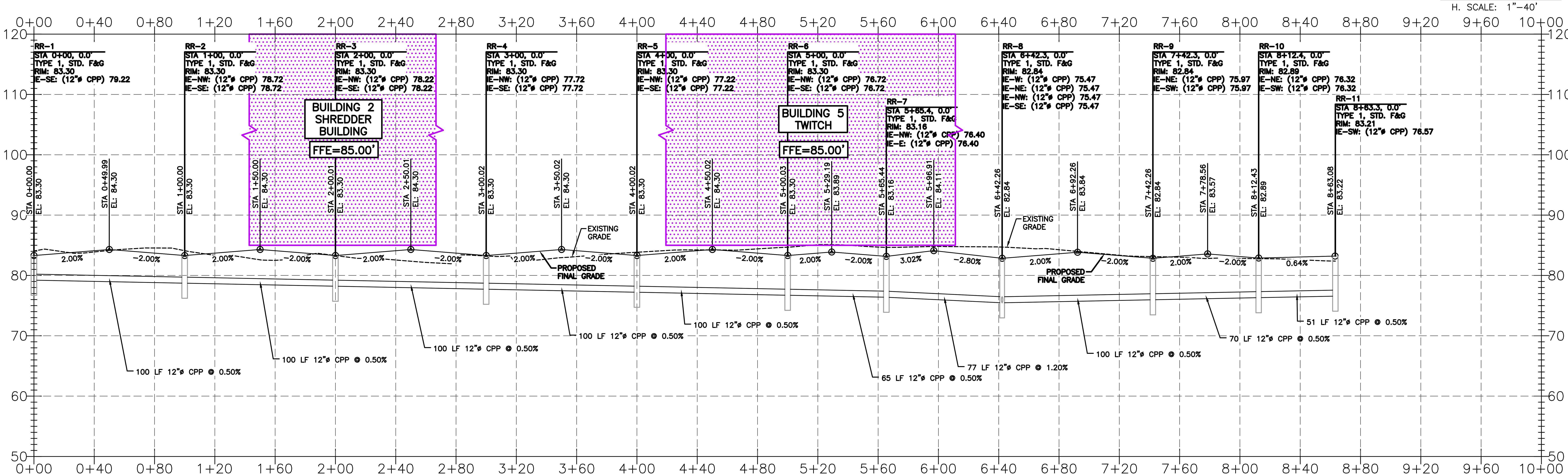




S2-S2' PROPOSED STORM RR PROFILE

H. SCALE: 1"=40'
V. SCALE: 1"=10'

NOTE: CB-9 IS NOT ON THE FIRE LANE, BUT CB-13 IS ON THE FIRE LANE. SHOWN HERE FOR CLARIFICATION. DRAINAGE IS FROM CB-13 TO CB-9

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

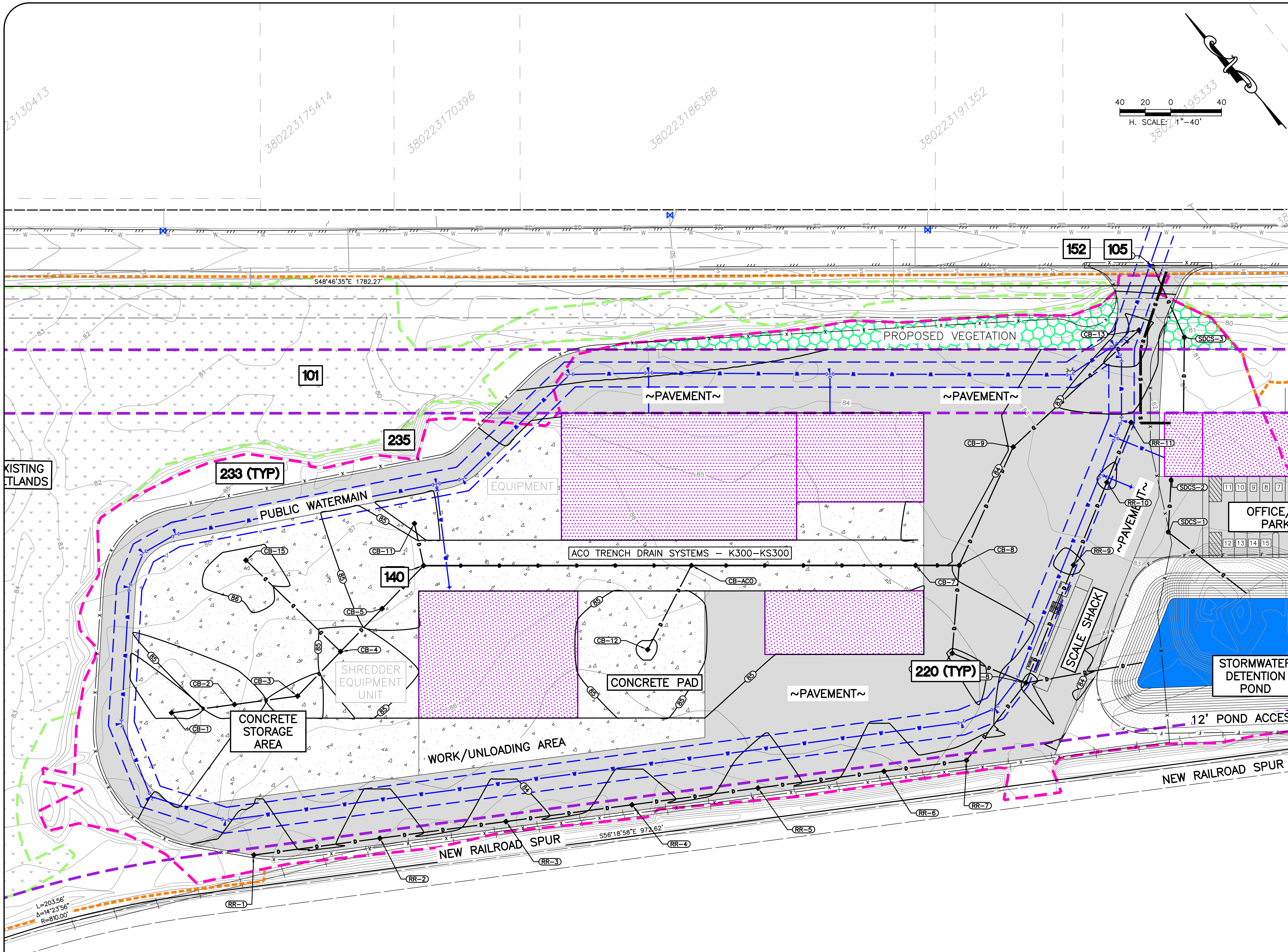
ABC RECYCLING
PLAN & PROFILE RAIL TO CONN PT

PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

18 OF: 27



LEGEND

ELEMENT #1 – MARK CLEARING LIMITS
- 101 — BMP C101 PRESERVE VEGETATION

ELEMENT #2 – ESTABLISH CONSTRUCTION ACCESS
- 105 — BMP C105 STABILIZED CONSTRUCTION ENTRANCE (ONLY INSTALLED IF NECESSARY)

ELEMENT #3 – CONTROL FLOW RATES
- 220 — BMP C220 STORM DRAIN INLET PROTECTION

ELEMENT #4 – INSTALL SEDIMENT CONTROLS
- 220 — BMP C220 STORM DRAIN INLET PROTECTION
- 233 — BMP 233 SILT FENCE
- 235 — BMP 235 STRAW WATTLES

ELEMENT #5 – STABILIZE SOILS
- 120 — BMP C120 TEMPORARY AND PERMANENT SEEDING
- 121 — BMP C121 MULCHING
- 140 — BMP C140 DUST CONTROL

ELEMENT #6 – PROTECT SLOPES
- 120 — BMP C120 TEMPORARY AND PERMANENT SEEDING
- 121 — BMP C121 MULCHING

ELEMENT #7 – PROTECT DRAIN INLETS
- 220 — BMP C220 STORM DRAIN INLET PROTECTION

ELEMENT #8 – STABILIZE CHANNELS AND OUTLETS
- 235 — BMP 235 STRAW WATTLES

ELEMENT #9 – CONTROL POLLUTANTS
- 152 — BMP C152 SAWCUTTING AND SURFACE POLLUTION PREVENTION
- 153 — BMP C153 MATERIAL DELIVERY, STORAGE AND CONTAINMENT

ELEMENT #10 – CONTROL DEWATERING
- 236 — BMP C236 VEGETATIVE FILTRATION

ELEMENT #11 – MAINTAIN BMPs
- 160 — BMP C160 CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT #12 – MANAGE THE PROJECT
- 160 — BMP C160 CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT #13 – PROTECT LID BMPs

NO LID BMPs PROPOSED

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, 51097
10-23-2023

ABC RECYCLING
TEMPORARY EROSION & SEDIMENT CONTROL
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A
NTS

ELEMENT 1: PRESERVE VEGETATION / MARK CLEARING LIMITS

A. BEFORE BEGINNING LAND DISTURBING ACTIVITIES, INCLUDING CLEARING AND GRADING, CLEARLY MARK ALL CLEARING LIMITS, SENSITIVE AREAS AND THEIR BUFFERS, AND TREES THAT ARE TO BE PRESERVED WITHIN THE CONSTRUCTION AREA.

B. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM DEGREE PRACTICABLE.

ADDITIONAL GUIDANCE FOR ELEMENT 1

- PLASTIC, METAL, FABRIC FENCE, OR OTHER PHYSICAL BARRIERS MAY BE USED TO MARK THE CLEARING LIMITS. NOTE THE DIFFERENCE BETWEEN THE PRACTICAL USE AND PROPER INSTALLATION OF BMP C233: SILT FENCE AND THE PROPER USE AND INSTALLATION OF BMP C103: HIGH-VISIBILITY FENCE.
- IF IT IS NOT PRACTICAL TO RETAIN THE DUFF LAYER IN PLACE, THEN STOCKPILE IT ON SITE, COVER IT TO PREVENT EROSION, AND REPLACE IT IMMEDIATELY WHEN YOU FINISH DISTURBING THE SITE.

SUGGESTED BMPS FOR ELEMENT 1

- BMP C101: PRESERVING NATURAL VEGETATION
- BMP C102: BUFFER ZONES
- BMP C103: HIGH-VISIBILITY FENCE
- BMP C233: SILT FENCE

ELEMENT 2: ESTABLISH CONSTRUCTION ACCESS

A. LIMIT CONSTRUCTION VEHICLE ACCESS AND EXIT TO ONE ROUTE, IF POSSIBLE.

B. STABILIZE ACCESS POINTS WITH A PAD OF QUARRY SPALLS, CRUSHED ROCK, OR OTHER EQUIVALENT BMPS, TO MINIMIZE TRACKING OF SEDIMENT ONTO PUBLIC ROADS.

C. LOCATE WHEEL WASH OR TIRE BATHS ON SITE, IF THE STABILIZED CONSTRUCTION ENTRANCE IS NOT EFFECTIVE IN PREVENTING TRACKING SEDIMENT ONTO ROADS.

D. IF SEDIMENT IS TRACKED OFF SITE, CLEAN THE AFFECTED ROADWAY(S) THOROUGHLY AT THE END OF EACH DAY, OR MORE FREQUENTLY AS NECESSARY (FOR EXAMPLE, DURING WET WEATHER). REMOVE SEDIMENT FROM ROADS BY SHOVELING, SWEEPING, OR PICKING UP AND TRANSPORTING THE SEDIMENT TO A CONTROLLED SEDIMENT DISPOSAL AREA.

E. CONDUCT STREET WASHING ONLY AFTER SEDIMENT IS REMOVED IN ACCORDANCE WITH 2.D (ABOVE).

F. CONTROL STREET WASH WASTEWATER BY PUMPING BACK ON SITE, OR OTHERWISE PREVENT IT FROM DIS- CHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

ADDITIONAL GUIDANCE FOR ELEMENT 2

MINIMIZE CONSTRUCTION SITE ACCESS POINTS ALONG LINEAR PROJECTS, SUCH AS ROADWAYS. STREET WASHING MAY REQUIRE LOCAL JURISDICTION APPROVAL.

SUGGESTED BMPS FOR ELEMENT 2

- BMP C105: STABILIZED CONSTRUCTION ACCESS
- BMP C106: WHEEL WASH
- BMP C107: CONSTRUCTION ROAD / PARKING AREA STABILIZATION

ELEMENT 3: CONTROL FLOW RATES

A. PROTECT PROPERTIES AND WATERWAYS DOWNSTREAM OF DEVELOPMENT SITES FROM EROSION AND THE ASSOCIATED DISCHARGE OF TURBID WATERS DUE TO INCREASES IN THE VELOCITY AND PEAK VOLUMETRIC FLOW RATE OF STORMWATER RUNOFF FROM THE PROJECT SITE.

B. WHERE NECESSARY TO COMPLY WITH 3.A (ABOVE), CONSTRUCT STORMWATER INFILTRATION OR DETENTION BMPS AS ONE OF THE FIRST STEPS IN GRADING. ASSURE THAT DETENTION BMPS FUNCTION PROPERLY BEFORE CONSTRUCTING SITE IMPROVEMENTS (E.G., IMPERVIOUS SURFACES).

C. IF PERMANENT INFILTRATION BMPS ARE USED FOR TEMPORARY FLOW CONTROL DURING CONSTRUCTION, PROTECT THESE BMPS FROM SILTATION DURING THE CONSTRUCTION PHASE.

ADDITIONAL GUIDANCE FOR ELEMENT 3

- CONDUCT A DOWNSTREAM ANALYSIS IF CHANGES IN FLOWS COULD IMPAIR OR ALTER CONVEYANCE SYSTEMS, STREAMBANKS, BED SEDIMENT, OR AQUATIC HABITAT. SEE III-3.2 PREPARING A STORMWATER SITE PLAN FOR OFF-SITE ANALYSIS GUIDELINES.
- EVEN GENTLY SLOPED AREAS NEED FLOW CONTROLS SUCH AS BMP C235: WATTLES OR OTHER ENERGY DISSIPATION / FILTRATION STRUCTURES. PLACE DISSIPATION FACILITIES CLOSER TOGETHER ON STEEPER SLOPES. THESE METHODS PREVENT WATER FROM BUILDING HIGHER VELOCITIES AS IT FLOWS DOWNSTREAM WITHIN THE CONSTRUCTION SITE.
- CONTROL STRUCTURES DESIGNED FOR PERMANENT DETENTION BMPS ARE NOT APPROPRIATE FOR USE DURING CONSTRUCTION WITHOUT MODIFICATION. IF USED DURING CONSTRUCTION, MODIFY THE CONTROL STRUCTURE TO ALLOW FOR LONG-TERM STORAGE OF RUNOFF AND ENABLE SEDIMENT TO SETTLE. VERIFY THAT THE BMP IS SIZED APPROPRIATELY FOR THIS PURPOSE. RESTORE BMPS TO THEIR ORIGINAL DESIGN DIMENSIONS, REMOVE SEDIMENT, AND INSTALL A FINAL CONTROL STRUCTURE AT COMPLETION OF THE PROJECT.
- EROSION HAS THE POTENTIAL TO OCCUR BECAUSE OF INCREASES IN THE VOLUME, VELOCITY, AND PEAK FLOW RATE OF STORMWATER RUNOFF FROM THE PROJECT SITE. THE LOCAL PERMITTING AGENCY MAY REQUIRE INFILTRATION OR DETENTION BMP DESIGNS THAT PROVIDE ADDITIONAL OR DIFFERENT STORMWATER FLOW CONTROL THAN THE DESIGNS DETAILED IN THIS MANUAL. THESE REQUIREMENTS MAY BE NECESSARY TO ADDRESS LOCAL CONDITIONS OR TO PROTECT PROPERTIES AND WATERWAYS DOWNSTREAM.
- VELOCITY OF WATER LEAVING THE SITE SHOULD NOT EXCEED 3 FEET/SECOND, IF THE DISCHARGE IS TO A STREAM OR DITCH. INSTALL VELOCITY DISSIPATION, SUCH AS BMP C207: CHECK DAMS OR BMP C202: RIPRAP CHANNEL LINING TO ENSURE REDUCTION OF THE FLOW VELOCITY TO A NON-EROSIVE LEVEL.
- IF THE DISCHARGE FROM A PROJECT SITE IS TO A MUNICIPAL STORM DRAINAGE SYSTEM, THE ALLOWABLE DIS- CHARGE RATE MAY BE LIMITED BY THE CAPACITY OF THE PUBLIC SYSTEM. IT MAY BE NECESSARY TO CLEAN THE MUNICIPAL STORM DRAINAGE SYSTEM PRIOR TO THE START OF THE DISCHARGE TO PREVENT SCOURING SOLIDS FROM THE DRAINAGE SYSTEM. OBTAIN PERMISSION FROM THE OWNER OF THE COLLECTION SYSTEM BEFORE DISCHARGING TO IT. ENSURE THAT NO DOWNSTREAM PIPES ARE SURCHARGED AS A RESULT OF INCREASED FLOWS FROM THE PROJECT SITE.
- IF THE DISCHARGE FROM A PROJECT SITE IS DIRECTLY TO A FLOW CONTROL EXEMPT RECEIVING WATER LISTED IN APPENDIX I-A: FLOW CONTROL EXEMPT RECEIVING WATERS OR TO AN INFILTRATION SYSTEM, THERE IS NO DISCHARGE FLOW LIMIT.

SUGGESTED BMPS FOR ELEMENT 3

- BMP C203: WATER BARS
- BMP C207: CHECK DAMS
- BMP C209: OUTLET PROTECTION
- BMP C235: WATTLES
- BMP C240: SEDIMENT TRAP
- BMP C241: SEDIMENT POND (TEMPORARY)

ELEMENT 4: INSTALL SEDIMENT CONTROLS

A. CONSTRUCT SEDIMENT CONTROL BMPS (SEDIMENT PONDS, TRAPS, FILTERS, ETC.) AS ONE OF THE FIRST STEPS IN GRADING. THESE BMPS MUST BE FUNCTIONAL BEFORE OTHER LAND DISTURBING ACTIVITIES TAKE PLACE.

B. MINIMIZE SEDIMENT DISCHARGES FROM THE SITE. THE DESIGN, INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS MUST ADDRESS FACTORS SUCH AS THE AMOUNT, FREQUENCY, INTENSITY AND DURATION OF PRECIPITATION, THE NATURE OF RESULTING STORMWATER RUNOFF, AND SOIL CHARACTERISTICS, INCLUDING THE RANGE OF SOIL PARTICLE SIZES EXPECTED TO BE PRESENT ON THE SITE.

C. DIRECT STORMWATER RUNOFF FROM DISTURBED AREAS THROUGH BMP C241: SEDIMENT POND (TEMPORARY) OR OTHER APPROPRIATE SEDIMENT REMOVAL BMP, BEFORE THE RUNOFF LEAVES A CONSTRUCTION SITE OR BEFORE DISCHARGE TO AN INFILTRATION FACILITY. RUNOFF FROM FULLY STABILIZED AREAS MAY BE DISCHARGED WITHOUT A SEDIMENT REMOVAL BMP, BUT MUST CONTROL FLOW RATES PER ELEMENT 3: CONTROL FLOW RATES.

D. LOCATE BMPS INTENDED TO TRAP SEDIMENT ON SITE IN A MANNER TO AVOID INTERFERENCE WITH THE MOVEMENT OF JUVENILE SALMONIDS ATTEMPTING TO ENTER OFF-CHANNEL AREAS OR DRAINAGES.

E. PROVIDE AND MAINTAIN NATURAL BUFFERS AROUND SURFACE WATERS, DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION, UNLESS INFEASIBLE.

F. WHERE FEASIBLE, DESIGN OUTLET STRUCTURES THAT WITHDRAW IMPOUNDED STORMWATER FROM THE SURFACE TO AVOID DISCHARGING SEDIMENT THAT IS STILL SUSPENDED LOWER IN THE WATER COLUMN.

ADDITIONAL GUIDANCE FOR ELEMENT 4

- OUTLET STRUCTURES THAT WITHDRAW IMPOUNDED STORMWATER FROM THE SURFACE TO AVOID DISCHARGING SEDIMENT THAT IS STILL SUSPENDED LOWER IN THE WATER COLUMN ARE FOR THE CONSTRUCTION PERIOD ONLY. IF INSTALLING A FLOATING PUMP STRUCTURE, INCLUDE A STOPPER TO PREVENT THE PUMP BASKET FROM HITTING THE BOTTOM OF THE POND.
- IF A SEDIMENT TRAPPING BMP UTILIZES A CONTROL STRUCTURE THAT WILL ALSO BE USED IN A PERMANENT DETENTION BMP APPLICATION, THE CONTROL STRUCTURE CONSTRUCTION MUST BE FINALIZED FOR THE PERMANENT BMP APPLICATION UPON PROJECT COMPLETION.
- INSTALL SEDIMENT CONTROLS IN A MANNER THAT PROTECTS THE SENSITIVE AREAS AND THEIR BUFFERS MARKED IN ACCORDANCE WITH ELEMENT 1: PRESERVE VEGETATION / MARK CLEARING LIMITS.
- WHERE FEASIBLE, DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION.
- SEED AND MULCH EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS ACCORDING TO THE TIMING INDICATED IN ELEMENT 5: STABILIZE SOILS.
- FULL STABILIZATION INCLUDES CONCRETE OR ASPHALT PAVING; QUARRY SPALLS USED AS DITCH LINING; OR THE USE OF ROLLED EROSION PRODUCTS, A BONDED FIBER MATRIX PRODUCT, OR VEGETATIVE COVER IN A MANNER THAT WILL FULLY PREVENT SOIL EROSION.
- THE LOCAL PERMITTING AUTHORITY MAY INSPECT AND APPROVE AREAS FULLY STABILIZED BY MEANS OTHER THAN PAVEMENT OR QUARRY SPALLS.

SUGGESTED BMPS FOR ELEMENT 4

- BMP C231: BRUSH BARRIER
- BMP C232: GRAVEL FILTER BERM
- BMP C233: SILT FENCE
- BMP C234: VEGETATED STRIP
- BMP C235: WATTLES
- BMP C240: SEDIMENT TRAP
- BMP C241: SEDIMENT POND (TEMPORARY)
- BMP C250: CONSTRUCTION STORMWATER CHEMICAL TREATMENT
- BMP C251: CONSTRUCTION STORMWATER FILTRATION

ELEMENT 5: STABILIZE SOILS

A. STABILIZE EXPOSED AND UNWORKED SOILS BY APPLICATION OF EFFECTIVE BMPS THAT PREVENT EROSION. APPLICABLE BMPS INCLUDE, BUT ARE NOT LIMITED TO: TEMPORARY AND PERMANENT SEEDING, SODDING, MULCHING, PLASTIC COVERING, EROSION CONTROL FABRICS AND MATTING, SOIL APPLICATION OF POLYACRYLAMIDE (PAM), THE EARLY APPLICATION OF GRAVEL BASE ON AREAS TO BE PAVED, AND DUST CONTROL.

B. CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION.

C. CONTROL STORMWATER DISCHARGES, INCLUDING BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND TO MINIMIZE DOWNSTREAM CHANNEL AND STREAM BANK EROSION.

D. SOILS MUST NOT REMAIN EXPOSED AND UNWORKED FOR MORE THAN THE TIME PERIODS SET FORTH BELOW TO PREVENT EROSION:

a. DURING THE DRY SEASON (MAY 1 - SEPTEMBER 30): 7 DAYS

b. DURING THE WET SEASON (OCTOBER 1 - APRIL 30): 2 DAYS

E. STABILIZE SOILS AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST.

F. STABILIZE SOIL STOCKPILES FROM EROSION, PROTECT WITH SEDIMENT TRAPPING MEASURES, AND WHERE POSSIBLE, LOCATE AWAY FROM STORM DRAIN INLETS, WATERWAYS AND DRAINAGE CHANNELS.

G. MINIMIZE THE AMOUNT OF SOIL EXPOSED DURING CONSTRUCTION ACTIVITY.

H. MINIMIZE THE DISTURBANCE OF STEEP SLOPES.

I. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

ADDITIONAL GUIDANCE FOR ELEMENT 5

- SOIL STABILIZATION BMPS SHOULD BE APPROPRIATE FOR THE TIME OF YEAR, SITE CONDITIONS, ESTIMATED DURATION OF USE, AND POTENTIAL WATER QUALITY IMPACTS THAT STABILIZATION AGENTS MAY HAVE ON DOWNSTREAM WATERS OR GROUND WATER.
- ENSURE THAT GRAVEL BASE USED FOR STABILIZATION IS CLEAN AND DOES NOT CONTAIN FINES OR SEDIMENT.

SUGGESTED BMPS FOR ELEMENT 5

- BMP C120: TEMPORARY AND PERMANENT SEEDING
- BMP C121: MULCHING
- BMP C122: NETS AND BLANKETS
- BMP C123: PLASTIC COVERING
- BMP C124: SODDING
- BMP C125: TOPSOILING / COMPOSTING
- BMP C126: POLYACRYLAMIDE (PAM) FOR SOIL EROSION PROTECTION
- BMP C130: SURFACE ROUGHENING
- BMP C131: GRADIENT TERRACES
- BMP C140: DUST CONTROL

ELEMENT 6: PROTECT SLOPES

A. DESIGN AND CONSTRUCT CUT-AND-FILL SLOPES IN A MANNER TO MINIMIZE EROSION. APPLICABLE PRACTICES INCLUDE, BUT ARE NOT LIMITED TO, REDUCING CONTINUOUS LENGTH OF SLOPE WITH TERRACING AND DIVERSIONS, REDUCING SLOPE STEEPNESS, AND ROUGHENING SLOPE SURFACES (FOR EXAMPLE, TRACK WALKING).

B. DIVERT OFF-SITE STORMWATER (RUN-ON) OR GROUND WATER AWAY FROM SLOPES AND DISTURBED AREAS WITH INTERCEPTOR DIKES, PIPES AND/OR SWALES. OFF-SITE STORMWATER SHOULD BE MAN- AGED SEPARATELY FROM STORMWATER GENERATED ON SITE.

C. AT THE TOP OF SLOPES, COLLECT DRAINAGE IN PIPE SLOPE DRAINS OR PROTECTED CHANNELS TO PREVENT EROSION. TEMPORARY PIPE SLOPE DRAINS MUST BE SIZED TO CONVEY THE FLOW RATE CALCULATED BY ONE OF THE FOLLOWING METHODS:

a. SINGLE EVENT HYDROGRAPH METHOD: THE PEAK VOLUMETRIC FLOW RATE CALCULATED USING A 10-MINUTE TIME STEP FROM A TYPE 1A, 10-YEAR, 24-HOUR FREQUENCY STORM.

OR

b. CONTINUOUS SIMULATION METHOD: THE 10-YEAR PEAK FLOW RATE, AS DETERMINED BY AN APPROVED CONTINUOUS RUNOFF MODEL WITH A 15-MINUTE TIME STEP.

D. THE HYDROLOGIC ANALYSIS MUST USE THE EXISTING LAND COVER CONDITION FOR PREDICTING FLOW RATES FROM TRIBUTARY AREAS OUTSIDE THE PROJECT LIMITS. FOR TRIBUTARY AREAS ON THE PROJECT SITE, THE ANALYSIS MUST USE THE TEMPORARY OR PERMANENT PROJECT LAND COVER CONDITION, WHICHEVER WILL PRODUCE THE HIGHEST FLOW RATES. IF USING THE WESTERN WASHINGTON HYDRO- LOGY MODEL (WWHM) TO PREDICT FLOWS, BARE SOIL AREAS SHOULD BE MODELED AS "LANDSCAPED" AREA.

E. PLACE EXCAVATED MATERIAL ON THE UPHILL SIDE OF TRENCHES, CONSISTENT WITH SAFETY AND SPACE CONSIDERATIONS.

F. PLACE CHECK DAMS AT REGULAR INTERVALS WITHIN CONSTRUCTED CHANNELS THAT ARE CUT DOWN A SLOPE.

ADDITIONAL GUIDANCE FOR ELEMENT 6

- CONSIDER SOIL TYPE AND ITS POTENTIAL FOR EROSION.
- STABILIZE SOILS ON SLOPES, AS SPECIFIED IN ELEMENT 5: STABILIZE SOILS.
- BMP COMBINATIONS ARE THE MOST EFFECTIVE METHOD OF PROTECTING SLOPES WITH DISTURBED SOILS. FOR EXAMPLE, USE BOTH BMP C121: MULCHING AND BMP C122: NETS AND BLANKETS IN COMBINATION.

SUGGESTED BMPS FOR ELEMENT 6

- BMP C120: TEMPORARY AND PERMANENT SEEDING
- BMP C121: MULCHING
- BMP C122: NETS AND BLANKETS
- BMP C123: PLASTIC COVERING
- BMP C124: SODDING
- BMP C130: SURFACE ROUGHENING
- BMP C131: GRADIENT TERRACES
- BMP C200: INTERCEPTOR DIKE AND SWALE
- BMP C201: GRASS-LINED CHANNELS
- BMP C203: WATER BARS
- BMP C204: PIPE SLOPE DRAINS
- BMP C205: SUBSURFACE DRAINS
- BMP C206: LEVEL SPREADER
- BMP C207: CHECK DAMS
- BMP C208: TRIANGULAR SILT DIKE (TSD)

ELEMENT 7: PROTECT DRAIN INLETS

A. PROTECT ALL STORM DRAIN INLETS MADE OPERABLE DURING CONSTRUCTION SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT.

B. CLEAN OR REMOVE AND REPLACE INLET PROTECTION DEVICES WHEN SEDIMENT HAS FILLED ONE-THIRD OF THE AVAILABLE STORAGE (UNLESS A DIFFERENT STANDARD IS SPECIFIED BY THE PRODUCT MANUFACTURER).

ADDITIONAL GUIDANCE FOR ELEMENT 7

PROTECT ALL EXISTING STORM DRAIN INLETS SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT.

- KEEP ALL APPROACH ROADS CLEAN. DO NOT ALLOW SEDIMENT AND STREET WASH WATER TO ENTER STORM DRAINS WITHOUT PRIOR AND ADEQUATE TREATMENT (AS DEFINED ABOVE) UNLESS TREATMENT IS PROVIDED BEFORE THE STORM DRAIN DISCHARGES TO WATERS OF THE STATE.
- INLETS SHOULD BE INSPECTED WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

SUGGESTED BMPS FOR ELEMENT 7

- BMP C220: INLET PROTECTION

ELEMENT 8: STABILIZE CHANNELS AND OUTLETS

A. DESIGN, CONSTRUCT, AND STABILIZE ALL ON-SITE CONVEYANCE CHANNELS TO PREVENT EROSION FROM THE FLOW RATE CALCULATED BY ONE OF THE FOLLOWING METHODS:

a. SINGLE EVENT HYDROGRAPH METHOD: THE PEAK VOLUMETRIC FLOW RATE CALCULATED USING A 10-MINUTE TIME STEP FROM A TYPE 1A, 10-YEAR, 24-HOUR FREQUENCY STORM.

OR

b. CONTINUOUS SIMULATION METHOD: THE 10-YEAR PEAK FLOW RATE, AS DETERMINED BY AN APPROVED CONTINUOUS RUNOFF MODEL WITH A 15-MINUTE TIME STEP.

THE HYDROLOGIC ANALYSIS MUST USE THE EXISTING LAND COVER CONDITION FOR PREDICTING FLOW RATES FROM TRIBUTARY AREAS OUTSIDE THE PROJECT LIMITS. FOR TRIBUTARY AREAS ON THE PROJECT SITE, THE ANALYSIS MUST USE THE TEMPORARY OR PERMANENT PROJECT LAND COVER CONDITION, WHICHEVER WILL PRODUCE THE HIGHEST FLOW RATES. IF USING THE WESTERN WASHINGTON HYDRO- LOGY MODEL (WWHM) TO PREDICT FLOWS, BARE SOIL AREAS SHOULD BE MODELED AS "LANDSCAPED" AREA.

B. PROVIDE STABILIZATION, INCLUDING ARMORING MATERIAL, ADEQUATE TO PREVENT EROSION OF OUTLETS, ADJACENT STREAM BANKS, SLOPES AND DOWNSTREAM REACHES AT THE OUTLETS OF ALL CONVEYANCE SYSTEMS.

ADDITIONAL GUIDANCE FOR ELEMENT 8

THE BEST METHOD FOR STABILIZING CHANNELS IS TO COMPLETELY LINE THE CHANNEL WITH BMP C122: NETS AND BLANKETS FIRST, THEN ADD BMP C207: CHECK DAMS AS NECESSARY TO FUNCTION AS AN ANCHOR AND TO SLOW THE FLOW OF WATER.

SUGGESTED BMPS FOR ELEMENT 8

- BMP C122: NETS AND BLANKETS
- BMP C202: RIPRAP CHANNEL LINING
- BMP C207: CHECK DAMS
- BMP C209: OUTLET PROTECTION

ELEMENT 9: CONTROL POLLUTANTS

DESIGN, INSTALL, IMPLEMENT AND MAINTAIN EFFECTIVE POLLUTION PREVENTION MEASURES TO MINIMIZE THE DISCHARGE OF POLLUTANTS. THE PROJECT PROPONENT MUST:

A. HANDLE AND DISPOSE OF ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS THAT OCCUR ON SITE IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER.

B. PROVIDE COVER, CONTAINMENT, AND PROTECTION FROM VANDALISM FOR ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCTS, AND OTHER MATERIALS THAT HAVE THE POTENTIAL TO POSE A THREAT TO HUMAN HEALTH OR THE ENVIRONMENT. ON-SITE FUELING TANKS MUST INCLUDE SECONDARY CONTAINMENT. SECONDARY CONTAINMENT MEANS PLACING TANKS OR CONTAINERS WITHIN AN IMPERVIOUS STRUCTURE CAPABLE OF CONTAINING 110% OF THE VOLUME CONTAINED IN THE LARGEST TANK WITHIN THE CONTAINMENT STRUCTURE. DOUBLE-WALLED TANKS DO NOT REQUIRE ADDITIONAL SECONDARY CONTAINMENT.

C. CONDUCT MAINTENANCE, FUELING, AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES USING SPILL PREVENTION AND CONTROL MEASURES. CLEAN CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY SPILL INCIDENT.

D. DISCHARGE WHEEL WASH OR TIRE BATH WASTEWATER TO A SEPARATE ON-SITE TREATMENT SYSTEM THAT PREVENTS DISCHARGE TO SURFACE WATER, OR TO THE SANITARY SEWER, WITH LOCAL SEWER DISTRICT APPROVAL.

E. APPLY FERTILIZERS AND PESTICIDES IN A MANNER AND AT APPLICATION RATES THAT WILL NOT RESULT IN LOSS OF CHEMICAL TO STORMWATER RUNOFF. FOLLOW MANUFACTURERS' LABEL REQUIREMENTS FOR APPLICATION RATES AND PROCEDURES.

F. USE BMPS TO PREVENT CONTAMINATION OF STORMWATER RUNOFF BY PH-MODIFYING SOURCES. THE SOURCES FOR THIS CONTAMINATION INCLUDE, BUT ARE NOT LIMITED TO: RECYCLED CONCRETE STOCKPILES, BULK CEMENT, CEMENT KILN DUST, FLY ASH, NEW CONCRETE WASHING AND CURING WATERS, WASTE STREAMS GENERATED FROM CONCRETE GRINDING AND SAWING, EXPOSED AGGREGATE PROCESSES, DEWATERING CONCRETE VAULTS, CONCRETE PUMPING AND MIXER WASHOUT WATERS.

G. ADJUST THE PH OF STORMWATER IF NECESSARY TO PREVENT VIOLATIONS OF WATER QUALITY STANDARDS.

H. ASSURE THAT WASHOUT OF CONCRETE TRUCKS IS PERFORMED OFF SITE OR IN DESIGNATED CONCRETE WASHOUT AREAS ONLY. DO NOT WASH OUT CONCRETE TRUCK DRUMS OR CONCRETE HANDLING EQUIPMENT ONTO THE GROUND, OR INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS. WASHOUT OF SMALL CONCRETE HANDLING EQUIPMENT MAY BE DISPOSED OF IN A FORMED AREA AWAITING CONCRETE WHERE IT WILL NOT CONTAMINATE SURFACE OR GROUND WATER. DO NOT DUMP EXCESS CONCRETE ON SITE, EXCEPT IN DESIGNATED CONCRETE WASHOUT AREAS. CONCRETE SPILLAGE OR CONCRETE DISCHARGE DIRECTLY TO GROUND WATER OR SURFACE WATERS OF THE STATE IS PROHIBITED. DO NOT WASH OUT TO FORMED AREAS AWAITING INFILTRATION BMPS.

I. OBTAIN WRITTEN APPROVAL FROM ECOLOGY BEFORE USING CHEMICAL TREATMENT OTHER THAN CO2, DRY ICE, OR FOOD GRADE VINEGAR TO ADJUST PH.

J. UNCONTAMINATED WATER FROM WATER-ONLY BASED SHAFT DRILLING FOR CONSTRUCTION OF BUILDING, ROAD, AND BRIDGE FOUNDATIONS MAY BE INFILTRATED PROVIDED THE WASTEWATER IS MANAGED IN A WAY THAT PROHIBITS DISCHARGE TO SURFACE WATERS. PRIOR TO INFILTRATION, WATER FROM WATER-ONLY BASED SHAFT DRILLING THAT COMES INTO CONTACT WITH CURING CONCRETE MUST BE NEUTRALIZED UNTIL PH IS IN THE RANGE OF 6.5 TO 8.5 (SU).

ADDITIONAL GUIDANCE FOR ELEMENT 9

- WHEEL WASH AND/OR TIRE BATH WASTEWATER CAN BE COMBINED WITH WASTEWATER FROM CONCRETE WASHOUT AREAS IF THE WASTEWATERS WILL BE PROPERLY DISPOSED OF AT AN OFFSITE LOCATION OR TREATMENT FACILITY.
- DO NOT USE UPLAND LAND APPLICATIONS FOR DISCHARGING WASTEWATER FROM CONCRETE WASHOUT AREAS.
- WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
- CONDUCT OIL CHANGES, HYDRAULIC SYSTEM DRAIN DOWN, SOLVENT AND DEGREASING CLEANING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS.
- CLEAN CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. EMERGENCY REPAIRS MAY BE PERFORMED ON-SITE USING TEMPORARY PLASTIC PLACED BENEATH AND, IF RAINING, OVER THE VEHICLE.

SUGGESTED BMPS FOR ELEMENT 9

- BMP C151: CONCRETE HANDLING
- BMP C152: SAWCUTTING AND SURFACING POLLUTION PREVENTION
- BMP C153: MATERIAL DELIVERY, STORAGE, AND CONTAINMENT
- BMP C154: CONCRETE WASHOUT AREA
- BMP C250: CONSTRUCTION STORMWATER CHEMICAL TREATMENT
- BMP C251: CONSTRUCTION STORMWATER FILTRATION
- BMP C252: TREATING AND DISPOSING OF HIGH PH WATER

ALSO SEE THE SOURCE CONTROL BMPS DETAILED IN VOLUME IV

ELEMENT 10: CONTROL DEWATERING

A. DISCHARGE FOUNDATION, VAULT, AND TRENCH DEWATERING WATER, WHICH HAVE SIMILAR CHARACTERISTICS TO STORMWATER RUNOFF AT THE SITE, INTO A CONTROLLED CONVEYANCE SYSTEM BEFORE DISCHARGE TO BMP C240: SEDIMENT TRAP OR BMP C241: SEDIMENT POND (TEMPORARY).

B. DISCHARGE CLEAN, NON-TURBID DEWATERING WATER, SUCH AS WELL-POINT GROUND WATER, TO SYSTEMS TRIBUTARY TO, OR DIRECTLY INTO SURFACE WATERS OF THE STATE, AS SPECIFIED IN ELEMENT 8: STABILIZE CHANNELS AND OUTLETS, PROVIDED THE DEWATERING FLOW DOES NOT CAUSE EROSION OR FLOODING OF RECEIVING WATERS. DO NOT ROUTE CLEAN DEWATERING WATER THROUGH STORMWATER SEDIMENT BMPS. NOTE THAT "SURFACE WATERS OF THE STATE" MAY EXIST ON A CONSTRUCTION SITE AS WELL AS OFF SITE; FOR EXAMPLE, A CREEK RUNNING THROUGH A SITE.

C. HANDLE HIGHLY TURBID OR OTHERWISE CONTAMINATED DEWATERING WATER SEPARATELY FROM STORM- WATER.

D. OTHER DEWATERING TREATMENT OR DISPOSAL OPTIONS MAY INCLUDE:

a. INFILTRATION.

b. TRANSPORT OFF SITE IN A VEHICLE, SUCH AS A VACUUM FLUSH TRUCK, FOR LEGAL DISPOSAL IN A MANNER THAT DOES NOT POLLUTE STATE WATERS.

c. ECOLOGY-APPROVED ON-SITE CHEMICAL TREATMENT OR OTHER SUITABLE TREATMENT TECHNOLOGIES.

d. SANITARY OR COMBINED SEWER DISCHARGE WITH LOCAL SEWER DISTRICT APPROVAL, IF THERE IS NO OTHER OPTION.

e. USE OF A SEDIMENTATION BAG THAT DISCHARGES TO A DITCH OR SWALE FOR SMALL VOLUMES OF LOCALIZED DEWATERING.

ADDITIONAL GUIDANCE FOR ELEMENT 10

- CHANNELS MUST BE STABILIZED, AS SPECIFIED IN ELEMENT 8: STABILIZE CHANNELS AND OUTLETS.
- CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM CAN CREATE HIGHLY TURBID OR CONTAMINATED DEWATERING WATER.
- DISCHARGING SEDIMENT-LADEN (MUDDY) WATER INTO WATERS OF THE STATE LIKELY CONSTITUTES VIOLATION OF WATER QUALITY STANDARDS FOR TURBIDITY. THE EASIEST WAY TO AVOID DISCHARGING MUDDY WATER IS THROUGH INFILTRATION AND PRESERVING VEGETATION.
- DEWATERING WATER FROM CONTAMINATED SITES MUST BE HANDLED SEPARATELY FROM STORMWATER. DIRECT CONTAMINATED STORMWATER TO A SANITARY SEWER WHERE ALLOWED BY THE LOCAL SEWER AUTHORITY, OR TO OTHER APPROVED TREATMENT.

SUGGESTED BMPS FOR ELEMENT 10

- BMP C203: WATER BARS
- BMP C236: VEGETATIVE FILTRATION

ELEMENT 11: MAINTAIN BMPS

A. MAINTAIN AND REPAIR ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BMPS AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION IN ACCORDANCE WITH BMP SPECIFICATIONS.

B. REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL BMPS WITHIN 30 DAYS AFTER ACHIEVING FINAL SITE STABILIZATION OR AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED.

ADDITIONAL GUIDANCE FOR ELEMENT 11

- SOME TEMPORARY EROSION AND SEDIMENT CONTROL BMPS ARE BIODEGRADABLE AND DESIGNED TO REMAIN IN PLACE FOLLOWING CONSTRUCTION. BMP C122: NETS AND BLANKETS IS AN EXAMPLE OF A BMP WITH BIODEGRADABLE OPTIONS.
- PROVIDE PROTECTION TO ALL BMPS INSTALLED FOR THE PERMANENT CONTROL OF STORMWATER FROM SEDIMENT AND COMPACTION. ALL BMPS THAT ARE TO REMAIN IN PLACE FOLLOWING COMPLETION OF CONSTRUCTION SHALL BE EXAMINED AND PLACED IN FULL OPERATING CONDITIONS. IF SEDIMENT ENTERS THE BMPS DURING CONSTRUCTION, IT SHALL BE REMOVED AND THE FACILITY SHALL BE RETURNED TO THE CONDITIONS SPECIFIED IN THE CONSTRUCTION DOCUMENTS.
- REMOVE OR STABILIZE TRAPPED SEDIMENT ON SITE. PERMANENTLY STABILIZE DISTURBED SOIL RESULTING FROM REMOVAL OF BMPS OR VEGETATION.

SUGGESTED BMPS FOR ELEMENT 11

- BMP C150: MATERIALS ON HAND
- BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD

ELEMENT 12: MANAGE THE PROJECT

A. PHASE DEVELOPMENT PROJECTS TO THE MAXIMUM DEGREE PRACTICABLE AND TAKE INTO ACCOUNT SEASONAL WORK LIMITATIONS.

B. INSPECT, MAINTAIN AND REPAIR ALL BMPS AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. PROJECTS REGULATED UNDER THE CONSTRUCTION STORMWATER GENERAL PERMIT (CSWGP) MUST CONDUCT SITE INSPECTIONS AND MONITORING IN ACCORDANCE WITH SPECIAL CONDITION S4 OF THE CSWGP.

C. MAINTAIN, UPDATE, AND IMPLEMENT THE CONSTRUCTION SWPPP.

D. PROJECTS THAT DISTURB ONE OR MORE ACRES MUST HAVE SITE INSPECTIONS CONDUCTED BY A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL). PROJECT SITES DISTURBING LESS THAN ONE ACRE MAY HAVE A CESCL OR A PERSON WITHOUT CESCL CERTIFICATION CONDUCT INSPECTIONS. BY THE INITIATION OF CONSTRUCTION, THE CONSTRUCTION SWPPP MUST IDENTIFY THE CESCL OR INSPECTOR, WHO MUST BE PRESENT ON SITE OR ON-CALL AT ALL TIMES.

ADDITIONAL GUIDANCE FOR ELEMENT 12

THE PROJECT MANAGER MUST ENSURE THAT THE PROJECT IS BUILT IN SUCH A WAY TO COMPLY WITH ALL CONSTRUCTION SWPPP ELEMENTS, AS DETAILED IN THIS SECTION. CONSIDERATIONS FOR THE PROJECT MANAGER INCLUDE, BUT ARE NOT LIMITED TO:

- CONSTRUCTION PHASING
- SEASONAL WORK LIMITATIONS
- COORDINATION WITH UTILITIES AND OTHER CONTRACTORS
- INSPECTION
- MONITORING
- MAINTAINING AN UPDATED CONSTRUCTION SWPPP

PHASING OF CONSTRUCTION

PHASE DEVELOPMENT PROJECTS WHERE FEASIBLE IN ORDER TO PREVENT SOIL EROSION AND TRANSPORTING OF SEDIMENT FROM THE SITE DURING CONSTRUCTION. REVEGETATE EXPOSED AREAS AND MAINTAIN THAT VEGETATION AS AN INTEGRAL PART OF THE CLEARING ACTIVITIES FOR ANY PHASE.

CLEARING AND GRADING ACTIVITIES FOR DEVELOPMENTS SHALL BE PERMITTED ONLY IF CONDUCTED USING AN APPROVED SITE DEVELOPMENT PLAN (E.G., SUBDIVISION APPROVAL) THAT ESTABLISHES PERMITTED AREAS OF CLEARING, GRADING, CUTTING, AND FILLING. MINIMIZE REMOVING TREES AND DISTURBING OR COMPACTING NATIVE SOILS WHEN ESTABLISHING PERMITTED CLEARING AND GRADING AREAS. SHOW ON THE SITE PLANS AND THE DEVELOPMENT SITE PERMITTED CLEARING AND GRADING AREAS AND ANY OTHER AREAS REQUIRED TO PRESERVE CRITICAL OR SENSITIVE AREAS, BUFFERS, NATIVE GROWTH PROTECTION EASEMENTS, OR TREE RETENTION AREAS AS MAY BE REQUIRED BY LOCAL JURISDICTIONS.

INSPECTION

ALL BMPS MUST BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. SITE INSPECTIONS MUST BE CONDUCTED BY A PERSON KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICES OF EROSION AND SEDIMENT CONTROL. THE PERSON MUST HAVE THE SKILLS TO 1) ASSESS THE SITE CONDITIONS AND CONSTRUCTION ACTIVITIES THAT COULD IMPACT THE QUALITY OF STORMWATER, AND 2) ASSESS THE EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES USED TO CONTROL THE QUALITY OF STORMWATER DISCHARGES.

FOR CONSTRUCTION SITES ONE ACRE OR LARGER THAT DISCHARGE STORMWATER TO SURFACE WATERS OF THE STATE, A CESCL MUST BE IDENTIFIED IN THE CONSTRUCTION SWPPP; THIS PERSON MUST BE ON-SITE OR ON-CALL AT ALL TIMES. CERTIFICATION MUST BE OBTAINED THROUGH AN APPROVED TRAINING PROGRAM THAT MEETS THE EROSION AND SEDIMENT CONTROL TRAINING STANDARDS ESTABLISHED BY ECOLOGY. SEE BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD.

APPROPRIATE BMPS OR DESIGN CHANGES SHALL BE IMPLEMENTED AS SOON AS POSSIBLE WHENEVER INSPECTION AND/OR MONITORING REVEALS THAT THE BMPS IDENTIFIED IN THE CONSTRUCTION SWPPP ARE INADEQUATE, DUE TO THE ACTUAL DISCHARGE OF /OR POTENTIAL TO DISCHARGE A SIGNIFICANT AMOUNT OF ANY POLLUTANT.

THE CESCL OR INSPECTOR MUST EXAMINE STORMWATER VISUALLY FOR THE PRESENCE OF SUSPENDED SEDIMENT, TURBIDITY, DISCOLORATION, AND OIL SHEEN. THEY MUST EVALUATE THE EFFECTIVENESS OF BMPS AND DETERMINE IF IT IS NECESSARY TO INSTALL, MAINTAIN, OR REPAIR BMPS TO IMPROVE THE QUALITY OF STORMWATER DISCHARGES.

BASED ON THE RESULTS OF THE INSPECTION, CONSTRUCTION SITE OPERATORS MUST CORRECT THE PROBLEMS IDENTIFIED BY:

- REVIEWING THE CONSTRUCTION SWPPP FOR COMPLIANCE WITH THE 13 ELEMENTS AND MAKING APPROPRIATE REVISIONS WITHIN 7 DAYS OF THE INSPECTION.
- IMMEDIATELY BEGINNING THE PROCESS OF FULLY IMPLEMENTING AND MAINTAINING APPROPRIATE SOURCE CONTROL AND/OR TREATMENT BMPS AS SOON AS POSSIBLE, ADDRESSING THE PROBLEMS NO LATER THAN WITHIN 10 DAYS OF THE INSPECTION. IF INSTALLATION OF NECESSARY TREATMENT BMPS IS NOT FEASIBLE WITHIN 10 DAYS, THE CONSTRUCTION SITE OPERATOR MAY REQUEST AN EXTENSION WITHIN THE INITIAL 10- DAY RESPONSE PERIOD.
- DOCUMENTING BMP IMPLEMENTATION AND MAINTENANCE IN THE SITE LOG BOOK (APPLIES ONLY TO SITES THAT HAVE COVERAGE UNDER THE CONSTRUCTION STORMWATER GENERAL PERMIT).

THE CESCL MUST INSPECT ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES, ALL BMPS, AND ALL STORMWATER DISCHARGE POINTS AT LEAST ONCE EVERY CALENDAR WEEK AND WITHIN 24 HOURS OF ANY DISCHARGE FROM THE SITE. (FOR PURPOSES OF THIS CONDITION, INDIVIDUAL DISCHARGE EVENTS THAT LAST MORE THAN ONE DAY DO NOT REQUIRE DAILY INSPECTIONS. FOR EXAMPLE, IF A STORMWATER POND DISCHARGES CONTINUOUSLY OVER THE COURSE OF A WEEK, ONLY ONE INSPECTION IS REQUIRED THAT WEEK.) THE CESCL OR INSPECTOR MAY REDUCE THE INSPECTION FREQUENCY FOR TEMPORARY STABILIZED, INACTIVE SITES TO ONCE EVERY CALENDAR MONTH

MAINTAINING AN UPDATED CONSTRUCTION SWPPP

CESCL CONTACT INFORMATION SHALL BE PROVIDED TO THE CITY OF FERNDALE AT OR BEFORE PRE-CONSTRUCION. THE CONSTRUCTION SWPPP WILL BE RETAINED ON-SITE AND WILL BE UPDATED ON A REGULAR BASIS. MODIFICATIONS TO THE CONSTRUCTION SWPPP WILL BE MADE WHENEVER THERE IS A SIGNIFICANT CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF ANY BMP.

RETAIN THE CONSTRUCTION SWPPP ON-SITE OR WITHIN REASONABLE ACCESS TO THE SITE.

MODIFY THE CONSTRUCTION SWPPP WHENEVER THERE IS A CHANGE IN THE DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE AT THE CONSTRUCTION SITE THAT HAS, OR COULD HAVE, A SIGNIFICANT EFFECT ON THE DISCHARGE OF POLLUTANTS TO WATERS OF THE STATE.

THE CONSTRUCTION SWPPP MUST BE MODIFIED IF, DURING INSPECTIONS OR INVESTIGATIONS CONDUCTED BY THE OWNER/OPERATOR, OR THE APPLICABLE LOCAL OR STATE REGULATORY AUTHORITY, IT IS DETERMINED THAT THE CONSTRUCTION SWPPP IS INEFFECTIVE IN ELIMINATING OR SIGNIFICANTLY MINIMIZING POLLUTANTS IN STORMWATER DIS- CHARGES FROM THE SITE. MODIFY THE CONSTRUCTION SWPPP AS NECESSARY TO INCLUDE ADDITIONAL OR MODIFIED BMPS DESIGNED TO CORRECT PROBLEMS IDENTIFIED. COMPLETE REVISIONS TO THE CONSTRUCTION SWPPP WITHIN SEVEN (7) DAYS FOLLOWING THE INSPECTION.

SUGGESTED BMPS FOR ELEMENT 12

- BMP C150: MATERIALS ON HAND
- BMP C160: CERTIFIED EROSION AND SEDIMENT CONTROL LEAD
- BMP C162: SCHEDULING

ELEMENT 13: PROTECT LOW IMPACT DEVELOPMENT BMPS

THE PRIMARY PURPOSE OF ON-SITE STORMWATER MANAGEMENT IS TO REDUCE THE DISRUPTION OF THE NATURAL SITE HYDROLOGY THROUGH INFILTRATION. BMPS USED TO MEET I-3.4.5 MR5: ON-SITE STORMWATER MANAGEMENT (OFTEN CALLED LID BMPS) ARE PERMANENT FACILITIES.

A. PROTECT ALL LID BMPS (INCLUDING, BUT NOT LIMITED TO BMP T7.30: BIORETENTION, BMP T5.14: RAIN GARDENS, AND BMP T5.15: PERMEABLE PAVEMENTS) FROM SEDIMENTATION THROUGH INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL BMPS ON PORTIONS OF THE SITE THAT DRAIN INTO THE LID BMPS. RESTORE THE BMPS TO THEIR FULLY FUNCTIONING CONDITION IF THEY ACCUMULATE SEDIMENT DURING CONSTRUCTION. RESTORING THE BMP MUST INCLUDE REMOVAL OF SEDIMENT AND ANY SEDIMENT-LADEN BIORETENTION/RAIN GARDEN SOILS, AND REPLACING THE REMOVED SOILS WITH SOILS MEETING THE DESIGN SPECIFICATION.

B. MAINTAIN THE INFILTRATION CAPABILITIES OF LID BMPS BY PROTECTING AGAINST COMPACTION BY CONSTRUCTION EQUIPMENT AND FOOT TRAFFIC. PROTECT COMPLETED LAWN AND LANDSCAPED AREAS FROM COMPACTION DUE TO CONSTRUCTION EQUIPMENT.

C. CONTROL EROSION AND AVOID INTRODUCING SEDIMENT FROM SURROUNDING LAND USES ONTO BMP T5.15: PERMEABLE PAVEMENTS. DO NOT ALLOW MUDDY CONSTRUCTION EQUIPMENT ON THE BASE MATERIAL OR PAVEMENT. DO NOT ALLOW SEDIMENT-LADEN RUNOFF ONTO PERMEABLE PAVEMENTS OR BASE MATERIALS.

D. PERMEABLE PAVEMENT FOULED WITH SEDIMENTS OR NO LONGER PASSING AN INITIAL INFILTRATION TEST MUST BE CLEANED USING PROCEDURES IN ACCORDANCE WITH THIS MANUAL OR THE MANUFACTURER'S PROCEDURES.

E. KEEP ALL HEAVY EQUIPMENT OFF EXISTING SOILS UNDER LID BMPS THAT HAVE BEEN EXCAVATED TO FINAL GRADE TO RETAIN THE INFILTRATION RATE OF THE SOILS.

ADDITIONAL GUIDANCE FOR ELEMENT 13

SEE CHAPTER 5: PRECISION SITE PREPARATION, CONSTRUCTION & INSPECTION OF LID FACILITIES IN THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND (HINMAN AND WULKAN, 2012) FOR MORE DETAIL ON PROTECTING LID INTEGRATED MANAGEMENT PRACTICES.

NOTE THAT THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND (HINMAN AND WULKAN, 2012) IS FOR ADDITIONAL INFORMATIONAL PURPOSES ONLY. YOU MUST FOLLOW THE GUIDANCE WITHIN THIS MANUAL IF THERE ARE ANY DISCREPANCIES BETWEEN THIS MANUAL AND THE LID TECHNICAL GUIDANCE MANUAL FOR PUGET SOUND

(HINMAN AND WULKAN, 2012).

SUGGESTED BMPS FOR ELEMENT 13

- BMP C102: BUFFER ZONES
- BMP C103: HIGH-VISIBILITY FENCE
- BMP C200: INTERCEPTOR DIKE AND SWALE
- BMP C201: GRASS-LINED CHANNELS
- BMP C207: CHECK DAMS
- BMP C208: TRIANGULAR SILT DIKE (TSD)
- BMP C231: BRUSH BARRIER
- BMP C233: SILT FENCE
- BMP C234: VEGETATED STRIP

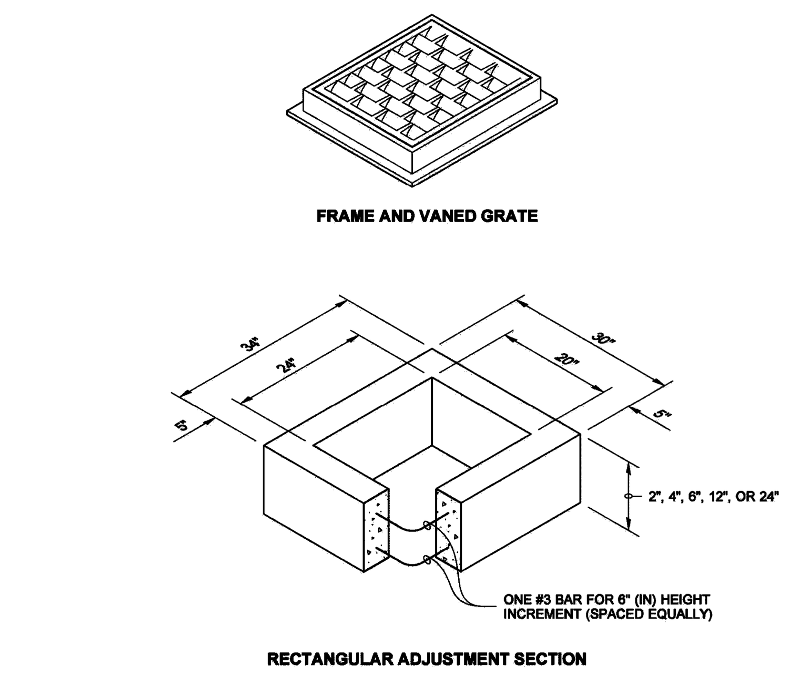
IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL
STATE OF WASHINGTON
51077
REGISTERED PROFESSIONAL ENGINEER
10-23-2023

ABC RECYCLING
STORMWATER POLUTION PROTECTION PLAN
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

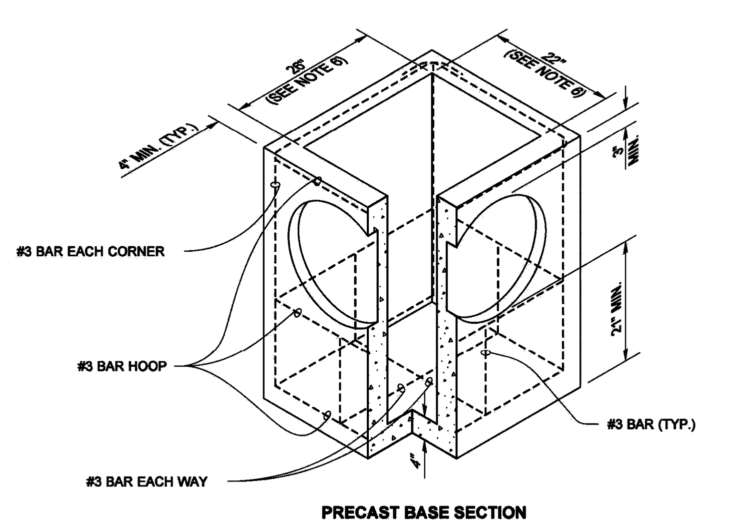


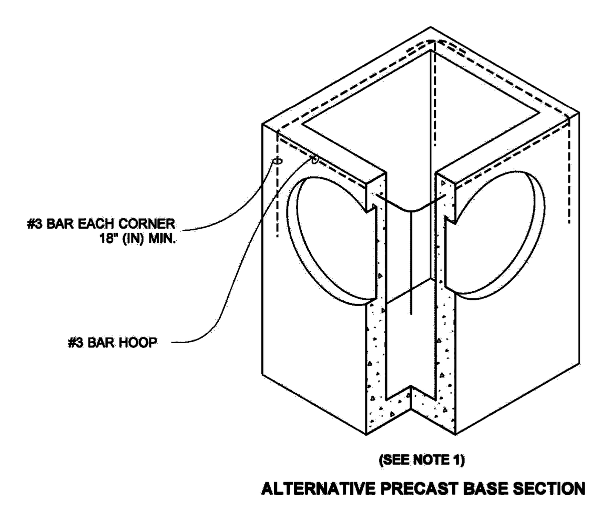
PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER (INCHES)
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP * (STD. SPEC. SECT. 9-05.20)	12"
SOLID WALL PVC (STD. SPEC. SECT. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. SECT. 9-05.12(2))	15"

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the **ALTERNATIVE PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3**.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1 : 24 or steeper.
6. The opening shall be measured at the top of the **Precast Base Section**.
7. All pickup holes shall be grouted full after the basin has been placed.





JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

Julie Heilman 2020.09.01 07:52:50 -07'00'

CATCH BASIN TYPE 1

STANDARD PLAN B-5.20-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

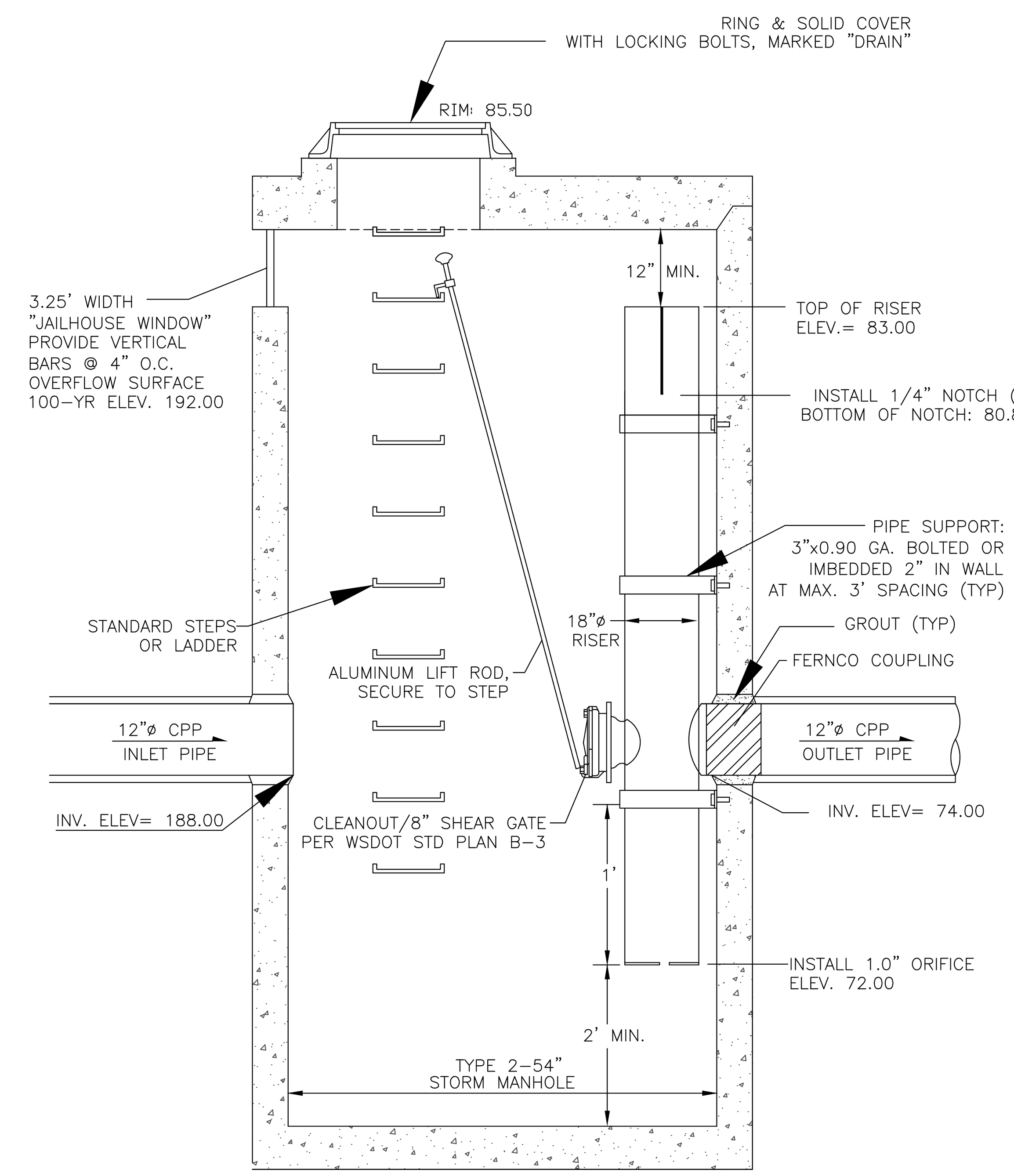
Roark, Steve Digitally signed by Roark, Steve Date: 2020.09.09 09:46:23 -07'00'

STATE DESIGN ENGINEER

Washington State Department of Transportation

CATCH BASIN TYPE 1

NTS



CONTROL STRUCTURE

NTS

NOTES:

THE PIPE SUPPORTS AND THE FLOW RESTRICTOR SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND BE ANCHORED AT A MAXIMUM SPACING OF 36" (IN). ATTACH THE PIPE SUPPORTS TO THE MANHOLE WITH 5/8" (IN) STAINLESS STEEL EXPANSION BOLTS OR EMBED THE SUPPORTS INTO THE MANHOLE WALL 2" (IN).

THE VERTICAL RISER STEM OF THE FLOW RESTRICTOR SHALL BE THE SAME DIAMETER AS THE HORIZONTAL OUTLET PIPE.

THE FLOW RESTRICTOR SHALL BE FABRICATED FROM ONE OF THE FOLLOWING MATERIALS:

0.060" (IN) CORRUGATED ALUMINUM ALLOY DRAIN PIPE
0.064" (IN) CORRUGATED GALVANIZED STEEL DRAIN PIPE WITH TREATMENT 1
0.064" (IN) CORRUGATED ALUMINIZED STEEL DRAIN PIPE
0.060" (IN) ALUMINUM ALLOY FLAT SHEET, IN ACCORDANCE WITH ASTM B 209, 5052 H32 OR EPS
HIGH DENSITY POLYETHYLENE STORM SEWER PIPE

THE FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT: THE SHEAR GATE IS VISIBLE FROM THE TOP; THE CLIMB-DOWN SPACE IS CLEAR OF THE RISER AND GATE; THE FRAME IS CLEAR OF THE CURB.

THE SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26 AND ASTM B 275, DESIGNATION ZG32A; OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B.

THE LIFT HANDLE SHALL BE MADE OF A SIMILAR METAL TO THE GATE (TO PREVENT GALVANIC CORROSION), IT MAY BE OF SOLID ROD OR HOLLOW TUBING, WITH ADJUSTABLE HOOK AS REQUIRED.

A NEOPRENE RUBBER GASKET IS REQUIRED BETWEEN THE RISER MOUNTING FLANGE AND THE GATE FLANGE.

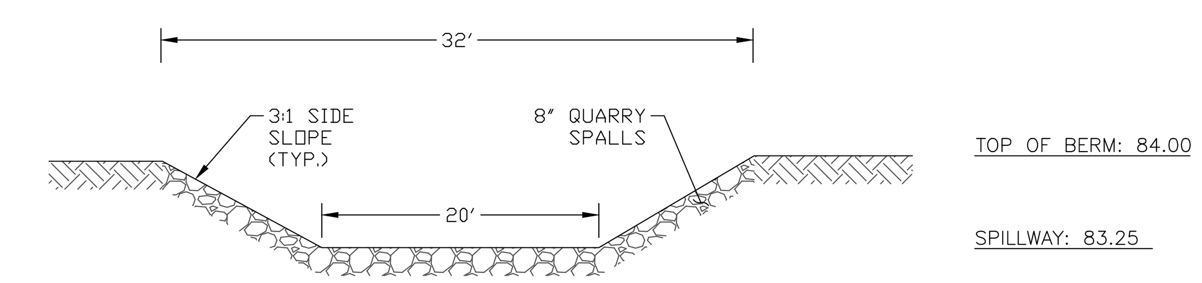
INSTALL THE GATE SO THAT THE LEVEL-LINE MARK IS LEVEL WHEN THE GATE IS CLOSED.

THE MATING SURFACES OF THE LID AND THE BODY SHALL BE MACHINED FOR PROPER FIT.

ALL SHEAR GATE BOLTS SHALL BE STAINLESS STEEL.

THE SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, A STOP TAB, OR SOME OTHER DEVICE.

ALTERNATIVE SHEAR GATE DESIGNS ARE ACCEPTABLE IF MATERIAL SPECIFICATIONS ARE MET.

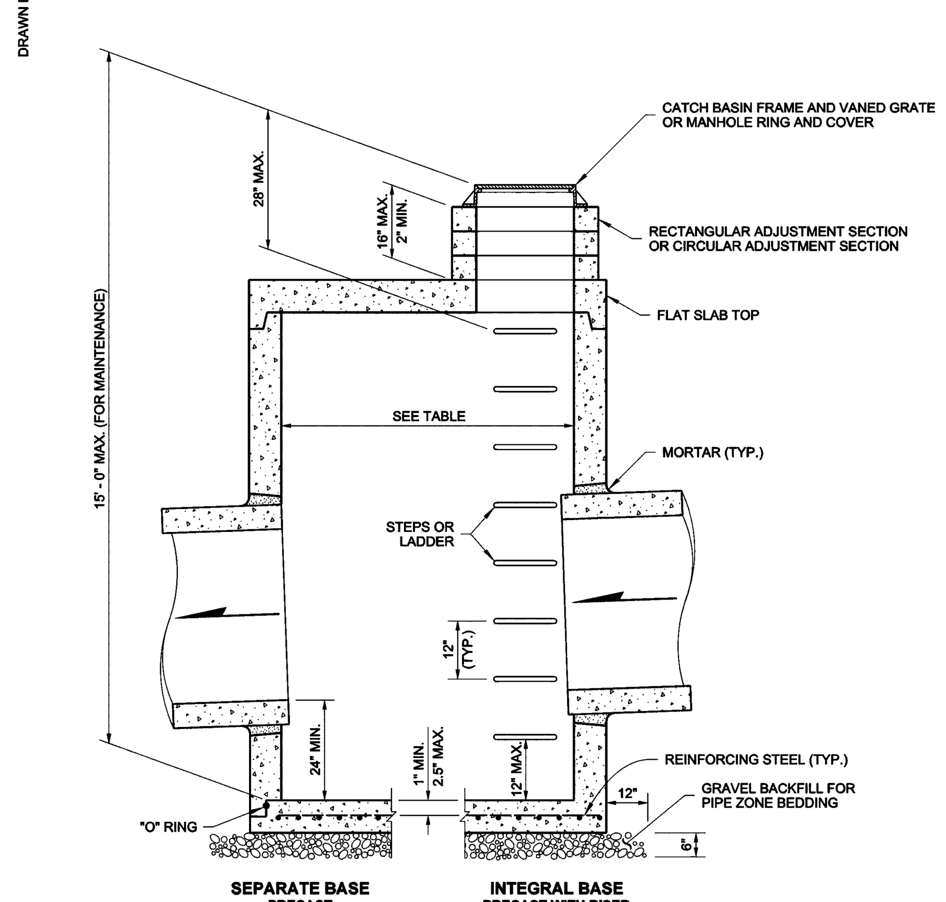


EMERGENCY OVERFLOW SPILLWAY DETAIL

NTS

NOTES

1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3.**



CATCH BASIN DIMENSIONS				
CATCH BASIN DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
54"	4.5"	8"	42"	8"
60"	5"	8"	48"	8"
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	8"	12"	84"	12"
120"	10"	12"	96"	12"
144"	12"	12"	108"	12"

PIPE ALLOWANCES					
CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER				
	CONCRETE	ALL METAL	CPSSP ① PP ④	SOLID WALL PVC ②	PROFILE WALL PVC ③
48"	24"	30"	24"	30"	30"
54"	30"	36"	30"	36"	36"
60"	36"	42"	36"	42"	42"
72"	42"	54"	42"	48"	48"
84"	54"	60"	54"	48"	48"
96"	60"	72"	60"	48"	48"
120"	66"	84"	60"	48"	48"
144"	78"	96"	60"	48"	48"

① Corrugated Polyethylene Storm Sewer Pipe (See **Standard Specification Section 9-05.20**)
② (See **Standard Specification Section 9-05.12(1)**)
③ (See **Standard Specification Section 9-05.12(2)**)
④ Polypropylene Pipe (See **Standard Specification Section 9-05.24**)

JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

Heilman, Julie Feb 20 2018 12:49 PM cosign

CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-02

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

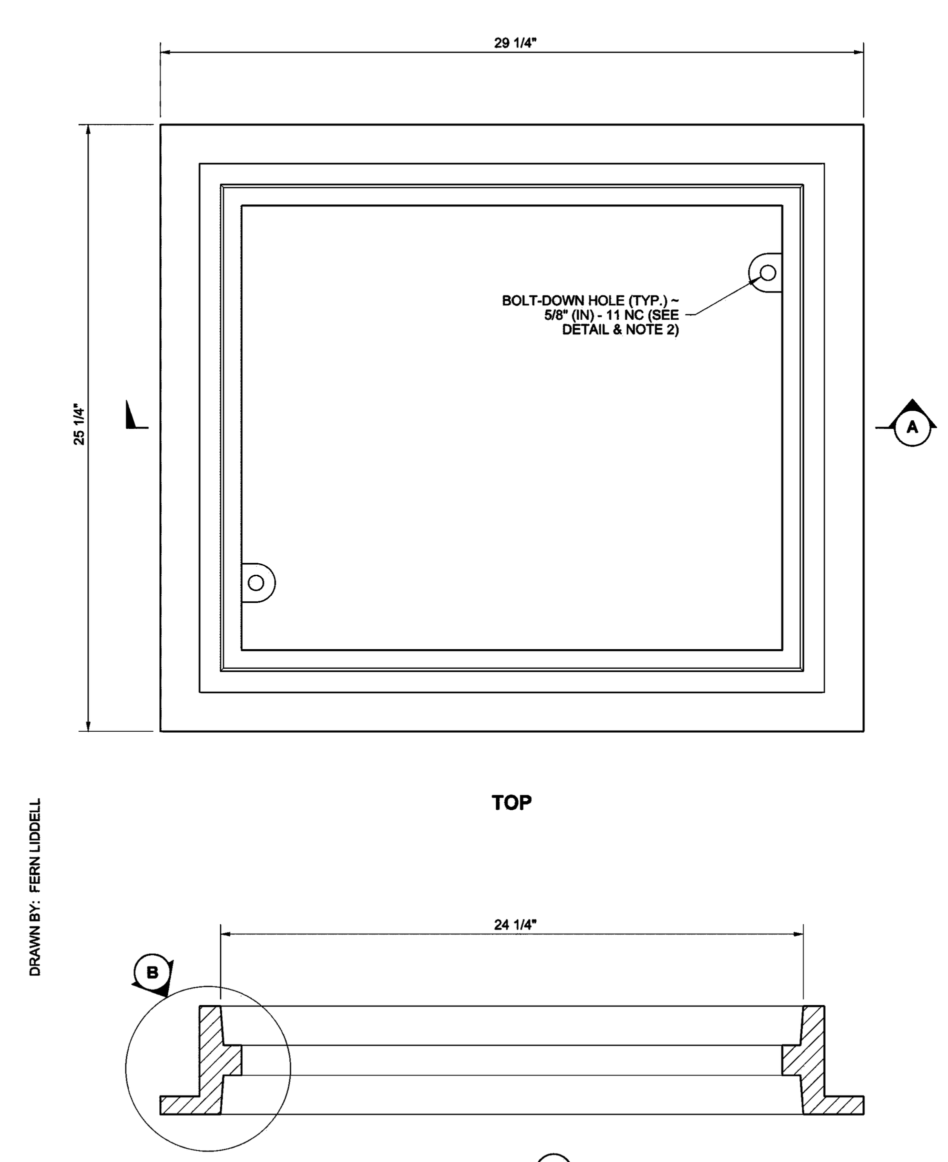
Carpenter, Jeff Mar 2 2018 10:01 AM cosign

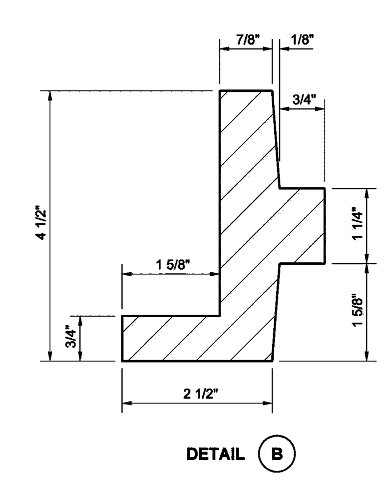
STATE DESIGN ENGINEER

Washington State Department of Transportation

CATCH BASIN TYPE 2

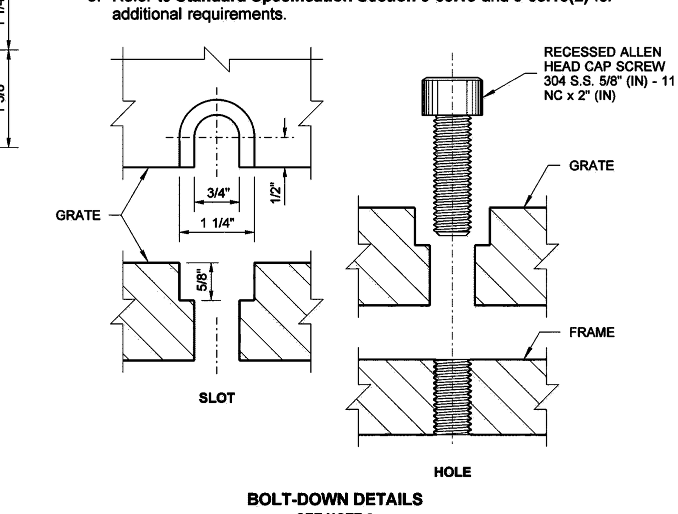
NTS

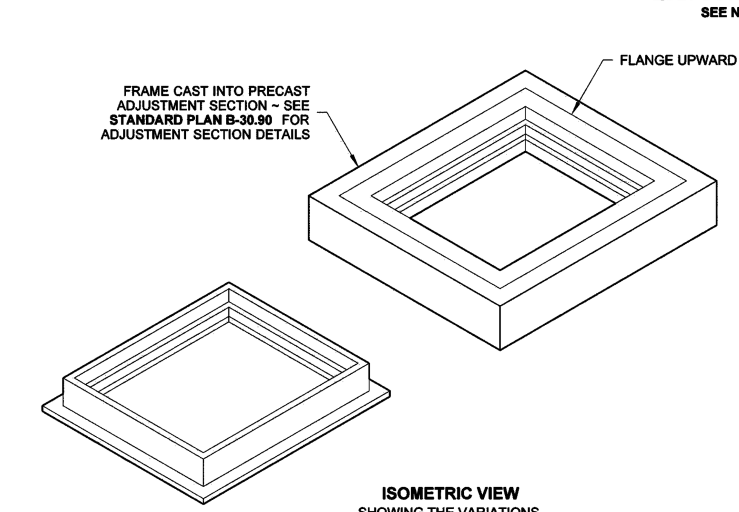




NOTES

1. This frame is designed to accommodate 20" (in) × 24" (in) grates or covers as shown on **Standard Plans B-30.20, B-30.30, B-30.40,** and **B-30.50.**
2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.





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Heilman, Julie Feb 20 2018 12:52 PM cosign

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-03

SHEET 1 OF 1 SHEET

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Carpenter, Jeff Mar 2 2018 7:53 AM

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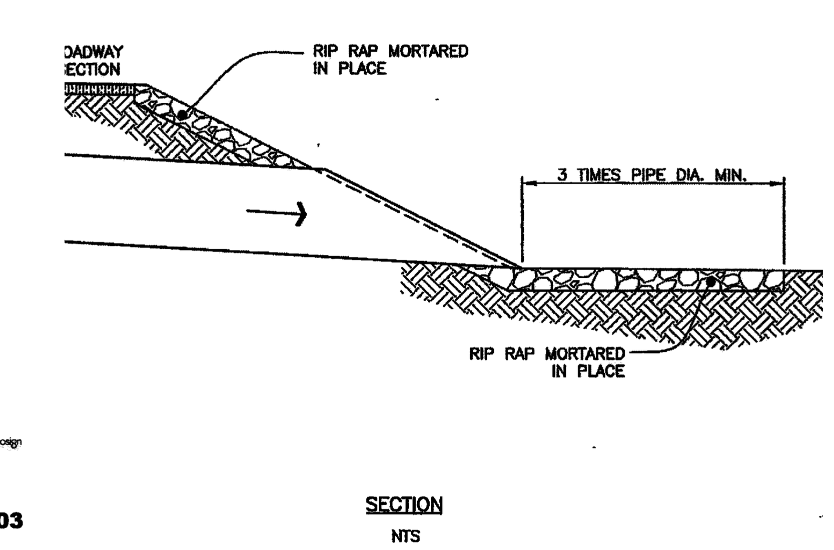
Washington State Department of Transportation

RECTANGULAR FRAME (REVERSIBLE)

NTS

NOTES:

1. INSTALL STRAW ROLLS ON SLOPES GREATER THAN .
2. INSTALL ALONG OUTER EXTENT OF CRITICAL AREAS BUFFER AT MINIMUM. TARGET TOE OF SLOPE AREAS WHERE FILL FROM JAMES STREET IS TO BE INSTALLED AT 3:1 MAXIMUM SLOPE.
3. SEE PLAN VIEW FOR ANTICIPATED INSTALLATION LOCATIONS(S).



STORM PIPE OUTLET PROTECTION

NTS

IMPACT DESIGN

5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODALL STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

03.15.2022

ABC RECYCLING
STORM DRAIN DETAILS-1

PLAN SET (10-23-2023)

741 MARINE DRIVE

BELLINGHAM, WASHINGTON 98226

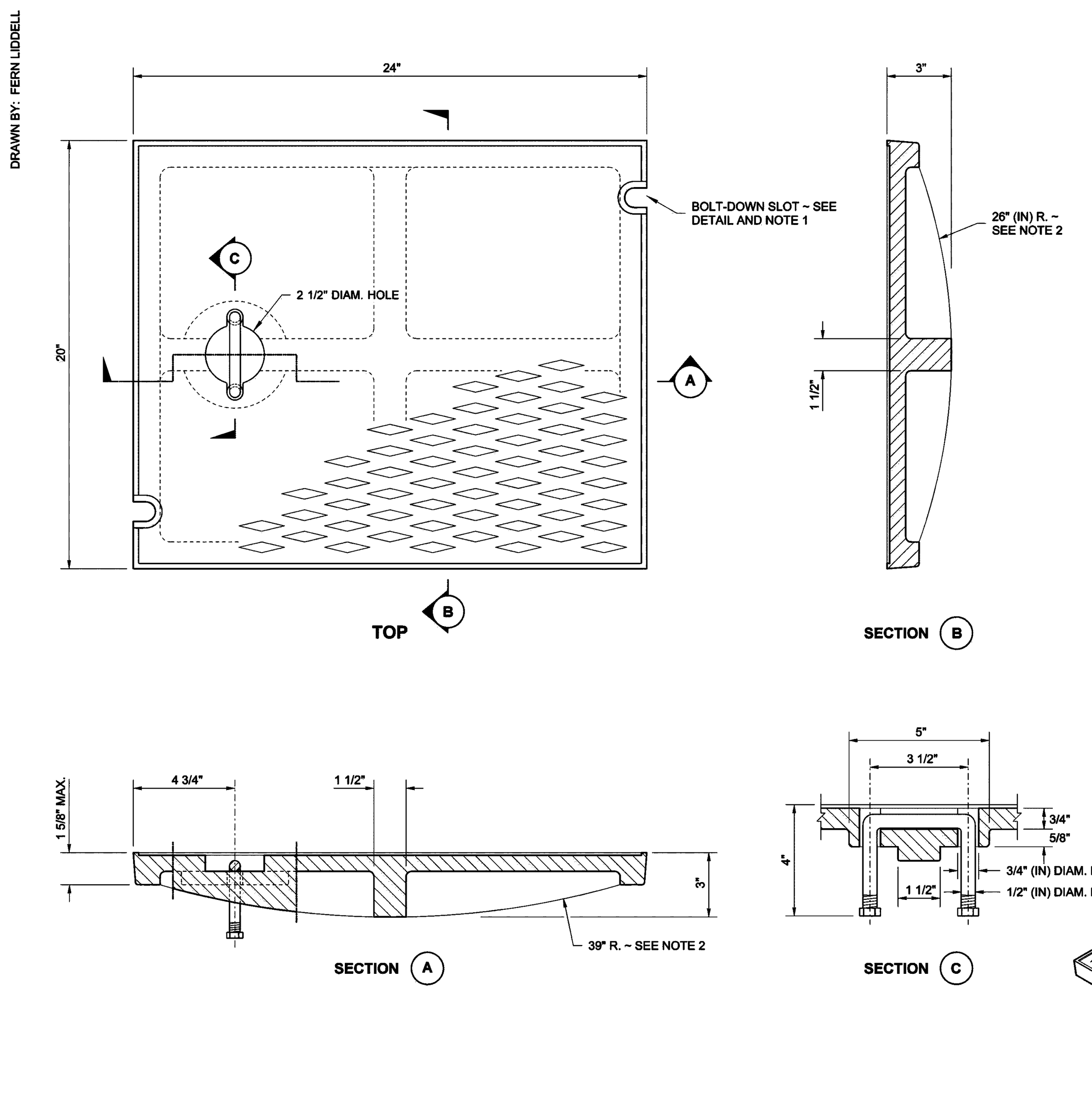
REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

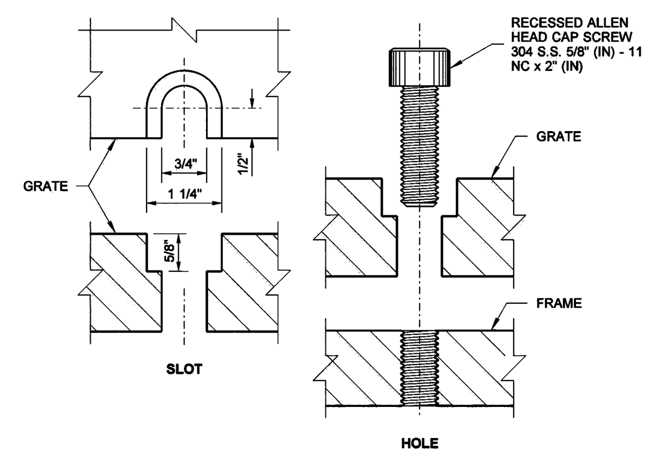
CHECKED BY: SIG

ISSUE DATE: 10-23-2023

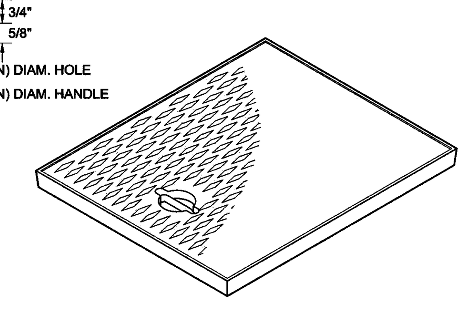


NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Alternative reinforcing designs are acceptable in lieu of the rib design.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.
4. For frame details, see **Standard Plan B-30.10.**



BOLT-DOWN DETAILS
SEE NOTE 1



ISOMETRIC

JULIE HEILMAN
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
Heilman, Julie
Feb 20 2018 12:53 PM

RECTANGULAR SOLID METAL COVER
STANDARD PLAN B-30.20-04
SHEET 1 OF 1 SHEET
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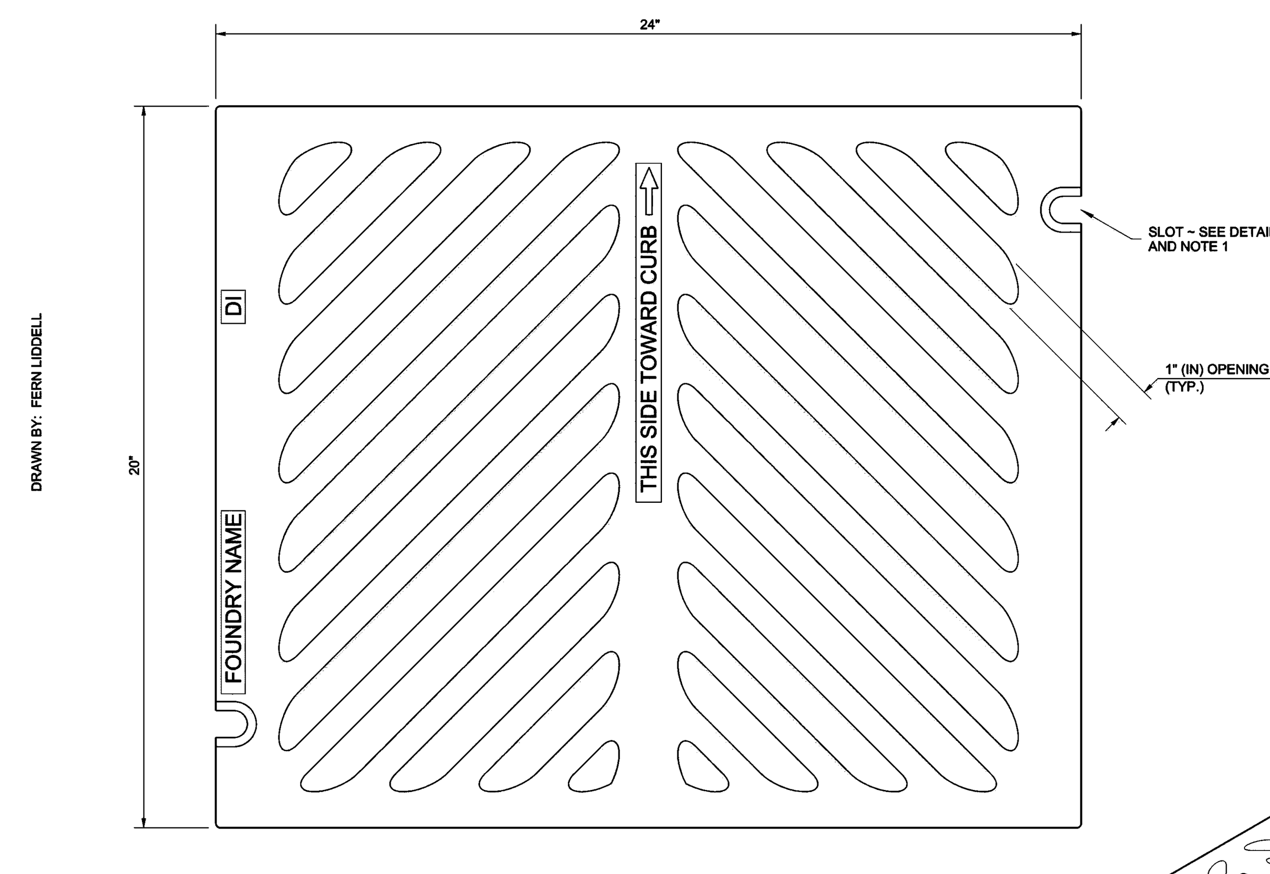
Carpenter, Jeff
Feb 27 2018 7:27 AM
STATE DESIGN ENGINEER
Washington State Department of Transportation

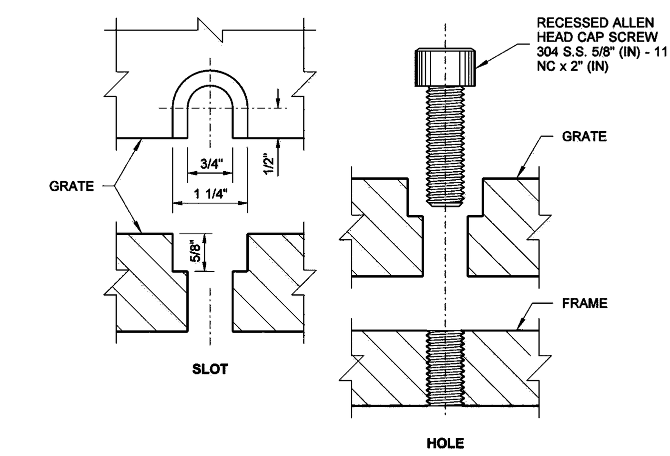
RECTANGULAR SOLID METAL COVER
NTS



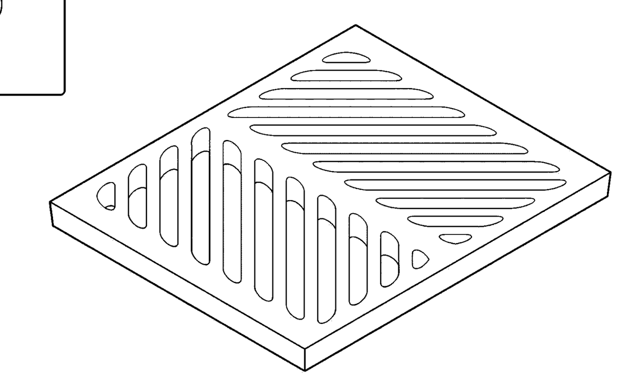
TOP

NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Refer to **Standard Specification section 9-05.15,** and **9-05.15(2)** for additional requirements.
3. For frame details, see **Standard Plan B-30.10**.
4. The thickness of the grate shall not exceed 1 5/8" (in).



BOLT-DOWN DETAILS
SEE NOTE 1

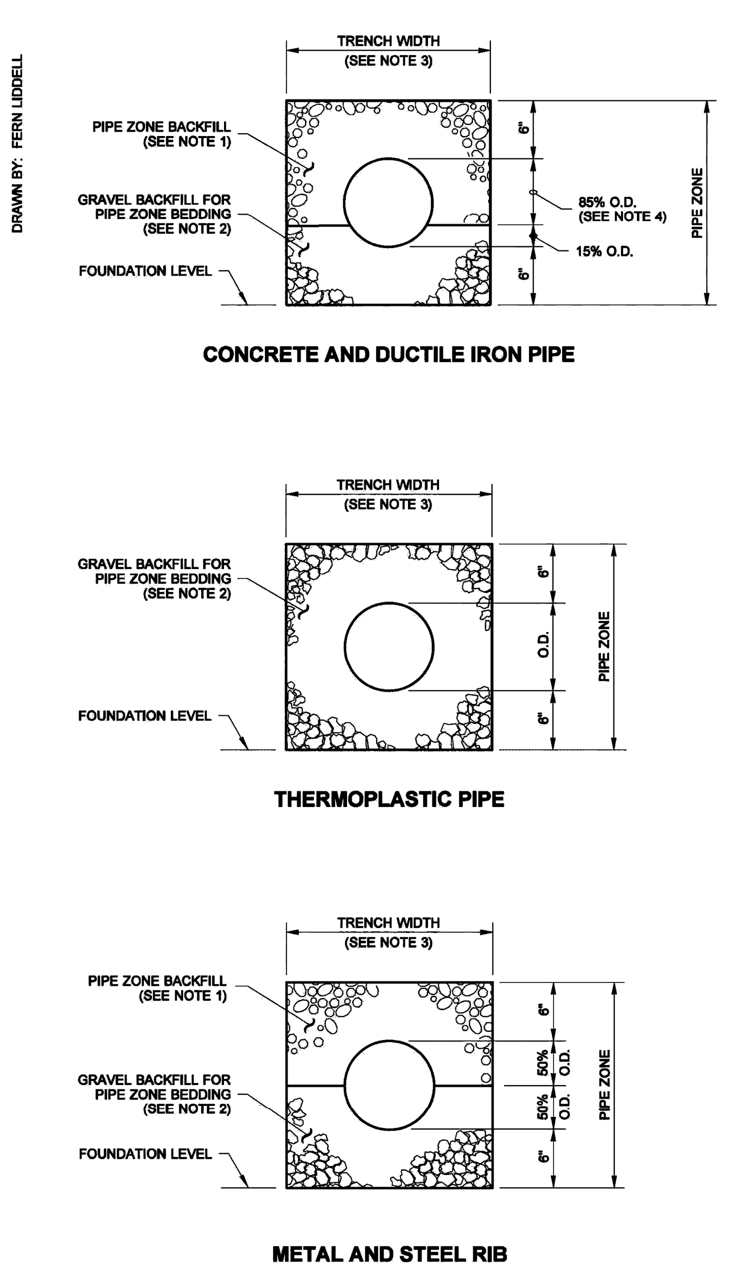


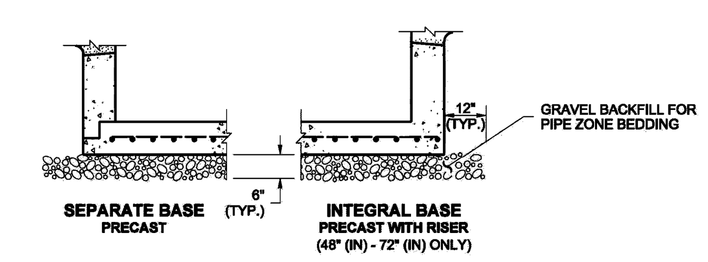
ISOMETRIC

JULIE HEILMAN
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
Heilman, Julie
Feb 20 2018 12:55 PM

RECTANGULAR HERRINGBONE GRATE
STANDARD PLAN B-30.50-03
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

RECTANGULAR HERRINGBONE GRATE
NTS

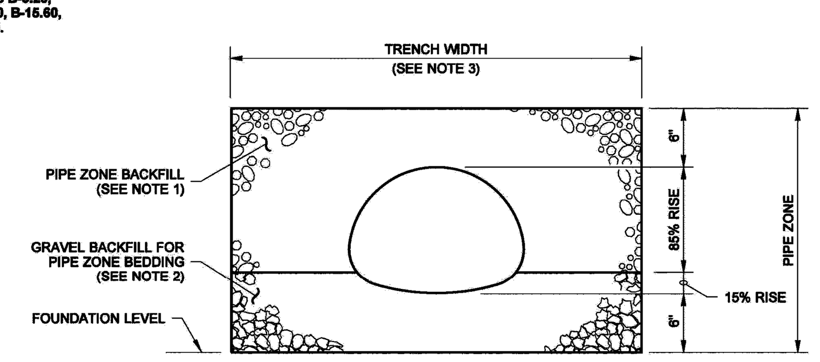




TYPICAL CONDITION FOR DRAINAGE STRUCTURE
THIS DETAIL APPLIES TO STANDARD PLANS B-5.20, B-5.40, B-5.60, B-10.20, B-10.40, B-15.20, B-15.40, B-15.60, B-25.20, B-25.60, B-35.20 AND B-35.40.

NOTES

1. See **Standard Specifications Section 7-08.3(3)** for Pipe Zone Backfill.
2. See **Standard Specifications Section 9-03.12(3)** for Gravel Backfill for Pipe Zone Bedding.
3. See **Standard Specifications Section 2-09.4** for Measurement of Trench Width.
4. For sanitary sewer installation, concrete pipe shall be imbedded to spring line.



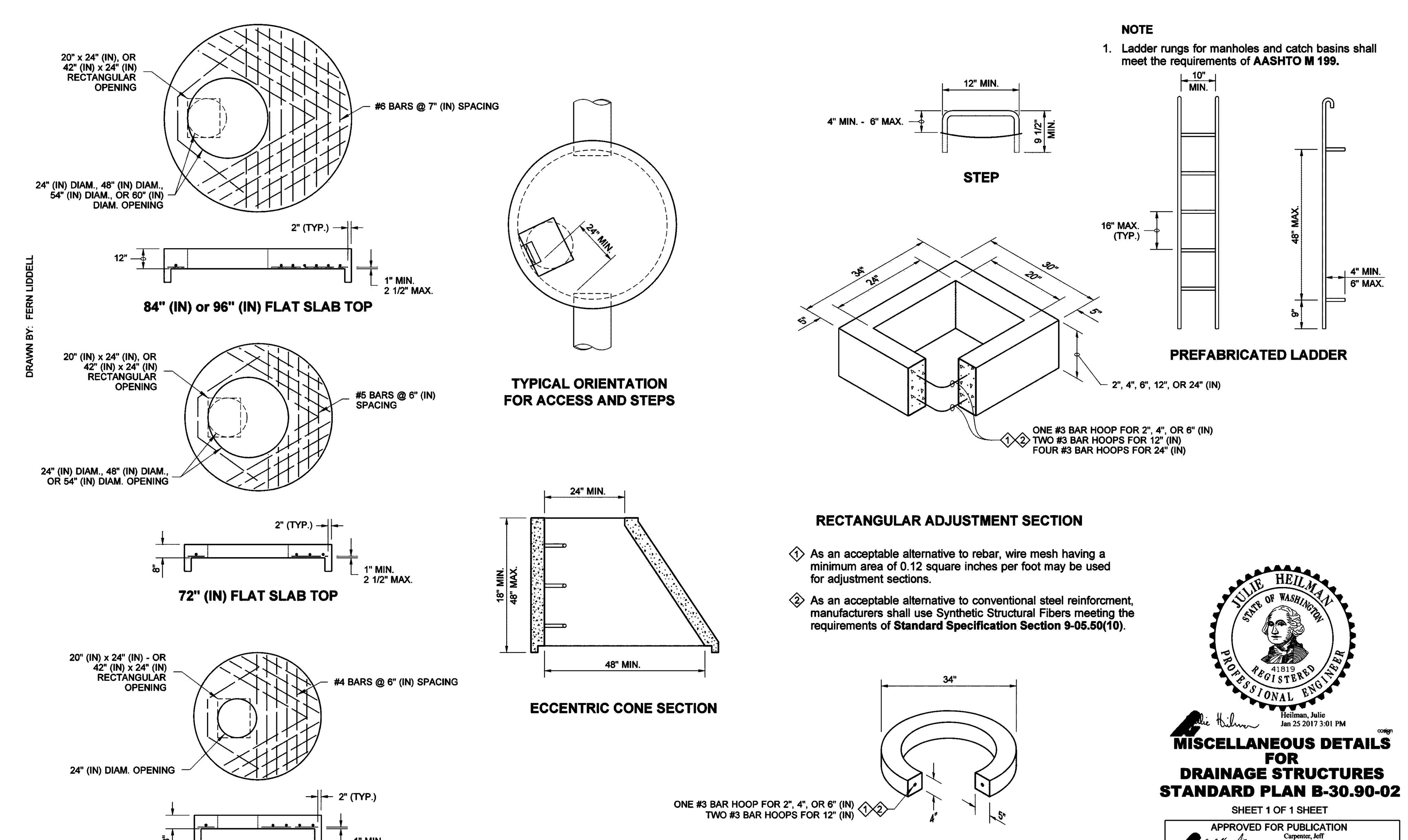
PIPE ARCHES

CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS		
PIPE	SIZE	MINIMUM DISTANCE BETWEEN BARRELS
CIRCULAR PIPE (DIAMETER)	UP TO 48"	24"
METAL PIPE ARCH (SPAN)	48" AND LARGER	DIAMETER/2 OR 36" WHICHEVER IS LESS

JULIE HEILMAN
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
Aug 17, 2021

PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-55.20-03
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
Aug 17, 2021
STATE DESIGN ENGINEER
Washington State Department of Transportation

PIPE ZONE BEDDING AND BACKFILL
NTS



NOTE

1. Ladder rungs for manholes and catch basins shall meet the requirements of **AASHTO M 199.**

RECTANGULAR ADJUSTMENT SECTION

1. As an acceptable alternative to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used for adjustment sections.
2. As an acceptable alternative to conventional steel reinforcment, manufacturers shall use Synthetic Structural Fibers meeting the requirements of **Standard Specification Section 9-05.50(10)**.

CIRCULAR ADJUSTMENT SECTION
For rectangular and circular adjustment sections, approved alternate material compositions are acceptable in lieu of precast concrete designs

JULIE HEILMAN
STATE OF WASHINGTON
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Heilman, Julie
Jan 23 2017 3:01 PM

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES
STANDARD PLAN B-30.90-02
SHEET 1 OF 1 SHEET
APPROVED FOR PUBLICATION
STATE DESIGN ENGINEER
Washington State Department of Transportation

MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES
NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-399-8138 WWW.BOLD-IMPACT.COM

SCOTT IAN GOODELL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
03.15.2022

ABC RECYCLING
STORM DRAIN DETAILS-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

GRATING PACIFIC

ACO DRAIN - KLASSIKDRAIN K300/KS300

Polymer Concrete Catch Basins

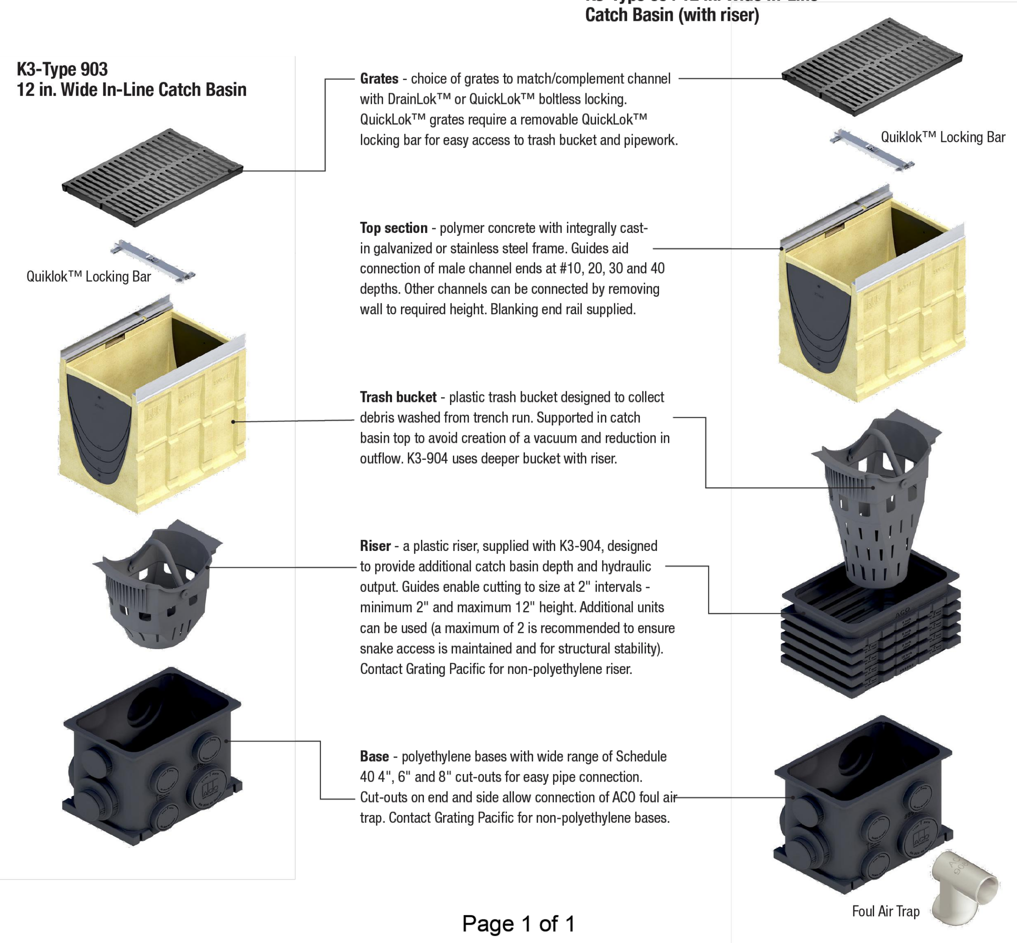
Polymer concrete catch basins are used either as stand alone area drains or more commonly as the outlet to a trench run. They provide the highest hydraulic output and allow easy access to the pipe system for maintenance.

In-line Type 903 and 904 catch basins same width and visually indistinguishable from trench run.

K300 Catch Basins Parts Table

Part Description	Part No. K300	Part No. KS300	Volume Gallons*	Weight lbs.
K3-903 in-line catch basin - 19.69"	94614	94615	30.4	88.0
K3-904 in-line catch basin - 19.69"	94635	94636	40.2	98.0
Series 600 optional riser	99902		9.8	10.0
Foul air trap - fits both 902 & 600 basins	90854		—	1.2

*Volume is up to grate seat and without trash bucket.



Page 1 of 1

GRATING PACIFIC

Locking mechanism; Compliant with Americans with Disabilities Act of 1990 Section 4.5.5; ASME A112.6.3 - 2001 Heel resistant less than 0.31" (8mm); Heel safe equal or less than 0.25" (6.5mm); Bicycle Safe compliant to Australian Standard AS 3996 - 2006; Anti-slip grates - BPN over 24

KLASSIKDRAIN K300/KS300 DRAINLOK™ GRATES

Description	Part No.	Length in.	Slot Size in.	Intake Area sq. in.	Wgt. lbs.	Locking mechanism	ADA	Heel resistant	Heel safe	Bicycle safe	Anti-slip
LOAD CLASS A - 3,500 LBS. - EN 1433 (58 PSI) PEDESTRIAN											
LONGITUDINAL STAINLESS											
Type 847D - stainless	142223	39.37"	0.81 x 0.24	263.2	28.6	DL	✔	✔	✔	✔	51.3
Type 848D - stainless	142224	19.69"	0.81 x 0.24	131.6	14.5	DL	✔	✔	✔	✔	51.3
Grade 304 stainless steel											
LOAD CLASS B - 28,000 LBS. - EN 1433 (483 PSI) LIGHT DUTY											
PERFORATED SLOTTED STEEL											
Type 811D - galvanized	138090	39.37"	0.25 dia.	64.8	30.9	DL	✔	✔	✔	✔	22.6
Type 813D - galvanized	138091	19.69"	0.25 dia.	31.9	15.0	DL	✔	✔	✔	✔	22.6
Type 865D - stainless*	138092	39.37"	0.25 dia.	64.8	30.9	DL	✔	✔	✔	✔	29.6
Type 866D - stainless*	138093	19.69"	0.25 dia.	31.9	15.0	DL	✔	✔	✔	✔	29.6
Grade 304 stainless steel											
LOAD CLASS C - 56,000 LBS. - EN 1433 (967 PSI) COMMERCIAL VEHICLE											
MESH STEEL											
Type 805D - galvanized	13819	19.69"	0.63 x 0.87	163.7	29.5	DL	✘	✘	✘	✔	52.1
Type 830D - stainless*	13849	19.69"	0.63 x 0.87	163.7	29.5	DL	✘	✘	✘	✔	41.3
Grade 304 stainless steel											
SLOTTED IRON											
Type 860D - iron	13870	19.69"	0.47 x 2.57 avg	88.1	38.0	DL	✘	✘	✘	✔	31.5
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
LONGITUDINAL IRON											
Type 876D - iron	99588	19.69"	1.97 x 0.24	64.3	35.8	DL	✔	✔	✔	✔	25.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
WAVE IRON											
Type 880D - iron	99581	19.69"	0.27 x 0.9 avg	88.5	48.0	DL	✔	✔	✘	✔	26.6
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											

DrainLok™ - Boltless & Barless Locking System

1. Position grate onto channel and align anti-shunt detail with recess in rail.
2. Push down or stand on grate until it clicks into position.
3. To remove first grate, insert grate removal tool into slots at end of grate, pull up sharply. Remaining grates can be removed by hand.

Page 1 of 2

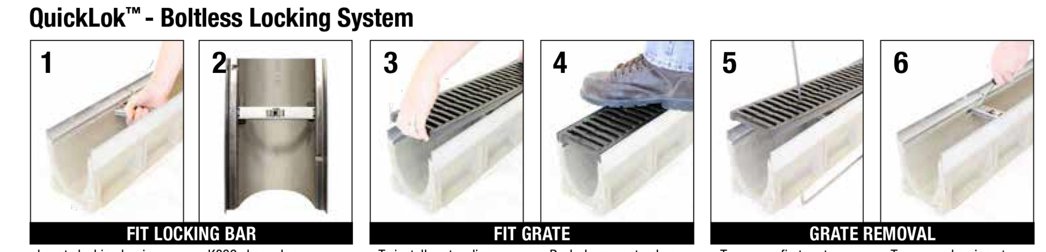
GRATING PACIFIC

Locking mechanism; Compliant with Americans with Disabilities Act of 1990 Section 4.5.5; ASME A112.6.3 - 2001 Heel resistant less than 0.31" (8mm); Heel safe equal or less than 0.25" (6.5mm); Bicycle Safe compliant to Australian Standard AS 3996 - 2006; Anti-slip grates - BPN over 24

KLASSIKDRAIN K300/KS300 QUICKLOK™ GRATES

Description	Part No.	Length in.	Slot Size in.	Intake Area sq. in.	Wgt. lbs.	Locking mechanism	ADA	Heel resistant	Heel safe	Bicycle safe	Anti-slip
LOAD CLASS C - 56,000 LBS. - EN 1433 (967 PSI) COMMERCIAL VEHICLE											
DECORATIVE STEEL											
Type 881Q - iron	93950	19.69"	0.29 x 0.43 avg	54.6	47.0	QL	✔	✘	✘	✔	38.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
MOSAIC IRON											
Type 879Q - iron	93958	19.69"	0.30 x 0.98 avg	47.0	47.3	QL	✔	✘	✘	✔	24.6
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
LOAD CLASS E - 135,000 LBS. - EN 1433 (2,321 PSI) INDUSTRIAL											
LONGITUDINAL IRON											
Type 878Q - iron	138130	19.69"	1.0 x 0.31	61.8	52.9	QL	✔	✔	✔	✔	25.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											
SLOTTED IRON											
Type 861Q - iron	10431	19.69"	0.39 x 5.71	97.0	56.0	QL	✘	✘	✘	✔	50.8
Ductile iron to ASTM A 536-84 - minimum grade 64-45-12											

QuickLok™ - Boltless Locking System

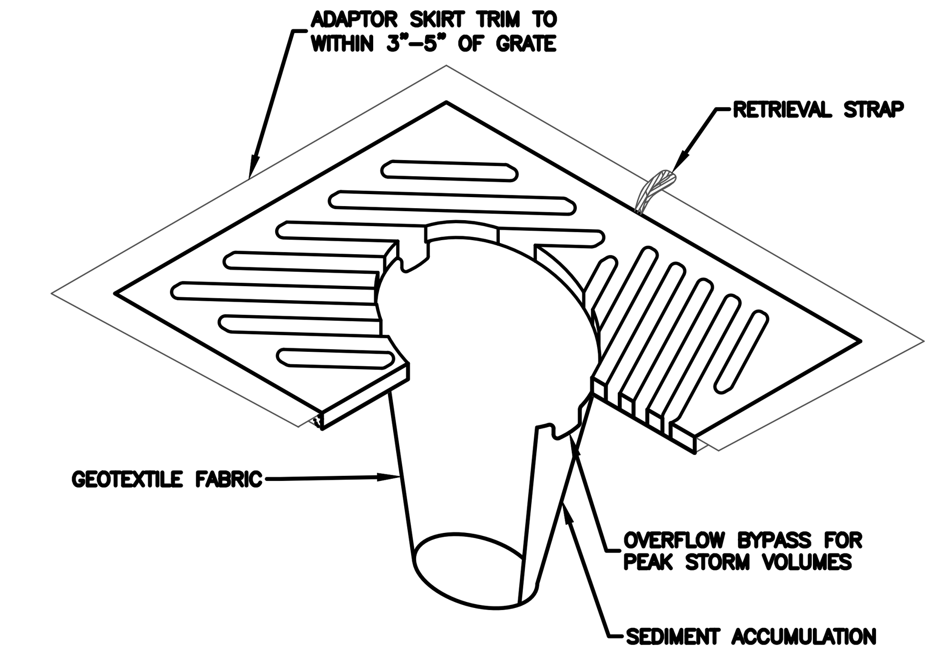


1. Locate locking bar in recesses, rotate and use hammer to tap securely into place. Serrated ends grip in recess.
2. K300 channels use plastic safety clip to hold in place.
3. To install grate, align QuickLok™ stud directly over locking bar.
4. Push down or stand on grate until it clicks into position.
5. To remove first grate, insert grate removal tool into slots at end of grate, pull up sharply. Remaining grates can be removed by hand.
6. To remove bar, insert screwdriver into hole at end of bar and lever back serrated end; rotate bar free.

Page 2 of 2

ACO TRENCH DRAIN SYSTEMS - K300-KS300 CATCH BASINS AND GRATES

NTS



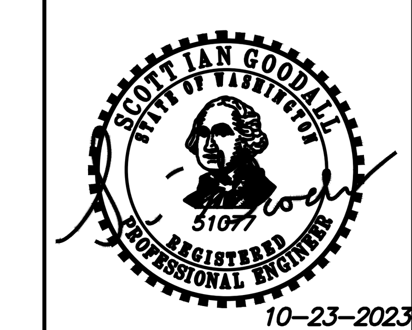
NOTES:

1. CATCH BASIN INSERT SHALL BE INSTALLED PRIOR TO CLEARING AND GRADING ACTIVITY.
2. INSTALL UPON PLACEMENT OF A NEW CATCH BASIN.
3. SEDIMENT SHALL BE REMOVED FROM THE INSERT SOCK WHEN IT BECOMES HALF FULL.
4. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING, AND RE-INSERTING INSERT SOCK INTO THE CATCH BASIN.

INLET PROTECTION

NTS

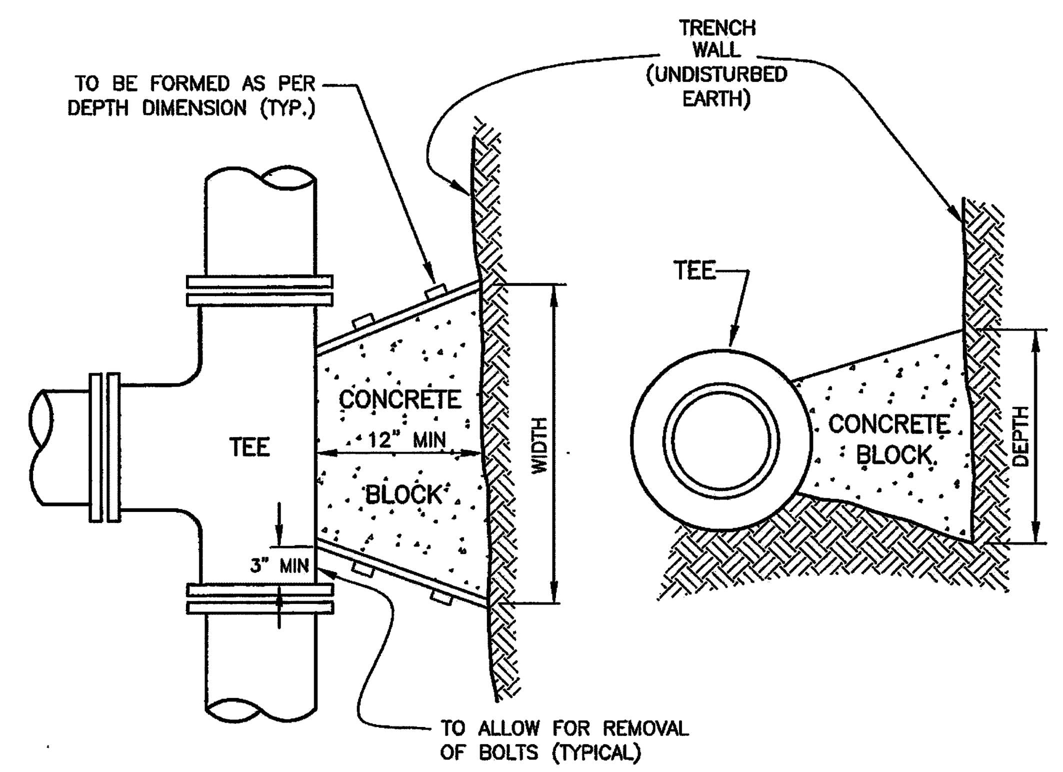
IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM



ABC RECYCLING
STORM DRAIN DETAILS-3
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

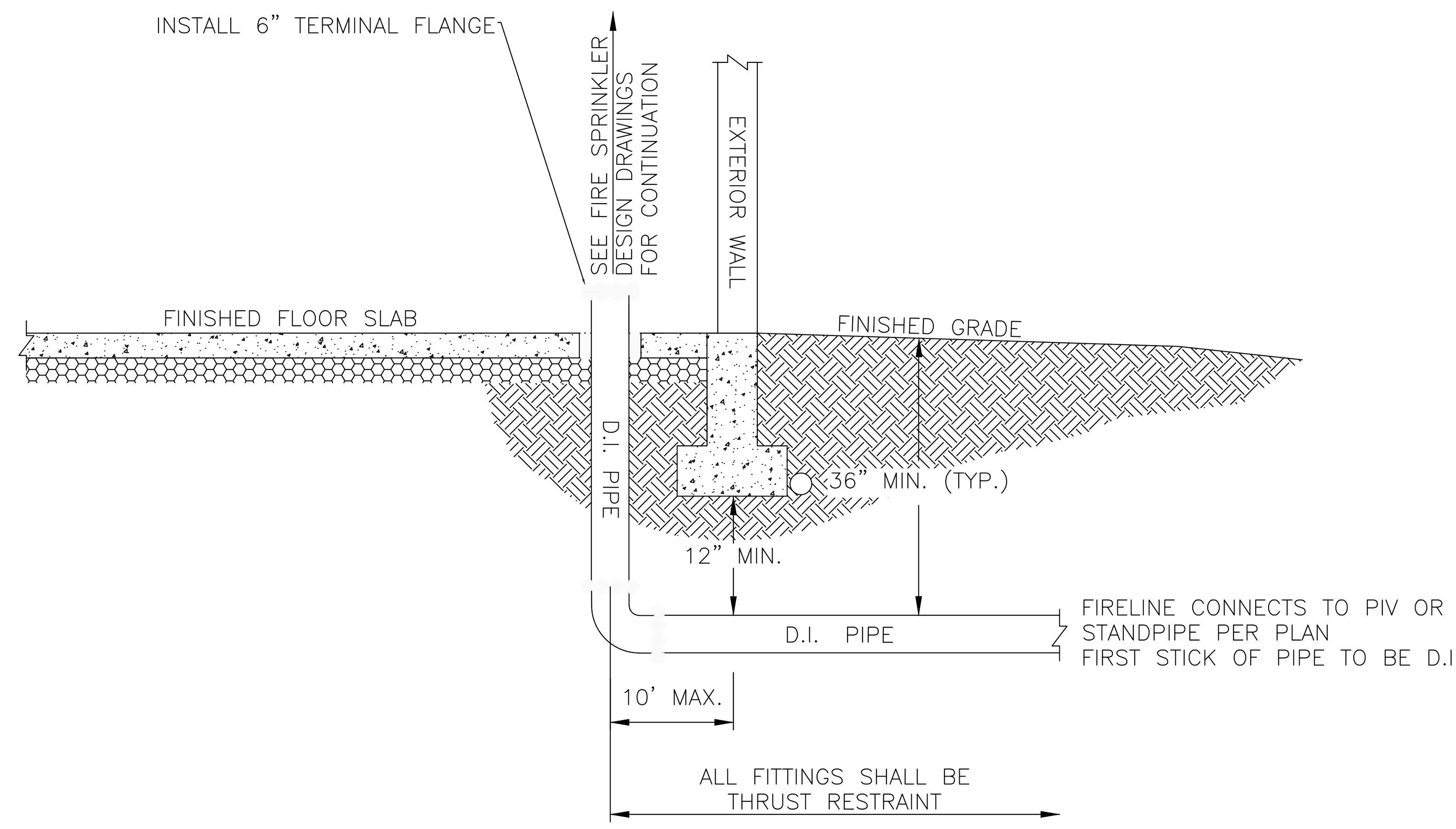


NOTE
- ALL DIMENSIONS APPLY TO STABLE TRENCH WALLS. UNDER VARIABLE CONDITIONS, SIZE OF THRUST BLOCK SHALL BE DETERMINED BY THE CITY ENGINEER.
- WRAP ALL FITTINGS WITH VISQUINE MIN. 6" PAST FLANGES, PRIOR TO POURING CONCRETE THRUST BLOCK.

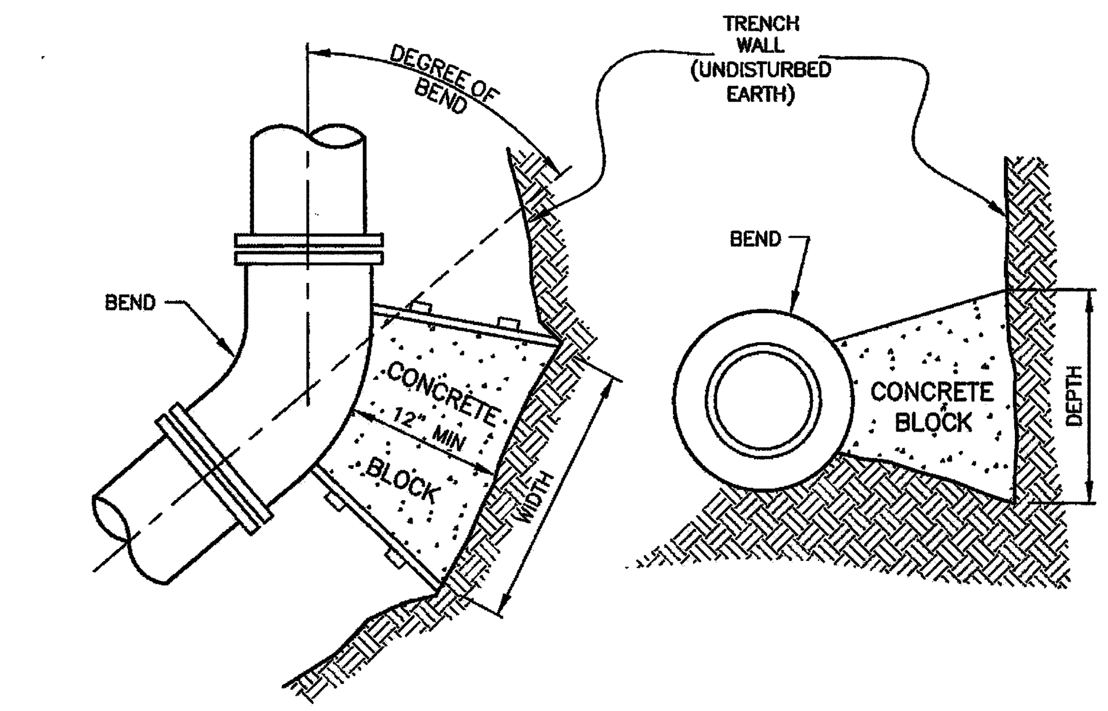
100 P.S.I. OPERATING PRESSURE

SIZE	WIDTH	DEPTH
6"	1'-6"	1'-6"
8"	2'-0"	2'-0"
10"	2'-6"	2'-6"
12"	3'-0"	3'-0"
16"	4'-6"	3'-6"
20"	6'-0"	4-0"
24"	7'-0"	5'-0"

THRUST BLOCK-TEE
NTS



FIRE LINE BUILDING CONNECTION
NTS



NOTE
- ALL DIMENSIONS APPLY TO STABLE TRENCH WALLS. UNDER VARIABLE CONDITIONS, SIZE OF THRUST BLOCK SHALL BE DETERMINED BY THE CITY ENGINEER.
- WRAP ALL FITTINGS WITH VISQUINE MIN. 6" PAST FLANGES, PRIOR TO POURING CONCRETE THRUST BLOCK.

100 P.S.I. OPERATING PRESSURE

SIZE	11¼°		22½°		45°		90°	
	WIDTH	DEPTH	WIDTH	DEPTH	WIDTH	DEPTH	WIDTH	DEPTH
6"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	1'-6"	2'-3"	1'-6"
8"	1'-3"	1'-3"	1'-3"	1'-3"	1'-9"	1'-9"	3'-0"	2'-0"
10"	1'-9"	1'-6"	1'-9"	1'-6"	2'-3"	2'-3"	3'-6"	2'-6"
12"	2'-0"	1'-9"	2'-0"	1'-9"	2'-9"	2'-6"	4'-0"	3'-0"
16"	2'-9"	2'-3"	2'-9"	2'-3"	4'-0"	3'-0"	6'-3"	3'-6"
20"	3'-6"	2'-9"	3'-6"	2'-9"	4'-6"	4'-0"	8'-6"	4'-0"
24"	4'-6"	3'-0"	4'-6"	3'-0"	5'-6"	5'-0"	9'-9"	5'-0"

THRUST BLOCK-ELBOW
NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

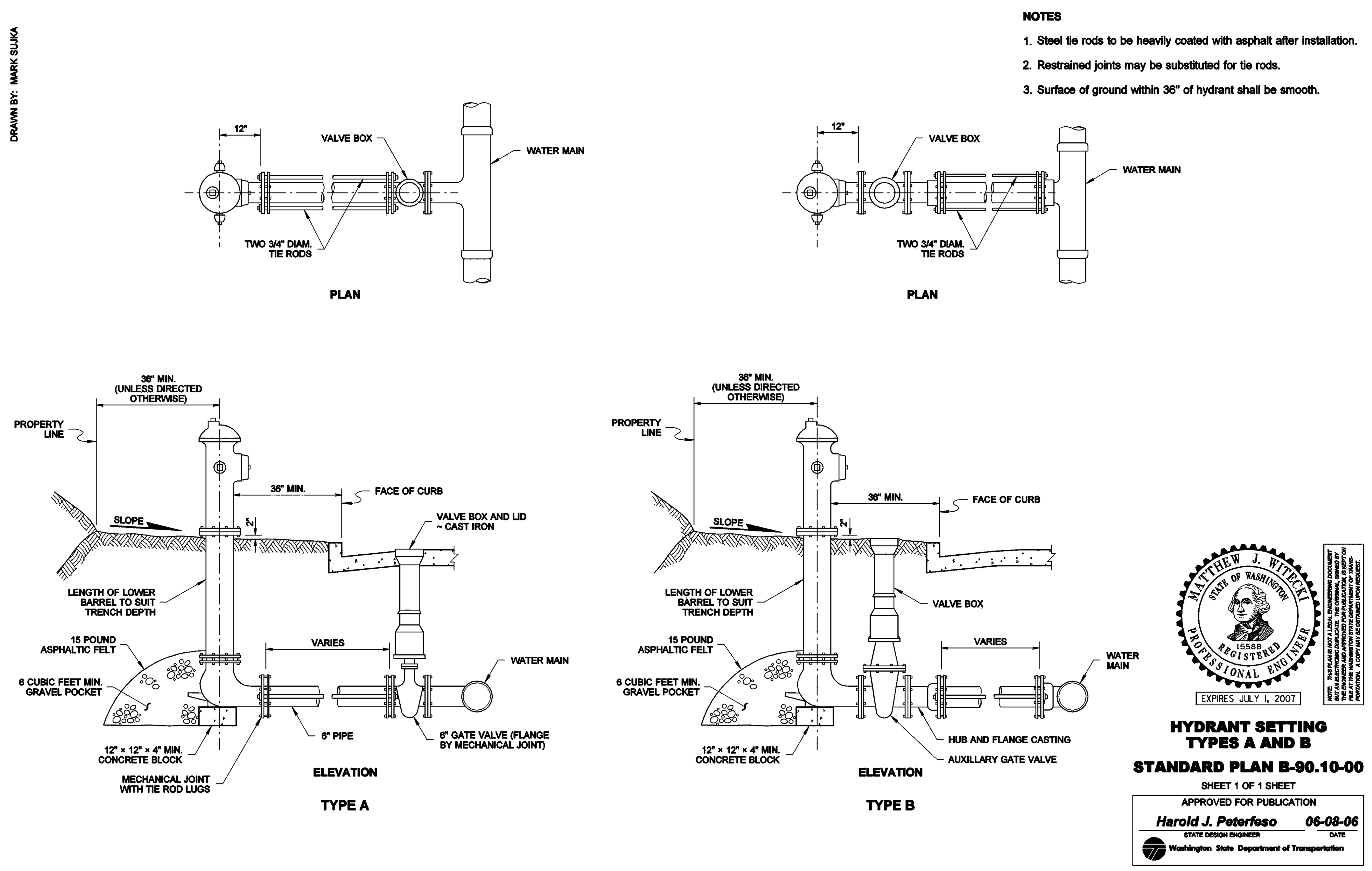
ABC RECYCLING
WATER DETAILS-1
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023

24 OF: 27

Z:\Shared\PROJECTS\21029 741 Marine Dr (ABC Recycling)\DWG\WATER DETAILS-1.dwg Oct 23, 2023-5:34pm

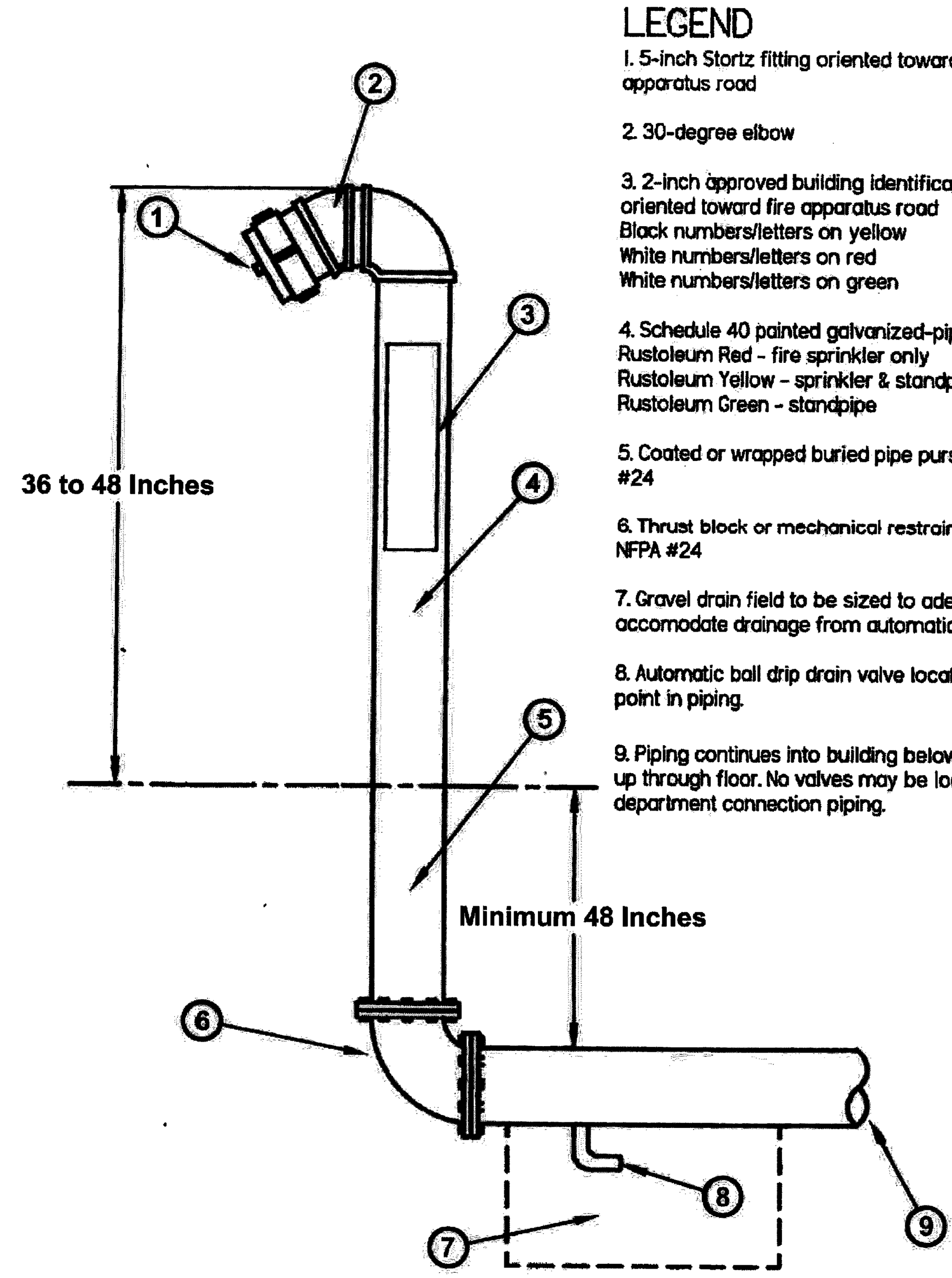


HYDRANT SETTINGS TYPE A & B

NTS

LEGEND

1. 5-inch Stortz fitting oriented toward fire apparatus road
2. 30-degree elbow
3. 2-inch approved building identification oriented toward fire apparatus road
   Black numbers/letters on yellow
   White numbers/letters on red
   White numbers/letters on green
4. Schedule 40 painted galvanized-pipe
   Rustoleum Red - fire sprinkler only
   Rustoleum Yellow - sprinkler & standpipe
   Rustoleum Green - standpipe
5. Coated or wrapped buried pipe pursuant to NFPA #24
6. Thrust block or mechanical restraint pursuant NFPA #24
7. Gravel drain field to be sized to adequately accomodate drainage from automatic ball drip.
8. Automatic ball drip drain valve located at lowest point in piping.
9. Piping continues into building below footing and up through floor. No valves may be located in fire department connection piping.



FDC DETAIL

NTS

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

08.09.2023

ABC RECYCLING
WATER DETAILS-2
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029

DESIGNED/DRAWN BY: BLS

CHECKED BY: SIG

ISSUE DATE: 10-23-2023

PROPOSED STORM STRUCTURES

STRUCTURE NAME	STRUCTURE DETAILS
CB–1	RIM = 84.500 SUMP = 77.347 PIPE = CB–1_CB–2 INV OUT = 79.35 3D LENGTH = 47.48
CB–2	RIM = 84.500 SUMP = 77.092 PIPE = CB–1_CB–2 INV IN = 79.09 3D LENGTH = 47.48 PIPE = CB–2_CB–3 INV OUT = 79.09 3D LENGTH = 47.48
CB–3	RIM = 84.500 SUMP = 76.837 PIPE = CB–2_CB–3 INV IN = 78.84 3D LENGTH = 47.48 PIPE = CB–3_CB–4 INV OUT = 78.84 3D LENGTH = 46.71
CB–4	RIM = 84.526 SUMP = 76.607 PIPE = CB–3_CB–4 INV IN = 78.61 3D LENGTH = 46.71 PIPE = CB–4_CB–5 INV OUT = 78.61 3D LENGTH = 45.00 PIPE = CB–4_CB–15 INV OUT = 78.61 3D LENGTH = 101.45
CB–5	RIM = 84.254 SUMP = 76.378 PIPE = CB–4_CB–5 INV IN = 78.38 3D LENGTH = 45.00 PIPE = CB–5_CB–6 INV OUT = 78.38 3D LENGTH = 44.99
CB–6	RIM = 84.600 SUMP = 76.230 PIPE = CB–5_CB–6 INV IN = 78.23 3D LENGTH = 44.99 PIPE = CB–6_CB–11 INV IN = 78.23 3D LENGTH = 31.57 PIPE = CB–6_CB ACO INV OUT = 78.23 3D LENGTH = 207.74
CB–7	RIM = 84.600 SUMP = 74.292 PIPE = CB ACO_B–7 INV IN = 76.29 3D LENGTH = 173.51 PIPE = CB–7_CB–8 INV OUT = 76.29 3D LENGTH = 31.35
CB–8	RIM = 83.759 SUMP = 74.128 PIPE = CB–7_CB–8 INV IN = 76.13 3D LENGTH = 31.35 PIPE = CB–8_CB–9 INV IN = 76.13 3D LENGTH = 100.19 PIPE = CB–8_CB–14 INV OUT = 76.13 3D LENGTH = 66.26
CB–9	RIM = 83.945 SUMP = 74.640 PIPE = CB–13_CB–9 INV IN = 76.64 3D LENGTH = 133.05 PIPE = CB–8_CB–9 INV OUT = 76.64 3D LENGTH = 100.19
CB–11	RIM = 84.847 SUMP = 76.400 PIPE = CB–6_CB–11 INV OUT = 78.40 3D LENGTH = 31.57
CB–12	RIM = 83.819 SUMP = 75.553 PIPE = CB ACO_CB–12 INV OUT = 77.55 3D LENGTH = 72.35
CB–13	RIM = 81.244 SUMP = 75.316 PIPE = CB–13_CB–9 INV OUT = 77.32 3D LENGTH = 133.05
CB–14	RIM = 83.759 SUMP = 73.782 PIPE = CB–8_CB–14 INV IN = 75.78 3D LENGTH = 66.26 PIPE = CB–14_RR–8 INV OUT = 75.78 3D LENGTH = 60.19
CB–15	RIM = 86.595 SUMP = 77.127 PIPE = CB–4_CB–15 INV IN = 79.13 3D LENGTH = 101.45
CB–ACO	RIM = 84.600 SUMP = 75.180 PIPE = CB–6_CB ACO INV IN = 77.18 3D LENGTH = 207.74 PIPE = CB ACO_CB–12 INV IN = 77.18 3D LENGTH = 72.35 PIPE = CB ACO_B–7 INV OUT = 77.18 3D LENGTH = 173.51
RR–1	RIM = 83.304 SUMP = 77.223 PIPE = RR–1_RR–2 INV OUT = 79.22 3D LENGTH = 97.47
RR–2	RIM = 83.304 SUMP = 76.722 PIPE = RR–1_RR–2 INV IN = 78.72 3D LENGTH = 97.47 PIPE = RR–2_RR–3 INV OUT = 78.72 3D LENGTH = 97.47
RR–3	RIM = 83.304 SUMP = 76.222 PIPE = RR–2_RR–3 INV IN = 78.22 3D LENGTH = 97.47 PIPE = RR–3_RR–4 INV OUT = 78.22 3D LENGTH = 97.47
RR–4	RIM = 83.304 SUMP = 75.722 PIPE = RR–3_RR–4 INV IN = 77.72 3D LENGTH = 97.47 PIPE = RR–4_RR–5 INV OUT = 77.72 3D LENGTH = 97.47
RR–5	RIM = 83.304 SUMP = 75.222 PIPE = RR–4_RR–5 INV IN = 77.22 3D LENGTH = 97.47 PIPE = RR–5_RR–6 INV OUT = 77.22 3D LENGTH = 97.47

PROPOSED STORM STRUCTURES

STRUCTURE NAME	STRUCTURE DETAILS
RR–6	RIM = 83.304 SUMP = 74.722 PIPE = RR–5_RR–6 INV IN = 76.72 3D LENGTH = 97.47 PIPE = RR–6_RR–7 INV OUT = 76.72 3D LENGTH = 62.91
RR–7	RIM = 83.161 SUMP = 74.395 PIPE = RR–6_RR–7 INV IN = 76.40 3D LENGTH = 62.91 PIPE = RR–7_RR–8 INV OUT = 76.40 3D LENGTH = 74.79
RR–8	RIM = 82.841 SUMP = 73.469 PIPE = RR–7_RR–8 INV IN = 75.47 3D LENGTH = 74.79 PIPE = RR–8_RR–9 INV IN = 75.47 3D LENGTH = 97.69 PIPE = CB–14_RR–8 INV IN = 75.47 3D LENGTH = 60.19 PIPE = RR–8_POND INV OUT = 75.47 3D LENGTH = 91.57
RR–9	RIM = 82.841 SUMP = 73.970 PIPE = RR–9_RR–10 INV IN = 75.97 3D LENGTH = 67.85 PIPE = RR–8_RR–9 INV OUT = 75.97 3D LENGTH = 97.69
RR–10	RIM = 82.889 SUMP = 74.320 PIPE = RR–10_RR–11 INV OUT = 76.32 3D LENGTH = 48.56 PIPE = RR–9_RR–10 INV OUT = 76.32 3D LENGTH = 67.85
RR–11	RIM = 83.214 SUMP = 74.574 PIPE = RR–10_RR–11 INV IN = 76.57 3D LENGTH = 48.56
SDCS–1	RIM = 83.058 SUMP = 73.667 PIPE = POND_SDCS–1 INV IN = 75.67 3D LENGTH = 75.96 PIPE = SDCS–1_SDCS–2 INV OUT = 75.67 3D LENGTH = 36.97
SDCS–2	RIM = 83.206 SUMP = 73.486 PIPE = SDCS–2_TREATMENT INV IN = 75.49 3D LENGTH = 1.04 PIPE = SDCS–1_SDCS–2 INV IN = 75.49 3D LENGTH = 36.97
SDCS–3	RIM = 83.255 SUMP = 73.193 PIPE = TREATMENT_SDCS–3 INV IN = 75.19 3D LENGTH = 57.46 PIPE = SDCS–3_SDCS–4 INV OUT = 75.19 3D LENGTH = 57.84
SDCS–4	RIM = 81.148 SUMP = 72.000 PIPE = SDCS–3_SDCS–4 INV IN = 74.00 3D LENGTH = 57.84

PROPOSED STORM PIPES

PIPE NAME	PIPE SIZE	Length	Slope
CB–1_CB–2	12"ø CPP, 12"	47.48	0.51%
CB–2_CB–3	12"ø CPP, 12"	47.48	0.50%
CB–3_CB–4	12"ø CPP, 12"	46.71	0.47%
CB–4_CB–5	12"ø CPP, 12"	45.00	0.49%
CB–4_CB–15	12"ø CPP, 12"	101.45	–0.50%
CB–5_CB–6	12"ø CPP, 12"	44.99	0.31%
CB–6_CB–11	12"ø CPP, 12"	31.57	0.50%
CB–6_CB ACO	12"ø CPP, 12"	207.74	0.50%
CB–7_CB–8	12"ø CPP, 12"	31.35	0.48%
CB–8_CB–9	12"ø CPP, 12"	100.19	0.50%
CB–8_CB–14	12"ø CPP, 12"	66.26	0.50%
CB–13_CB–9	12"ø CPP, 12"	133.05	0.50%
CB–14_RR–8	12"ø CPP, 12"	60.19	0.50%
CB ACO_B–7	12"ø CPP, 12"	173.51	0.50%
CB ACO_CB–12	12"ø CPP, 12"	72.35	0.50%
POND_SDCS–1	18"ø CPP, 18"	75.96	0.43%
RR–1_RR–2	12"ø CPP, 12"	97.47	0.50%
RR–2_RR–3	12"ø CPP, 12"	97.47	0.50%
RR–3_RR–4	12"ø CPP, 12"	97.47	0.50%
RR–4_RR–5	12"ø CPP, 12"	97.47	0.50%
RR–5_RR–6	12"ø CPP, 12"	97.47	0.50%
RR–6_RR–7	12"ø CPP, 12"	62.91	0.50%
RR–7_RR–8	12"ø CPP, 12"	74.79	1.20%
RR–8_POND	12"ø CPP, 12"	91.57	0.51%
RR–8_RR–9	12"ø CPP, 12"	97.69	0.50%
RR–9_RR–10	12"ø CPP, 12"	67.85	0.50%
RR–10_RR–11	12"ø CPP, 12"	48.56	–0.50%
SDCS–1_SDCS–2	18"ø CPP, 18"	36.97	0.44%
SDCS–2_TREATMENT	18"ø CPP, 18"	1.04	–0.00%
SDCS–3_SDCS–4	18"ø CPP, 18"	57.84	1.96%
TREATMENT_SDCS–3	18"ø CPP, 18"	57.46	0.50%

IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

10-23-2023

ABC RECYCLING
STORM & WATERMAIN STRUCTURES & PIPES
PLAN SET (10-23-2023)
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226

REV	DATE	BY	DESCRIPTION

PROJECT NUMBER: 21029
DESIGNED/DRAWN BY: BLS
CHECKED BY: SIG
ISSUE DATE: 10-23-2023


MARINE DRIVE
MARINE DRIVE
380223130413
380223175414
380223170396
380223186368
380223191352
380223203319
ABC RECYCLING
BASIN MAP
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226
BASIN MAP LEGEND
136,059 FT² ASPHALT
90,650 FT² CONCRETE
52,000 FT² BUILDINGS
13,226 FT² GRAVEL
21,766 FT² POND
40 20 0 40
H. SCALE: 1"–40'
IMPACT DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

MARINE DRIVE
MARINE DRIVE
3802231 30413
380223175414
380223170396
380223186368
380223191352
380223195335
380223203319
380223106374
BUILDING 2
SEPARATION
ABC RECYCLING
BASIN MAP
741 MARINE DRIVE
BELLINGHAM, WASHINGTON 98226
BASIN MAP LEGEND
136,059 FT² ASPHALT
90,650 FT² CONCRETE
52,000 FT² BUILDINGS
13,226 FT² GRAVEL
21,766 FT² POND
40 20 0 40
H. SCALE: 1"–40'
IMPACT
DESIGN
5426 BARRETT ROAD, SUITE A103
360-389-8138 WWW.BOLD-IMPACT.COM

WWHM2012
PROJECT REPORT

Project Name: ABC - Marine Drive Prelim 7-21-23
Site Name: ABC Recycling
Site Address:
City :
Report Date: 10/21/2023
Gage : Blaine
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.86
Version Date: 2023/01/27
Version : 4.2.19

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	7.18
Pervious Total	7.18

Impervious Land Use	acre
Impervious Total	0
Basin Total	7.18

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Trapezoidal Pond 1
Bottom Length: 100.00 ft.
Bottom Width: 100.00 ft.
Depth: 10 ft.
Volume at riser head: 3.4434 acre-feet.

Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 9 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.024 ft.
Notch Height: 2.173 ft.
Orifice 1 Diameter: 1.001 in. **Elevation:** 0 ft.

Element Flows To:
Outlet 1 **Outlet 2**

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.229	0.000	0.000	0.000
0.1111	0.232	0.025	0.009	0.000
0.2222	0.235	0.051	0.012	0.000
0.3333	0.238	0.078	0.015	0.000
0.4444	0.242	0.104	0.018	0.000
0.5556	0.245	0.131	0.020	0.000
0.6667	0.248	0.159	0.022	0.000
0.7778	0.251	0.187	0.024	0.000
0.8889	0.254	0.215	0.025	0.000
1.0000	0.257	0.243	0.027	0.000
1.1111	0.261	0.272	0.028	0.000
1.2222	0.264	0.301	0.030	0.000
1.3333	0.267	0.331	0.031	0.000
1.4444	0.271	0.361	0.032	0.000
1.5556	0.274	0.391	0.033	0.000
1.6667	0.277	0.422	0.035	0.000
1.7778	0.281	0.453	0.036	0.000
1.8889	0.284	0.484	0.037	0.000
2.0000	0.288	0.516	0.038	0.000
2.1111	0.291	0.548	0.039	0.000
2.2222	0.294	0.581	0.040	0.000
2.3333	0.298	0.614	0.041	0.000
2.4444	0.301	0.647	0.042	0.000
2.5556	0.305	0.681	0.043	0.000
2.6667	0.308	0.715	0.044	0.000
2.7778	0.312	0.749	0.045	0.000
2.8889	0.316	0.784	0.046	0.000
3.0000	0.319	0.820	0.047	0.000
3.1111	0.323	0.855	0.048	0.000
3.2222	0.326	0.892	0.048	0.000
3.3333	0.330	0.928	0.049	0.000
3.4444	0.334	0.965	0.050	0.000
3.5556	0.338	1.002	0.051	0.000
3.6667	0.341	1.040	0.052	0.000
3.7778	0.345	1.078	0.052	0.000
3.8889	0.349	1.117	0.053	0.000

4.0000	0.353	1.156	0.054	0.000
4.1111	0.356	1.195	0.055	0.000
4.2222	0.360	1.235	0.055	0.000
4.3333	0.364	1.275	0.056	0.000
4.4444	0.368	1.316	0.057	0.000
4.5556	0.372	1.357	0.058	0.000
4.6667	0.376	1.399	0.058	0.000
4.7778	0.380	1.441	0.059	0.000
4.8889	0.384	1.483	0.060	0.000
5.0000	0.388	1.526	0.060	0.000
5.1111	0.392	1.570	0.061	0.000
5.2222	0.396	1.613	0.062	0.000
5.3333	0.400	1.658	0.062	0.000
5.4444	0.404	1.702	0.063	0.000
5.5556	0.408	1.747	0.064	0.000
5.6667	0.412	1.793	0.064	0.000
5.7778	0.416	1.839	0.065	0.000
5.8889	0.420	1.885	0.066	0.000
6.0000	0.424	1.932	0.066	0.000
6.1111	0.428	1.980	0.067	0.000
6.2222	0.433	2.028	0.067	0.000
6.3333	0.437	2.076	0.068	0.000
6.4444	0.441	2.125	0.069	0.000
6.5556	0.445	2.174	0.069	0.000
6.6667	0.450	2.224	0.070	0.000
6.7778	0.454	2.274	0.070	0.000
6.8889	0.458	2.325	0.072	0.000
7.0000	0.462	2.376	0.077	0.000
7.1111	0.467	2.428	0.083	0.000
7.2222	0.471	2.480	0.091	0.000
7.3333	0.476	2.532	0.099	0.000
7.4444	0.480	2.586	0.107	0.000
7.5556	0.484	2.639	0.116	0.000
7.6667	0.489	2.693	0.125	0.000
7.7778	0.493	2.748	0.134	0.000
7.8889	0.498	2.803	0.145	0.000
8.0000	0.502	2.859	0.156	0.000
8.1111	0.507	2.915	0.168	0.000
8.2222	0.511	2.971	0.181	0.000
8.3333	0.516	3.029	0.231	0.000
8.4444	0.521	3.086	0.249	0.000
8.5556	0.525	3.144	0.268	0.000
8.6667	0.530	3.203	0.287	0.000
8.7778	0.535	3.262	0.306	0.000
8.8889	0.539	3.322	0.326	0.000
9.0000	0.544	3.382	0.347	0.000
9.1111	0.549	3.443	0.935	0.000
9.2222	0.553	3.504	1.985	0.000
9.3333	0.558	3.566	3.231	0.000
9.4444	0.563	3.628	4.452	0.000
9.5556	0.568	3.691	5.447	0.000
9.6667	0.573	3.755	6.104	0.000
9.7778	0.577	3.819	6.600	0.000
9.8889	0.582	3.883	7.032	0.000
10.000	0.587	3.948	7.438	0.000
10.111	0.592	4.014	7.822	0.000

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS FLAT	**3.1**
ROOF TOPS FLAT	**1.19**
DRIVEWAYS FLAT	**0.3**
SIDEWALKS FLAT	**2.08**
POND	**0.51**
Impervious Total	**7.18**
Basin Total	**7.18**

Element Flows To:

Surface	**Interflow**	**Groundwater**
Trapezoidal Pond 1	Trapezoidal Pond 1	

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:7.18
Total Impervious Area:0

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:7.18

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.139294
5 year	0.209522
10 year	0.248174
25 year	0.288438
50 year	0.313052
100 year	0.333828

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.075086
5 year	0.1129
10 year	0.144167
25 year	0.191772
50 year	0.233803
100 year	0.282082

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.157	0.070
1950	0.160	0.065
1951	0.229	0.239
1952	0.052	0.053
1953	0.068	0.068
1954	0.134	0.068
1955	0.095	0.128
1956	0.106	0.113
1957	0.219	0.066
1958	0.075	0.059
1959	0.101	0.062
1960	0.145	0.061
1961	0.110	0.066
1962	0.101	0.063
1963	0.107	0.058
1964	0.205	0.185
1965	0.240	0.115
1966	0.209	0.058
1967	0.188	0.116
1968	0.195	0.072
1969	0.108	0.063
1970	0.041	0.047
1971	0.196	0.066
1972	0.131	0.072
1973	0.112	0.103
1974	0.138	0.063
1975	0.109	0.066
1976	0.196	0.261
1977	0.107	0.057
1978	0.149	0.070
1979	0.097	0.058
1980	0.216	0.135
1981	0.093	0.062
1982	0.242	0.145
1983	0.107	0.065
1984	0.394	0.158
1985	0.188	0.062
1986	0.337	0.084
1987	0.156	0.068
1988	0.124	0.060
1989	0.141	0.061
1990	0.187	0.094
1991	0.137	0.166
1992	0.155	0.068

1993	0.135	0.056
1994	0.061	0.051
1995	0.152	0.067
1996	0.200	0.073
1997	0.294	0.309
1998	0.043	0.053
1999	0.317	0.236
2000	0.052	0.063
2001	0.019	0.044
2002	0.132	0.062
2003	0.027	0.053
2004	0.110	0.117
2005	0.173	0.064
2006	0.142	0.071
2007	0.147	0.067
2008	0.065	0.051
2009	0.154	0.070

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.3942	0.3089
2	0.3366	0.2606
3	0.3172	0.2394
4	0.2936	0.2360
5	0.2423	0.1850
6	0.2404	0.1664
7	0.2291	0.1583
8	0.2192	0.1448
9	0.2157	0.1346
10	0.2088	0.1282
11	0.2047	0.1166
12	0.1999	0.1162
13	0.1963	0.1153
14	0.1961	0.1129
15	0.1953	0.1035
16	0.1879	0.0937
17	0.1876	0.0840
18	0.1870	0.0734
19	0.1728	0.0722
20	0.1601	0.0721
21	0.1573	0.0706
22	0.1563	0.0703
23	0.1548	0.0700
24	0.1535	0.0699
25	0.1515	0.0684
26	0.1494	0.0684
27	0.1468	0.0682
28	0.1452	0.0678
29	0.1424	0.0674
30	0.1414	0.0671
31	0.1379	0.0665
32	0.1373	0.0662
33	0.1347	0.0657
34	0.1337	0.0655
35	0.1316	0.0654

36	0.1306	0.0654
37	0.1241	0.0640
38	0.1120	0.0635
39	0.1097	0.0634
40	0.1096	0.0634
41	0.1086	0.0628
42	0.1076	0.0624
43	0.1075	0.0624
44	0.1074	0.0623
45	0.1073	0.0619
46	0.1061	0.0613
47	0.1008	0.0612
48	0.1006	0.0603
49	0.0974	0.0586
50	0.0945	0.0582
51	0.0929	0.0580
52	0.0746	0.0579
53	0.0677	0.0572
54	0.0652	0.0564
55	0.0611	0.0534
56	0.0520	0.0532
57	0.0516	0.0531
58	0.0430	0.0508
59	0.0412	0.0507
60	0.0267	0.0472
61	0.0188	0.0445

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0696	20608	14228	69	Pass
0.0721	19199	9321	48	Pass
0.0746	17830	8290	46	Pass
0.0770	16596	7597	45	Pass
0.0795	15494	7114	45	Pass
0.0819	14493	6643	45	Pass
0.0844	13531	6145	45	Pass
0.0869	12677	5715	45	Pass
0.0893	11867	5298	44	Pass
0.0918	11139	4930	44	Pass
0.0942	10517	4504	42	Pass
0.0967	9877	4113	41	Pass
0.0992	9319	3771	40	Pass
0.1016	8761	3516	40	Pass
0.1041	8256	3287	39	Pass
0.1065	7758	3063	39	Pass
0.1090	7259	2836	39	Pass
0.1114	6795	2656	39	Pass
0.1139	6419	2477	38	Pass
0.1164	6053	2297	37	Pass
0.1188	5732	2171	37	Pass
0.1213	5443	2063	37	Pass

0.1237	5138	1911	37	Pass
0.1262	4845	1799	37	Pass
0.1287	4564	1678	36	Pass
0.1311	4299	1591	37	Pass
0.1336	4081	1506	36	Pass
0.1360	3865	1429	36	Pass
0.1385	3670	1369	37	Pass
0.1409	3456	1292	37	Pass
0.1434	3275	1216	37	Pass
0.1459	3097	1121	36	Pass
0.1483	2917	1038	35	Pass
0.1508	2748	977	35	Pass
0.1532	2573	912	35	Pass
0.1557	2421	839	34	Pass
0.1582	2274	772	33	Pass
0.1606	2124	721	33	Pass
0.1631	2028	671	33	Pass
0.1655	1934	611	31	Pass
0.1680	1838	567	30	Pass
0.1705	1739	538	30	Pass
0.1729	1632	503	30	Pass
0.1754	1537	455	29	Pass
0.1778	1448	410	28	Pass
0.1803	1376	353	25	Pass
0.1827	1300	331	25	Pass
0.1852	1242	316	25	Pass
0.1877	1180	308	26	Pass
0.1901	1121	301	26	Pass
0.1926	1061	291	27	Pass
0.1950	997	285	28	Pass
0.1975	938	275	29	Pass
0.2000	897	268	29	Pass
0.2024	865	256	29	Pass
0.2049	814	250	30	Pass
0.2073	762	243	31	Pass
0.2098	722	236	32	Pass
0.2122	672	231	34	Pass
0.2147	623	226	36	Pass
0.2172	584	217	37	Pass
0.2196	545	207	37	Pass
0.2221	509	198	38	Pass
0.2245	469	192	40	Pass
0.2270	431	187	43	Pass
0.2295	396	182	45	Pass
0.2319	374	175	46	Pass
0.2344	345	161	46	Pass
0.2368	320	142	44	Pass
0.2393	299	125	41	Pass
0.2418	276	117	42	Pass
0.2442	260	107	41	Pass
0.2467	247	101	40	Pass
0.2491	238	96	40	Pass
0.2516	227	92	40	Pass
0.2540	214	86	40	Pass
0.2565	201	81	40	Pass
0.2590	190	77	40	Pass
0.2614	171	69	40	Pass

0.2639	154	68	44	Pass
0.2663	144	65	45	Pass
0.2688	127	64	50	Pass
0.2713	113	63	55	Pass
0.2737	101	60	59	Pass
0.2762	97	59	60	Pass
0.2786	90	57	63	Pass
0.2811	82	48	58	Pass
0.2835	77	42	54	Pass
0.2860	72	38	52	Pass
0.2885	67	34	50	Pass
0.2909	60	29	48	Pass
0.2934	54	24	44	Pass
0.2958	49	17	34	Pass
0.2983	41	16	39	Pass
0.3008	35	12	34	Pass
0.3032	28	10	35	Pass
0.3057	23	7	30	Pass
0.3081	19	4	21	Pass
0.3106	13	0	0	Pass
0.3131	10	0	0	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.1247 **acre-feet**
On-line facility target flow: 0.0629 **cfs.**
Adjusted for 15 min: 0.0629 **cfs.**
Off-line facility target flow: 0.0434 **cfs.**
Adjusted for 15 min: 0.0434 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	N	857.27			N	0.00			
Total Volume Infiltrated		857.27	0.00	0.00		0.00	0.00	0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Failed

Perlnd and Implnd Changes

No changes have been made.

WWHM2012
PROJECT REPORT

Project Name: Unmitigated ABC - Marine Drive Prelim 7-21-23
Site Name: Unmitigated ABC Recycling
Site Address:
City :
Report Date: 10/21/2023
Gage : Blaine
Data Start : 1948/10/01
Data End : 2009/09/30
Precip Scale: 0.86
Version Date: 2023/01/27
Version : 4.2.19

Low Flow Threshold for POC 1 : 50 Percent of the 2 Year

High Flow Threshold for POC 1: 50 year

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	**acre**
Pervious Total	**0**

Impervious Land Use	**acre**
ROADS FLAT	**3.1**
ROOF TOPS FLAT	**1.19**
DRIVEWAYS FLAT	**0.3**
SIDEWALKS FLAT	**2.08**
POND	**0.51**
Impervious Total	**7.18**
Basin Total	**7.18**

Element Flows To:

Surface	**Interflow**	**Groundwater**

MITIGATED LAND USE

Name : Basin 1

Bypass: No

GroundWater: No

Pervious Land Use	acre
Pervious Total	**0**

Impervious Land Use	acre
ROADS FLAT	3.1
ROOF TOPS FLAT	1.19
DRIVEWAYS FLAT	0.3
SIDEWALKS FLAT	2.08
POND	0.51
Impervious Total	**7.18**
Basin Total	**7.18**

Element Flows To:

Surface	Interflow	Groundwater

ANALYSIS RESULTS

Stream Protection Duration

Predeveloped Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:7.18

Mitigated Landuse Totals for POC #1
Total Pervious Area:0
Total Impervious Area:7.18

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	2.497523
5 year	3.329601
10 year	3.882061
25 year	4.583691
50 year	5.109849
100 year	5.639639

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)

2 year	2.497523
5 year	3.329601
10 year	3.882061
25 year	4.583691
50 year	5.109849
100 year	5.639639

Stream Protection Duration
Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	1.900	1.900
1950	4.387	4.387
1951	1.796	1.796
1952	1.723	1.723
1953	2.011	2.011
1954	3.556	3.556
1955	2.367	2.367
1956	2.956	2.956
1957	3.062	3.062
1958	3.056	3.056
1959	1.876	1.876
1960	3.130	3.130
1961	1.406	1.406
1962	3.769	3.769
1963	3.224	3.224
1964	3.406	3.406
1965	4.018	4.018
1966	3.161	3.161
1967	2.264	2.264
1968	2.388	2.388
1969	2.159	2.159
1970	1.656	1.656
1971	1.624	1.624
1972	2.950	2.950
1973	1.622	1.622
1974	1.856	1.856
1975	2.208	2.208
1976	3.072	3.072
1977	5.569	5.569
1978	3.079	3.079
1979	3.081	3.081
1980	2.717	2.717
1981	3.646	3.646
1982	2.604	2.604
1983	1.827	1.827
1984	4.061	4.061
1985	2.551	2.551
1986	4.072	4.072
1987	3.194	3.194
1988	2.431	2.431
1989	5.778	5.778
1990	2.618	2.618
1991	2.030	2.030
1992	2.011	2.011
1993	1.927	1.927
1994	1.394	1.394

1995	1.783	1.783
1996	2.940	2.940
1997	2.747	2.747
1998	1.346	1.346
1999	2.812	2.812
2000	2.108	2.108
2001	2.988	2.988
2002	2.005	2.005
2003	1.929	1.929
2004	3.371	3.371
2005	2.518	2.518
2006	2.654	2.654
2007	2.678	2.678
2008	1.312	1.312
2009	1.766	1.766

Stream Protection Duration
Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	5.7782	5.7782
2	5.5687	5.5687
3	4.3869	4.3869
4	4.0717	4.0717
5	4.0606	4.0606
6	4.0180	4.0180
7	3.7688	3.7688
8	3.6461	3.6461
9	3.5559	3.5559
10	3.4061	3.4061
11	3.3710	3.3710
12	3.2239	3.2239
13	3.1942	3.1942
14	3.1611	3.1611
15	3.1296	3.1296
16	3.0807	3.0807
17	3.0792	3.0792
18	3.0718	3.0718
19	3.0625	3.0625
20	3.0558	3.0558
21	2.9880	2.9880
22	2.9557	2.9557
23	2.9502	2.9502
24	2.9404	2.9404
25	2.8121	2.8121
26	2.7474	2.7474
27	2.7173	2.7173
28	2.6777	2.6777
29	2.6544	2.6544
30	2.6181	2.6181
31	2.6040	2.6040
32	2.5506	2.5506
33	2.5185	2.5185
34	2.4307	2.4307
35	2.3879	2.3879
36	2.3668	2.3668
37	2.2644	2.2644

38	2.2080	2.2080
39	2.1590	2.1590
40	2.1081	2.1081
41	2.0303	2.0303
42	2.0115	2.0115
43	2.0110	2.0110
44	2.0053	2.0053
45	1.9286	1.9286
46	1.9265	1.9265
47	1.9003	1.9003
48	1.8756	1.8756
49	1.8562	1.8562
50	1.8275	1.8275
51	1.7964	1.7964
52	1.7834	1.7834
53	1.7659	1.7659
54	1.7234	1.7234
55	1.6561	1.6561
56	1.6245	1.6245
57	1.6223	1.6223
58	1.4055	1.4055
59	1.3940	1.3940
60	1.3459	1.3459
61	1.3123	1.3123

Stream Protection Duration
POC #1
The Facility PASSED

The Facility PASSED.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
1.2488	1430	1430	100	Pass
1.2878	1257	1257	100	Pass
1.3268	1131	1131	100	Pass
1.3658	1007	1007	100	Pass
1.4048	898	898	100	Pass
1.4438	802	802	100	Pass
1.4828	724	724	100	Pass
1.5218	646	646	100	Pass
1.5608	583	583	100	Pass
1.5998	528	528	100	Pass
1.6388	488	488	100	Pass
1.6778	442	442	100	Pass
1.7168	408	408	100	Pass
1.7558	372	372	100	Pass
1.7948	335	335	100	Pass
1.8338	314	314	100	Pass
1.8728	284	284	100	Pass
1.9118	264	264	100	Pass
1.9508	247	247	100	Pass
1.9898	226	226	100	Pass
2.0288	206	206	100	Pass
2.0678	192	192	100	Pass
2.1068	179	179	100	Pass
2.1458	169	169	100	Pass

2.1848	156	156	100	Pass
2.2238	144	144	100	Pass
2.2628	140	140	100	Pass
2.3018	130	130	100	Pass
2.3408	120	120	100	Pass
2.3798	115	115	100	Pass
2.4188	106	106	100	Pass
2.4578	102	102	100	Pass
2.4968	96	96	100	Pass
2.5358	89	89	100	Pass
2.5748	80	80	100	Pass
2.6138	74	74	100	Pass
2.6528	62	62	100	Pass
2.6918	57	57	100	Pass
2.7308	54	54	100	Pass
2.7698	52	52	100	Pass
2.8088	51	51	100	Pass
2.8478	46	46	100	Pass
2.8868	45	45	100	Pass
2.9258	44	44	100	Pass
2.9648	40	40	100	Pass
3.0038	37	37	100	Pass
3.0428	36	36	100	Pass
3.0818	30	30	100	Pass
3.1208	30	30	100	Pass
3.1598	28	28	100	Pass
3.1988	24	24	100	Pass
3.2378	22	22	100	Pass
3.2768	20	20	100	Pass
3.3158	20	20	100	Pass
3.3548	20	20	100	Pass
3.3938	19	19	100	Pass
3.4328	18	18	100	Pass
3.4718	17	17	100	Pass
3.5108	16	16	100	Pass
3.5498	14	14	100	Pass
3.5888	13	13	100	Pass
3.6278	13	13	100	Pass
3.6668	11	11	100	Pass
3.7058	11	11	100	Pass
3.7448	11	11	100	Pass
3.7838	10	10	100	Pass
3.8228	10	10	100	Pass
3.8618	10	10	100	Pass
3.9008	10	10	100	Pass
3.9398	10	10	100	Pass
3.9788	9	9	100	Pass
4.0178	8	8	100	Pass
4.0568	7	7	100	Pass
4.0958	5	5	100	Pass
4.1348	5	5	100	Pass
4.1738	4	4	100	Pass
4.2128	4	4	100	Pass
4.2518	4	4	100	Pass
4.2908	4	4	100	Pass
4.3298	4	4	100	Pass
4.3688	4	4	100	Pass

4.4078	3	3	100	Pass
4.4468	3	3	100	Pass
4.4858	3	3	100	Pass
4.5248	3	3	100	Pass
4.5638	3	3	100	Pass
4.6028	3	3	100	Pass
4.6418	3	3	100	Pass
4.6808	3	3	100	Pass
4.7198	3	3	100	Pass
4.7588	3	3	100	Pass
4.7978	3	3	100	Pass
4.8368	3	3	100	Pass
4.8758	3	3	100	Pass
4.9148	3	3	100	Pass
4.9538	3	3	100	Pass
4.9928	3	3	100	Pass
5.0318	3	3	100	Pass
5.0708	3	3	100	Pass
5.1098	3	3	100	Pass

Water Quality BMP Flow and Volume for POC #1
On-line facility volume: 0.1247 **acre-feet**
On-line facility target flow: 0.0629 **cfs.**
Adjusted for 15 min: 0.0629 **cfs.**
Off-line facility target flow: 0.0434 **cfs.**
Adjusted for 15 min: 0.0434 **cfs.**

LID Report

LID Technique	Used for Treatment?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft.)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit

Compliance with LID Standard 8
Duration Analysis Result = Passed

Perlnd and Implnd Changes

No changes have been made.

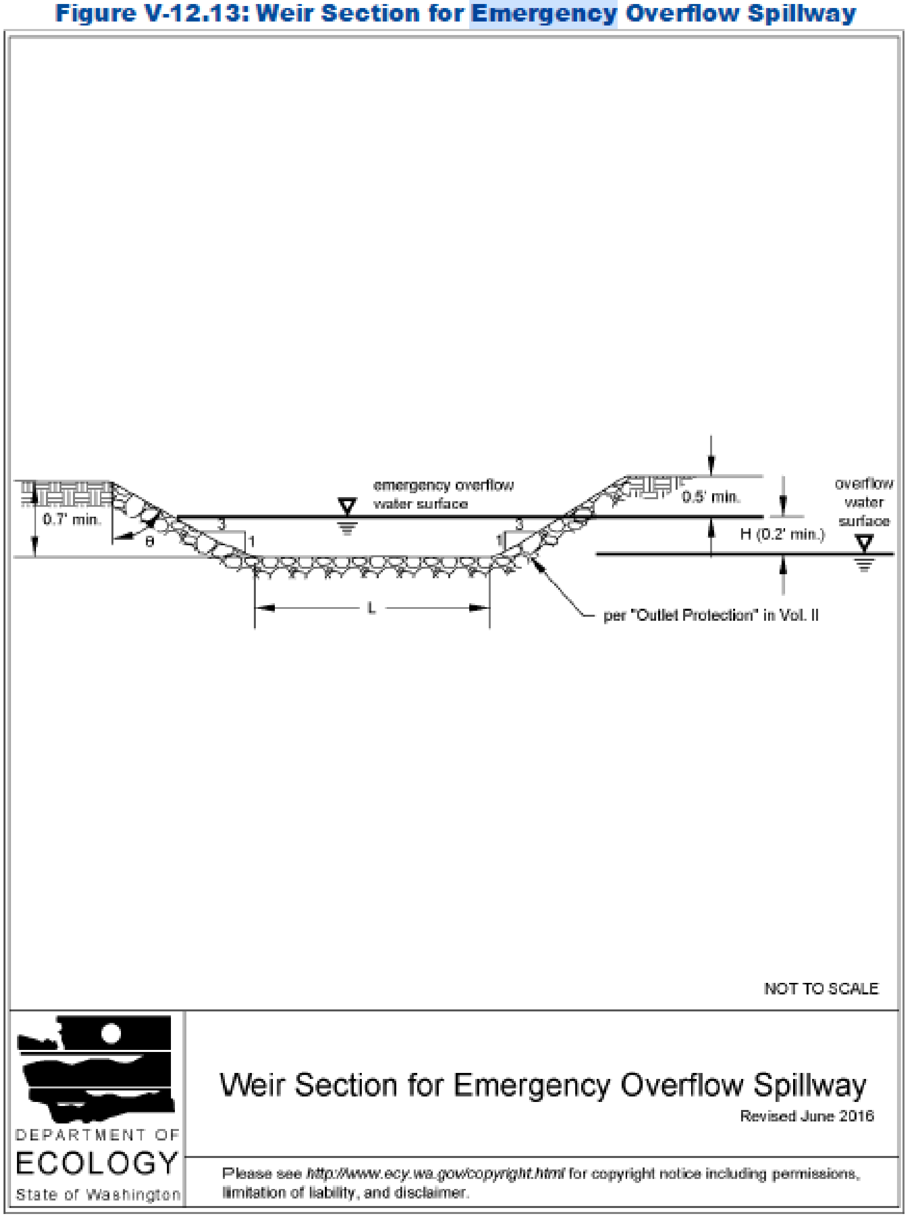
Emergency Overflow Spillway Capacity Calculation:

Overflow Height (H) = 0.2’

$L = [Q_{100} / (3.21 \times H^{3/2})] - 2.4\ H$ or 6 feet minimum

$L = [5.6 / (3.21 \times (0.20)^{3/2})] - 2.4 \times (0.20) = 19.0$’ feet. **20.0 feet provided** ✓

Figure V-12.13: Weir Section for Emergency Overflow Spillway



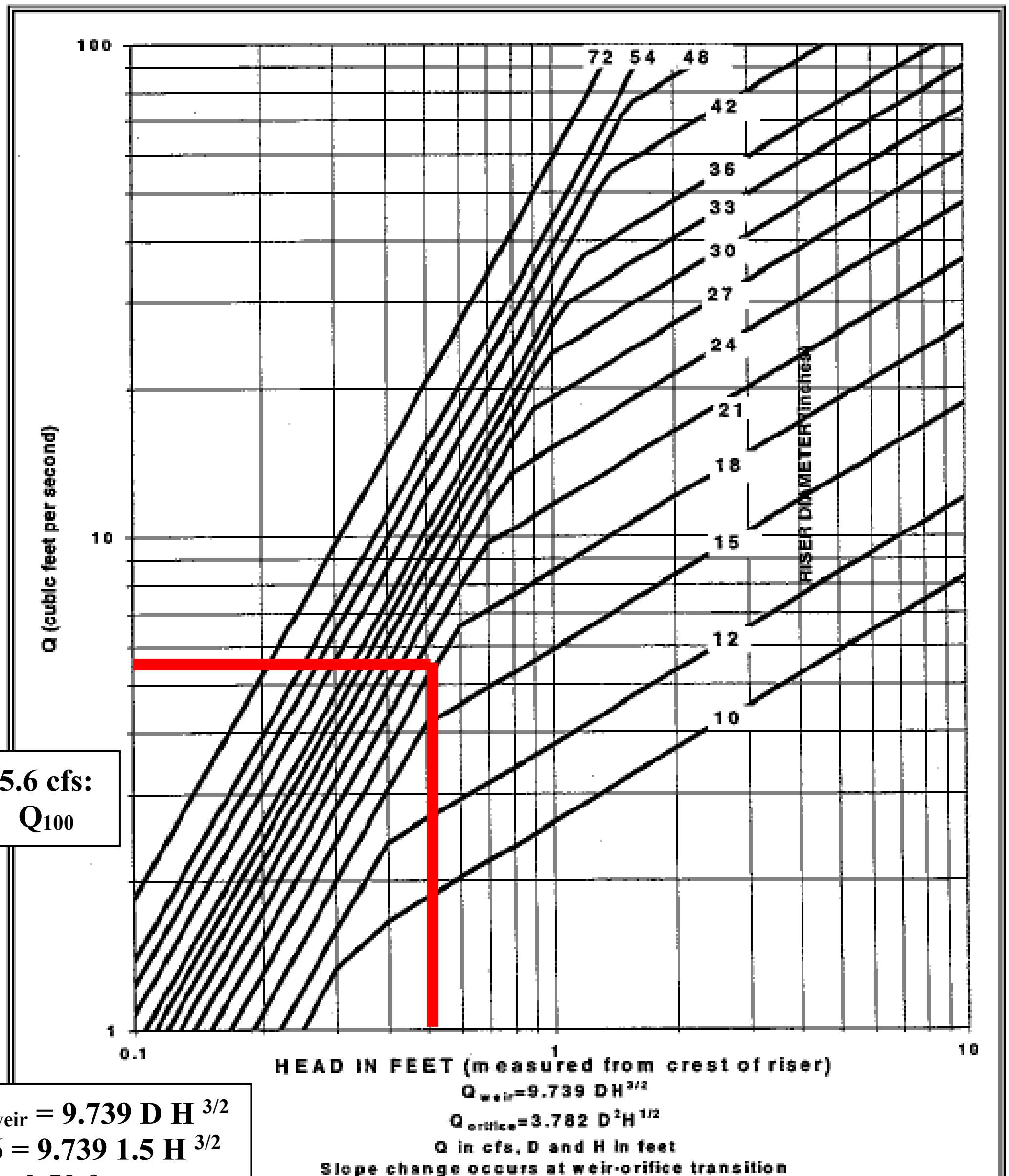


Figure 3.2.16 - Riser Inflow Curves

5.6 cfs:
Q_{100}

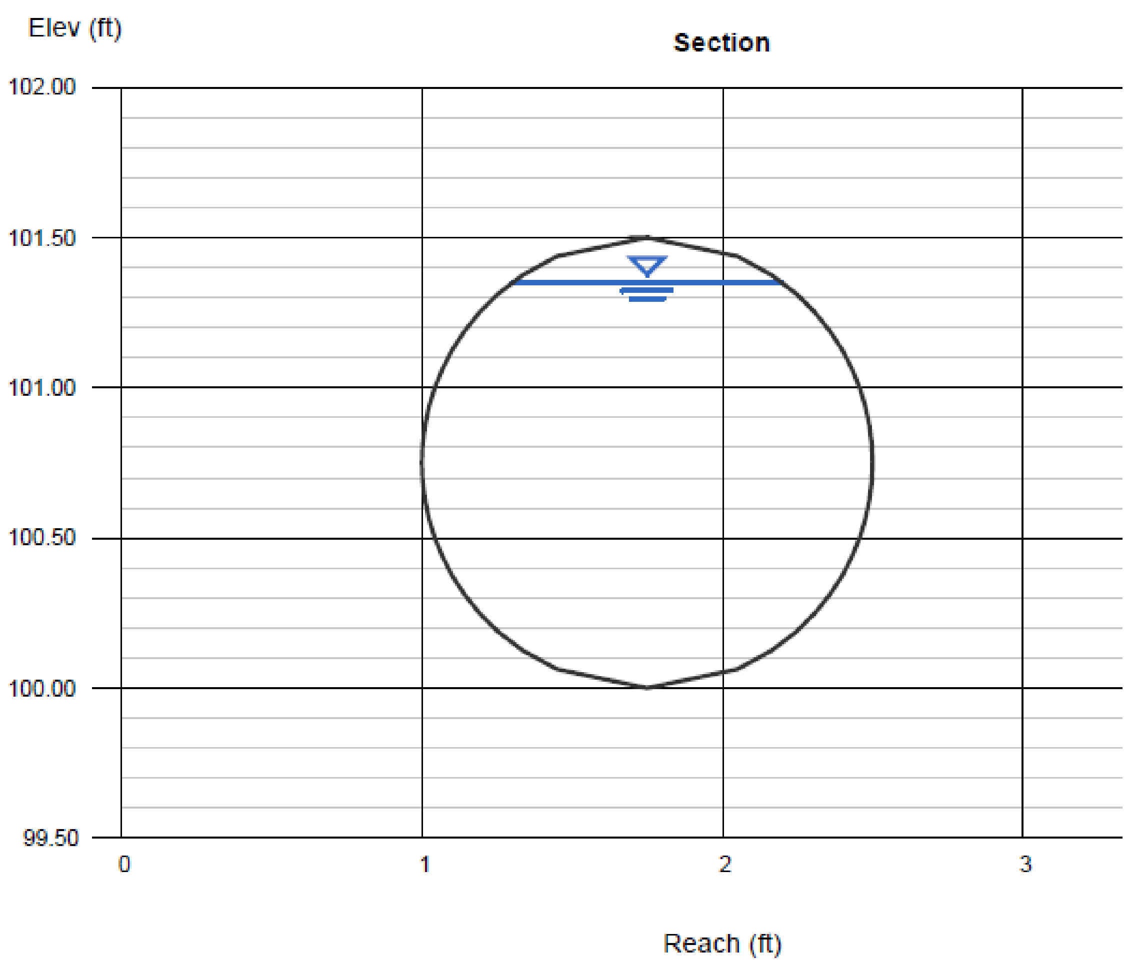
$Q_{weir} = 9.739\ D\ H^{3/2}$
$5.6 = 9.739\ 1.5\ H^{3/2}$
$H = 0.53$ ft
0.53' required
1.0' provided ✓

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. | Saturday, Oct 21 2023

18 inch pipe outfall

Circular		**Highlighted**	
Diameter (ft)	= 1.50	Depth (ft)	= 1.35
		Q (cfs)	= 8.576
		Area (sqft)	= 1.68
Invert Elev (ft)	= 100.00	Velocity (ft/s)	= 5.12
Slope (%)	= 0.50	Wetted Perim (ft)	= 3.75
N-Value	= 0.012	Crit Depth, Yc (ft)	= 1.14
		Top Width (ft)	= 0.90
Calculations		EGL (ft)	= 1.76
Compute by:	Q vs Depth		
No. Increments	= 10		



October 6, 2023

Scott Goodall
Impact Design
5426 Barrett Road, Suite A103
Ferndale, WA 98248

Re: Technical Memo for ABC Recycling Proposed Bellingham Shredder – Stormwater Treatment

This technical memo provides information on proposed stormwater treatment measures for a potential metal recycling & shredding facility to be developed by ABC Recycling. ABC Recycling is a regional metal recycling company with existing facilities in British Columbia, Alberta, and Washington State. This memo is organized into the following sections:

1. Review of Washington State Department of Ecology ISGP Requirements
2. Review of Whatcom County Enhanced Treatment BMP Requirements
3. Discussion of Typical Stormwater Runoff from Metal Recycling & Shredding Facilities
4. Description of Proposed Stormwater Treatment System
5. How the Proposed Stormwater Treatment System Addresses the Treatment Needs

Additionally, a process flow diagram, equipment layout, and draft Operation & Maintenance Manual (IOM) are included as appendices at the end of this document. A final IOM will be generated at the time of equipment installation based on final as-built equipment and site details.

1. Review of Washington State Department of Ecology ISGP Requirements

According to the Washington State Department of Ecology, for many sites, the industrial stormwater general permit (ISGP) provides sufficient and appropriate stormwater management requirements for industrial stormwater. The owner intends to file for general permit coverage and abide by all the requirements of the permit. For the purposes of selecting stormwater treatment measures for the facility, the site will be designated as a "Scrap Recycling" industrial facility which requires additional monitoring against benchmark values for Lead and Petroleum Hydrocarbons. Below is the list of contaminants of concern and their benchmark values:

- Turbidity: Turbidity is a measure of the cloudiness or haziness of water caused by the presence of suspended particles, such as sediment and silt. High turbidity levels in stormwater runoff can indicate erosion and sedimentation issues, potentially harming aquatic ecosystems.
- pH Levels: pH is monitored to ensure that stormwater discharges do not fall outside a specified range, as extreme pH levels can harm aquatic life and water quality.
- Oil Sheen: Facilities often need to control and limit the discharge of oil and grease in stormwater runoff. These substances can be harmful to aquatic ecosystems.
- Zinc: Zinc can be toxic to aquatic organisms and is a common constituent of contaminated stormwater. Sources of zinc in stormwater include tire dust from vehicles and material handling equipment, leaks and drips of vehicle fluids, galvanized surfaces, paints containing zinc oxide, erosion of earthen materials, pesticides, and atmospheric deposition.
- Copper: Copper can be toxic to aquatic organisms and is a common constituent of contaminated stormwater. Sources of copper in stormwater include vehicle brake pads,

architectural copper, pesticides, marine antifouling coatings, vehicle servicing and cleaning, domestic water sources, wood preservatives, and atmospheric deposition.

- Lead: Lead is a heavy metal that can be toxic to aquatic organisms and poses significant health risks to humans. It is also a common constituent of contaminated stormwater runoff. Sources of lead in stormwater can include older buildings with lead-based paints, industrial processes involving lead, vehicle batteries, plumbing materials containing lead, and atmospheric deposition.
- Petroleum Hydrocarbons (Diesel Fractions): Diesel fuel and its components, present in facilities where diesel-powered equipment or vehicles are used, can pose environmental risks if they are released into stormwater runoff. Monitoring and controlling the concentration of petroleum hydrocarbons, such as diesel fuel, helps prevent contamination of receiving waters.

Parameter	Units	Benchmark Value	Analytical Method	Laboratory Quantitation Level	Minimum Sampling Frequency
Turbidity	NTU	25	EPA 180.1 Meter	0.5	1/quarter
pH	Standard Units	5.0 to 9.0	Meter/Paper	±0.5	1/quarter
Oil Sheen	Yes/No	No Visible Oil Sheen	N/A	N/A	1/quarter
Copper, Total	µg/L	14	EPA 200.8	2.0	1/quarter
Zinc, Total	µg/L	117	EPA 200.8	2.5	1/quarter
Lead, Total	µg/L	81.6	EPA 200.8	0.5	1/quarter
Petroleum Hydrocarbons (Diesel Fraction)	mg/L	10	NWTPH-Dx	0.1	1/quarter

2. Review of Whatcom County Enhanced Treatment BMP Requirements

In addition to compliance with ISGP requirements, the project engineer also concluded that Whatcom County Enhanced Treatment BMP requirements will also be simultaneously applicable to stormwater discharges from the facility. A description of Basic and Enhanced Treatment BMP requirements is listed below:

"Basic Treatment BMPs are intended to achieve 80% removal of total suspended solids for influent concentrations that are greater than 100 mg/l, but less than 200 mg/l. For influent concentrations greater than 200 mg/l, a higher treatment goal may be appropriate. For influent concentrations less than 100 mg/l, the BMPs are intended to achieve an effluent goal of 20 mg/l total suspended solids."

"Enhanced Treatment BMPs are intended to provide a higher rate of removal of dissolved metals than Basic Treatment BMPs. Based on a review of dissolved metals removal from Basic Treatment BMPs, a "higher rate of removal" is currently defined as

greater than 30% dissolved copper removal (assuming a dissolved copper influent range of 0.005 to 0.02 mg/l), and greater than 60% dissolved zinc removal (assuming a dissolved zinc influent range of 0.02 to 0.3 mg/l). In addition, Enhanced Treatment BMPs are also intended to achieve the Basic Treatment Performance Goal."

Parameter	Units	Influent Range Assumption	Percent Reduction Target
Total Suspended Solids	mg/L	100 to 200	80%
Copper, Dissolved	mg/L	0.005 to 0.02	30%
Zinc, Dissolved	mg/L	0.02 to 0.3	60%

3. Discussion of Typical Stormwater Runoff from Metal Recycling & Shredding Facilities

WaterTectonics (Everett, WA) has been retained by the client to provide recommendations for appropriate stormwater treatment measures for this potential facility. WaterTectonics designs, builds, and installs treatment systems for clients in industrial stormwater applications. The company was started in 1999 and installed its first treatment system at a metal recycling facility in Washington State in 2004. Since then, it has installed multiple facilities at metal recycling and shredding sites in Washington State and across the US and Canada. WaterTectonics is a member of the Institute of Scrap Recycling Industries (ISRI) and is a regular presenter on stormwater treatment for this industry. The below discussion of typical stormwater runoff is relative to WaterTectonics' specific experience and data sets treating water for metal recycling and shredding facilities.

- Turbidity: Turbidity is almost always above ISGP benchmarks for most recycling and shredding facilities we have worked with. The level of turbidity can be highly variable from < 100 NTU to > 1000 NTU depending on the storm event intensity, current site activity, and other factors.
- pH Levels: pH is typically within ISGP benchmarks for most recycling and shredding facilities we have worked with. If pH is out of range, it is typically on the low side in our experience, with common low values in the 5.5 to 6.5 range.
- Oil Sheen: Oil sheens are periodically visible (for sites without treatment) for most recycling and shredding facilities we have worked with. The sheens are often attributable to a specific spill event or leak on site.
- Copper, Total: Copper is almost always above ISGP benchmarks for most recycling and shredding facilities we have worked with. Typical average influent ranges are 0.1 to 0.3mg/L. Typical spikes can be in the range of 0.4 to 0.8mg/L.
- Zinc, Total: Zinc is almost always above ISGP benchmarks for most recycling and shredding facilities we have worked with. Typical average influent ranges are 0.3 to 1.0mg/L. Typical spikes can be in the range of 1.0 to 5.0mg/L.
- Lead: Copper is rarely above ISGP benchmarks for most recycling and shredding facilities we have worked with. Typical average influent ranges are non-detect to 0.050mg/L. When spikes occur, they are often in the 0.1 to 0.2 mg/L range.

- Petroleum Hydrocarbons (Diesel Fractions): Petroleum hydrocarbons are periodically above ISGP benchmark levels for most recycling and shredding facilities we have worked with. There can be occasional high spikes. The spikes are often attributable to a specific spill event or leak on site. Spikes are typically < 100mg/L in our experience.
- Total Suspended Solids (TSS): Total suspended solids are usually in the 50 to 500mg/L range for most recycling and shredding facilities we have worked with. The level of TSS can be highly variable and depends on the storm event intensity, current site activity, and other factors.
- Zinc, Dissolved: Dissolved zinc is occasionally present in influent stormwater for most recycling and shredding facilities we have worked with. Although total zinc is almost always high, the ratio of dissolved zinc for these types of facilities is often low and sometimes non-detect.
- Copper, Dissolved: Dissolved copper is occasionally present in influent stormwater for most recycling and shredding facilities we have worked with. Although total copper is almost always high, the ratio of dissolved copper for these types of facilities is often low and sometimes non-detect.

4. Description of Proposed Stormwater Treatment System

Water quality flowrates were determined by the project engineer using the Western Washington Hydrology Model (WWHM) for the site. The minimum flowrate was determined to be 0.08cfs (36.2gpm) and was based on the full 2-year release rate for treatment system downstream of detention, where the detention pond was sized based on the flow control requirements of the WSDOE Manual. The owner has requested a treatment system flowrate of 100gpm, providing significant capacity beyond the calculated 36.2gpm minimum flowrate.

The owner will pump water from a detention pond to a new above-ground storage tank. The owner will provide a connection on the tank for WaterTectonics to tie in treatment system source pumps. Water will be pumped out of the storage tank using a flooded-suction transfer pump and transferred to a weir clarifier. Real-time readings for flow and pH are taken to automate water quality and dosing needs. Coagulant and pH adjustment chemical are dosed in-line on the way to the tanks. At the proposed 100gpm processing rate, this provides approximately 180 minutes of settling time in the tank.

Water is then pumped out of the weir tank using a flooded-suction media filter pump that pushes water through a media filter. The filter utilizes glass filtration media, which is effective down to 20-micron particulate removal and is inexpensive and easy to backwash. The filter is conservatively sized with a flux rate ~5gpm/sf.

After passing through the media filters, water enters a real-time water quality valve that analyzes pH and turbidity and adjusts pH as needed. If the water is within the used-defined discharge parameters, it is directed through a polishing filter filled with granulated activated carbon (GAC) and then discharged. If the water is not within the user-defined discharge parameters, it is recirculated back to the detention pond.

Additional filtration or polishing vessels could be added in the future, if required, to enhance water quality or meet changing treatment needs.

The advanced treatment components and media filter will be housed in an 8’x40’ conex. This container will also hold the chemical tote, chemical dosing pumps, pH and turbidity probes, flow meter, media filter, media filter pump and VFD, HMI and control systems, and water quality recirculation loop. The container provides protection against dust, dirt, and equipment damage, extends the life of equipment, reduces maintenance, and improves aesthetics. Additionally, the container provides a secure, lockable location to store spare parts, tools, sampling bottles, maintenance logs, SWPPP documents, and other ancillary items. The system provides protection against freezing conditions with internal heaters.

5. **How the Proposed Stormwater Treatment System Addresses the Treatment Needs**

The proposed treatment system design addresses each of the above contaminants, often through multiple ways, throughout the system. The proposed technology (“Electrocoagulation Subtractive Technology”) is a General Use Level Designation treatment technology in the Construction category. Although it is not listed in the Enhanced treatment category, we believe that it is a more appropriate technology selection for the application. Many of the enhanced treatment BMP options are designed for sites with low TSS and low metals loadings, like roadways and parking lots. Industrial facilities have significantly higher loadings in these areas that would quickly blind or foul many of the listed enhanced treatment BMPs in this application.

A discussion of the various methods employed is shown in the table below:

Parameter	How The Parameter is Addressed in the System Design
Total Suspended Solids	Removal of Total Suspended Solids (TSS) is primarily a function of particle size. Large particulate material can be settled in a basin with sufficient settling time. Although a particle size distribution analysis has not been run on this water (because the site has not yet been built), based on our experience working across many similar applications, we would expect a high percentage of the TSS in this water to be of relatively small particle size (<10µm) and difficult to settle out in a basin of reasonable size. There are often large sources of fine particulate on these types of sites. This fine particulate material is addressed by introducing a coagulant to settle and filter material. It is expected that TSS leaving the media filtration system will regularly be less than 10mg/L, which is important and needed for the GAC system to function effectively.
Turbidity	Turbidity removal often correlates with TSS removal in applications like these. See above description for TSS removal approach. Turbidity can have other sources that give the water a “stained” appearance where it is low in TSS but high in turbidity. This is less common though and would likely arise from a spill or other specific event.
pH	The treatment system proposed includes both pre and post pH adjustment controls. The influent pH adjustment is for raising pH, and the effluent pH adjustment is for lowering pH. This is typically what is needed in these applications. The pH control system reads pH in real-time and then calls for automated injection of the corresponding base or acid. The system is fully automated and displays the data on the HMI screen.
Oil Sheen	Oil sheens will be removed in several ways throughout the system. First, some emulsified oils may be separated using coagulation. Because the system utilizes an over/under clarification design, any oils that are separated and float would be captured in the clarification system. Unless there is a large oil spill or some other

	similar event, it is not expected that additional oil sheen treatment will be needed beyond what is included in the currently proposed design.
Copper – Total & Dissolved	The system can address both total and dissolved copper in the proposed design. Total copper is addressed by introducing a coagulant to destabilize surface charges on particulates that hold them in suspension, settling the material out in a clarification system, filtering the material that has not settled out, and then adsorbing any remaining material in the granular activated carbon (GAC) polishing system. Dissolved copper is addressed by optimizing pH at the influent to lower the solubility of the copper in solution. Copper is least soluble at a higher pH (>8.5 typically). The system is equipped with effluent pH control to lower the pH back within range prior to discharge.
Zinc – Total & Dissolved	The system can address both total and dissolved zinc in the proposed design. Total zinc is addressed by introducing a coagulant to destabilize surface charges on particulates that hold them in suspension, settling the material out in a clarification system, filtering the material that has not settled out, and then adsorbing any remaining material in the granular activated carbon (GAC) polishing system. Dissolved zinc is addressed by optimizing pH at the influent to lower the solubility of the zinc in solution. Zinc is least soluble at a higher pH (>9.2 typically). The system is equipped with effluent pH control to lower the pH back within range prior to discharge.
Lead	The system can address both total and dissolved lead in the proposed design. Total lead is addressed by introducing a coagulant to destabilize surface charges on particulates that hold them in suspension, settling the material out in a clarification system, filtering the material that has not settled out, and then adsorbing any remaining material in the granular activated carbon (GAC) polishing system. Dissolved lead is addressed by optimizing pH at the influent to lower the solubility of the lead in solution. Lead is least soluble at a higher pH (>8.5 typically). The system is equipped with effluent pH control to lower the pH back within range prior to discharge.
Petroleum Hydrocarbons (Diesel Fraction)	Depending on the nature of the petroleum and potential influent loading, some fraction may be removed in upstream processes. Any remaining petroleum hydrocarbons would likely be removed at the granular activated carbon (GAC) stage of the treatment system. If loadings are exceptionally high, additional pre-treatments or additional stages of GAC could be added. However, in our experience, neither of these is expected to be needed.

This document was prepared under the supervision of TJ Mothersbaugh, Director of Sales with support from Aaron Narag, Applications Engineer, and Janelle Leonard, Technical Writer. For any questions, please contact TJ at the information below.

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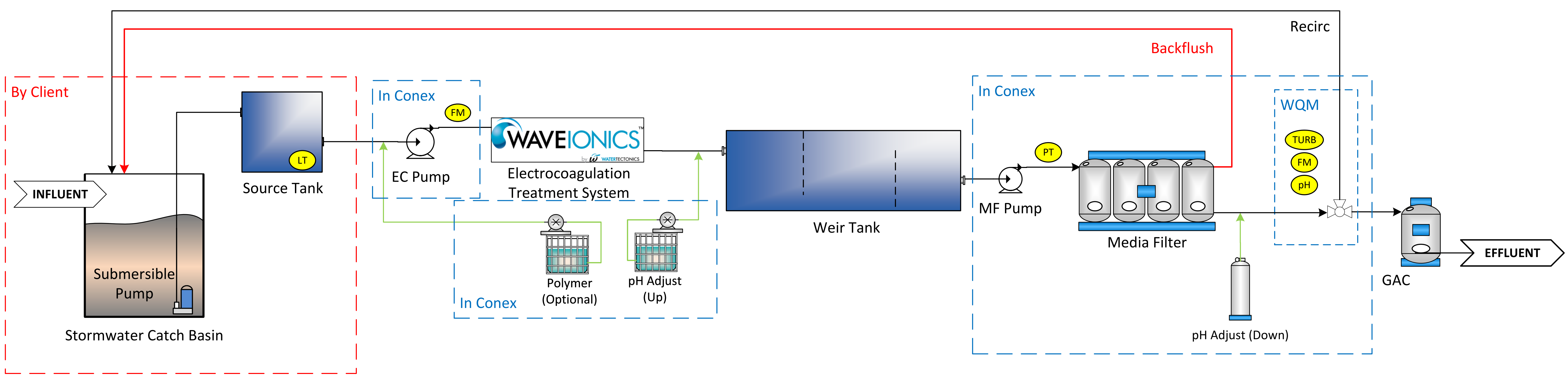
ABC Recycling – Bellingham Shredder

WATERTECTONICS



REVISIONS

REV	DESCRIPTION	DATE	INITIALS	REV	DESCRIPTION	DATE	INITIALS
0	Original	10/3/2023	AJN				

WATERTECTONICS

DRAWING NUMBER:

	INITIALS	DATE
DRAWN BY	AJN	10/3/2023
ENGINEER		
CHECKED BY		
APPROVED BY		
APPROVED BY		

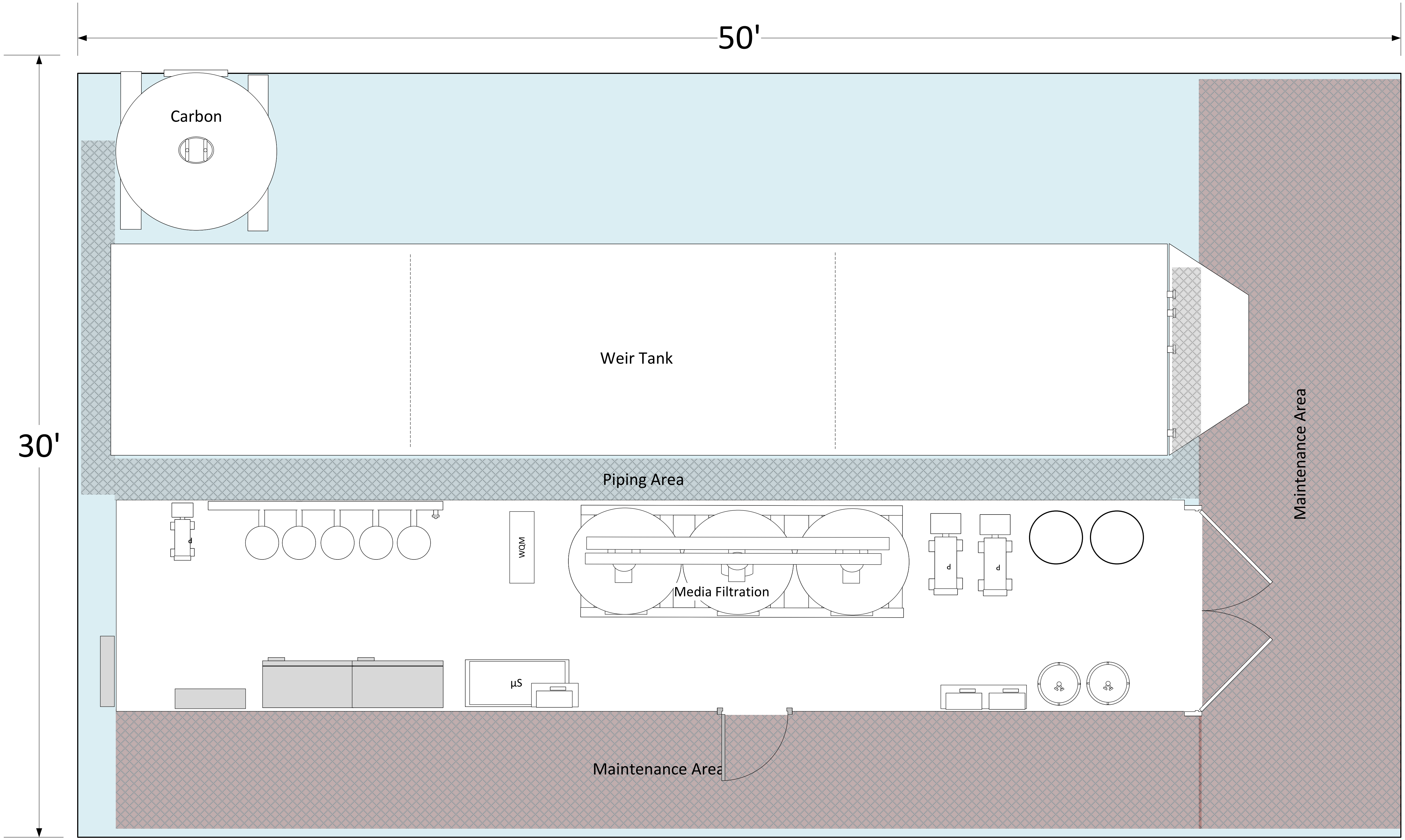
PROJECT

ABC Recycling – Bellingham Shredder – 100gpm Stormwater Treatment System

SHEET 1 OF 1

ABC Recycling – Bellingham Shredder

WATERTECTONICS



REVISIONS

REV	DESCRIPTION	DATE	INITIALS	REV	DESCRIPTION	DATE	INITIALS
0	Original	7/31/2023	AJN				

WATERTECTONICS

DRAWING NUMBER:

	INITIALS	DATE
DRAWN BY	AJN	7/31/2023
ENGINEER		
CHECKED BY		
APPROVED BY		
APPROVED BY		

PROJECT

ABC Recycling - Bellingham Shredder - 100gpm Stormwater Treatment System

SHEET 1 OF 1

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Whatcom County Area, Washington

October 5, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

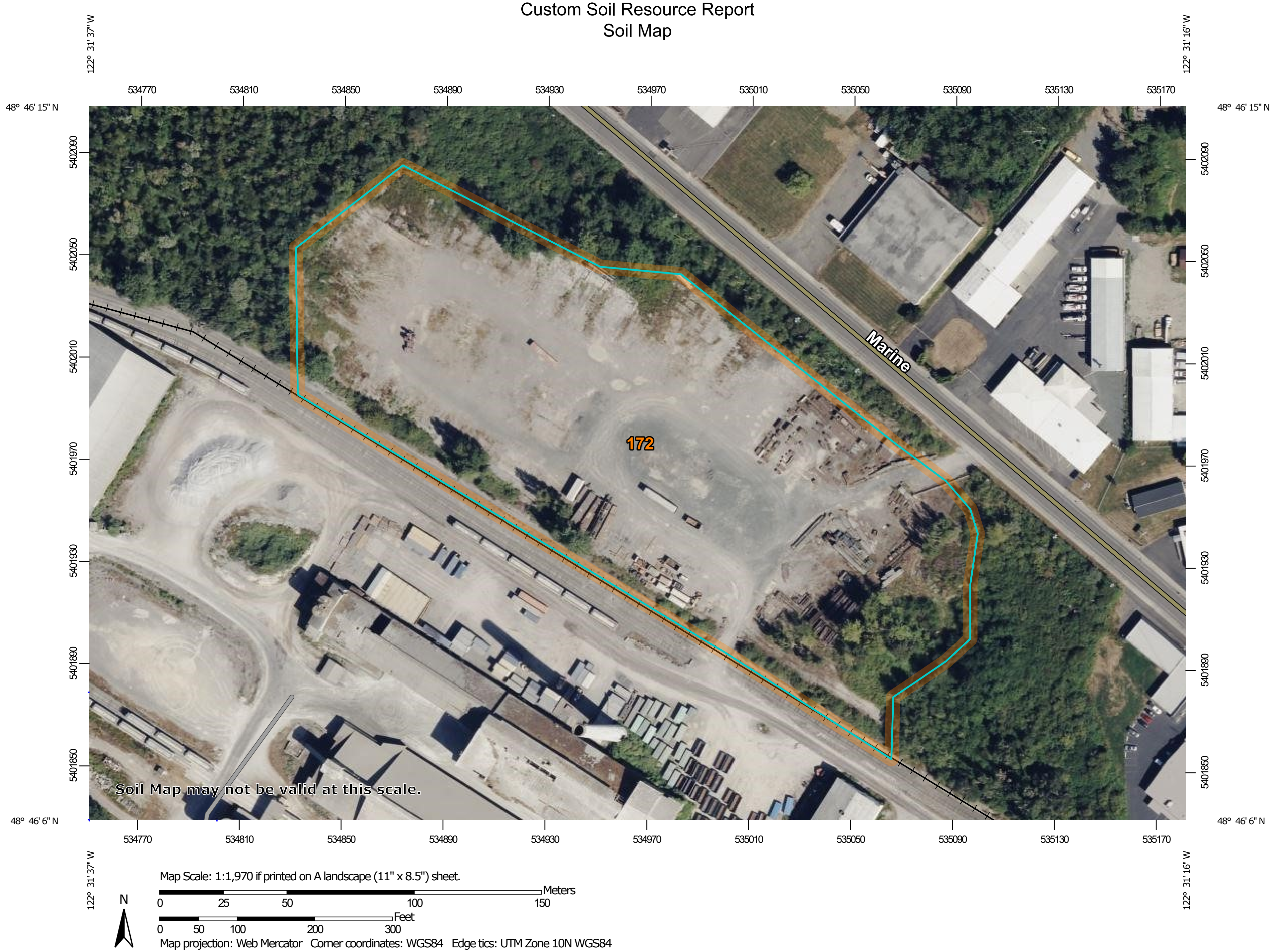
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:1,970 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Whatcom County Area, Washington
Survey Area Data: Version 23, Aug 29, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 14, 2022—Sep 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
172	Urban land-Whatcom-Labounty complex, 0 to 8 percent slopes	7.5	100.0%
Totals for Area of Interest		**7.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Whatcom County Area, Washington

172—Urban land-Whatcom-Labounty complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2j35
Elevation: 0 to 200 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 40 percent
Whatcom and similar soils: 30 percent
Labounty, undrained, and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Whatcom

Setting

Landform: Hillslopes
Parent material: Volcanic ash and loess over glaciomarine deposits

Typical profile

H1 - 0 to 9 inches: ashy silt loam
H2 - 9 to 16 inches: ashy silt loam
H3 - 16 to 26 inches: loam
H4 - 26 to 60 inches: loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Seasonally Wet Soils (G002XN202WA)

Other vegetative classification: Seasonally Wet Soils (G002XN202WA)
Hydric soil rating: No

Description of Labounty, Undrained

Setting

Landform: Depressions
Parent material: Volcanic ash, loess, glaciomarine deposits

Typical profile

H1 - 0 to 10 inches: ashy silt loam
H2 - 10 to 16 inches: loam
H3 - 16 to 35 inches: loam
H4 - 35 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F002XA007WA - Puget Lowlands Wet Forest
Forage suitability group: Wet Soils (G002XN102WA)
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Minor Components

Everett

Percent of map unit: 3 percent
Hydric soil rating: No

Birchbay

Percent of map unit: 2 percent
Hydric soil rating: No

Bellingham, undrained

Percent of map unit: 2 percent
Landform: Depressions
Other vegetative classification: Wet Soils (G002XN102WA)
Hydric soil rating: Yes

Squalicum

Percent of map unit: 1 percent
Hydric soil rating: No

Chuckanut

Percent of map unit: 1 percent
Hydric soil rating: No

Kickerville

Percent of map unit: 1 percent
Hydric soil rating: No

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August 2023
Marine Drive Property

Phase 2 Environmental Assessment Report

Prepared for ABC Recycling

August 2023
Marine Drive Property

Phase 2 Environmental Assessment Report

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Project Number: 202005-01.01
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ABBREVIATIONS

bgs	below ground surface
COPC	constituent of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	conceptual site model
ESA	environmental site assessment
mg/kg	milligrams per kilogram
MTCA	Washington Model Toxics Control Act
NWTPH-Dx	diesel range hydrocarbons and residual range hydrocarbons
NWTPH-Gx	gasoline range hydrocarbons
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
SAP	sampling and analysis plan
TCLP	toxicity characteristic leaching procedure
TEQ	toxic equivalents quotient
TPH	total petroleum hydrocarbons
µg/L	micrograms per liter

1 Introduction

This Phase 2 Environmental Assessment Report describes the sampling and results from the Phase 2 Environmental Site Assessment (ESA) sampling. Sampling was conducted in response to recommendations for further studies identified as part of the Phase 1 ESA for the portion of the Lehigh Hanson-owned property that ABC Recycling is considering purchasing (the Property). The conclusions and recommendations presented in this report represent Anchor QEA’s best professional judgment regarding environmental conditions at the subject Property as of November 2020. These conclusions and recommendations are based on Anchor QEA’s review of the information presented in this report and on state and federal regulations and policies as they exist at the time that this report was prepared.

1.1 Statement of Objectives

The Phase 2 ESA was conducted to determine whether historical uses of the Property or nearby sites have contaminated the Property and will indicate if any contaminants present in soil have migrated into groundwater. This environmental assessment will provide information relevant to identifying, defining, and evaluating property conditions associated with metals, petroleum products, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and dioxins/furans that may pose a risk to human health or the environment, or risk of bodily injury to persons on the Property and thereby give rise to potential liability. This understanding will support ABC Recycling’s due diligence process to aid in determining whether to purchase the Property from Lehigh Hanson.

1.2 Background

The Property is located at 741 Marine Drive in Bellingham, Washington, 98225 (Figure 1; Whatcom County parcel number 380223124302). The Property, encompassing a total area of approximately 18 acres, is unpaved and unimproved except for a gravel lot with temporary equipment, containers, and debris in the central portion of the Property. The remaining portion of the Property for purchase is undeveloped forest. The elevation of the Property ranges from approximately 85 to 100 feet in elevation above sea level. The Property boundary is bordered by Marine Drive to the northeast and by an active railroad spur along the southwestern border. The northwestern boundary generally follows the tree line, while the southeastern boundary is delineated by asphalt or mowed grass associated with the adjacent property at 749 Marine Drive. Lehigh Hanson is the current owner of the Property. The Property is currently occupied by Northwest Recycling and Bellingham Marine. Current site activities include equipment, container, and material storage.

The central portion of the Property that is now the yard was cleared between 1968 and 1971 and established as a materials storage area for the cement plant. From 2006 to present, the yard has remained active with equipment and materials stored on site.

The cement plant adjacent to the Property began operation as Columbia Northwest in 1913. The plant was purchased and sold by multiple different cement companies before the Tilbury Cement Company (later Lehigh Hanson) bought the plant in 1987.

In March 2020, Lehigh Hanson conducted surface soil sampling in the developed yard portion of the Property. Samples were analyzed for total petroleum hydrocarbons (TPHs) and metals. All samples were detect for oil-range TPHs, mercury, arsenic, barium, cadmium, chromium, and lead. Chromatogram results indicated all samples likely contained lube oil and some samples likely contained weathered gasoline and diesel.

Anchor QEA recently conducted a Phase 1 ESA in October 2020 and identified the history of material storage and historical stockpiling of limestone on the Property (Anchor QEA 2020a). Geoprobe borings to groundwater and the collection of soil and groundwater samples as well as test pit soil sampling were recommended in the Phase 1 ESA to provide additional information regarding soil and groundwater quality and to refine information regarding site conditions. It is recognized that there may be potential sources of contamination remaining from historical uses on the Property and potentially from adjacent sites that are currently monitored by the Washington State Department of Ecology and the Environmental Protection Agency; however, no specific sources of on-site contamination were identified through the Phase 1 ESA process.

1.3 Preliminary Conceptual Site Model

A preliminary conceptual site model (CSM) has been developed based on the results of historical research from the Phase 1 ESA (Anchor QEA 2020a) to provide a framework for Phase 2 testing such that a general understanding of site conditions and the presence of contamination is validated through the sampling process. A discussion of the chemicals and media of concern, the fate and transport characteristics of released contaminants, and the potential exposure pathways to human and ecological receptors is included in this section. The CSM will serve as the basis for developing recommendations to inform potential concerns associated with levels of contamination that may influence whether ABC Recycling chooses to purchase the Property.

As described in the Phase 1 ESA (Anchor QEA 2020a), the Property has historically been used to stockpile materials, including limestone, although a comprehensive list of materials stockpiled on site is not available. The central yard portion of the site is currently leased to Northwest Recycling and Bellingham Marine and is used as storage space for a variety of containers, old equipment, and materials. The equipment and materials present on site do not appear to be frequently used or to contain any hazardous materials, are generally in good order, and are often stored on top of steel mats. Shipping and large bin type containers do appear to be moved routinely and a number of them were observed coming and going during both the Phase 1 site reconnaissance and Phase 2 sampling.

Soil, groundwater, and air are media within the Property that could potentially be affected by the constituents of potential concern (COPCs) identified at the site. The historical and current activities identified in the Phase 1 ESA prompted selection of metals, PAHs, TPHs, PCBs, and dioxin/furan congeners as COPCs for soil, groundwater, and air on the Property as a potential exposure risk to human receptors. Soil contamination could result from residual stockpile material; leaching of metals from storage of large metal containers; or surficial spills of gasoline, diesel, heavy oil, or hydraulic fluid from maintenance, storage, or operation of heavy machinery. Soil contamination could also possibly be present from previous undocumented landfilling activities. Groundwater contamination could result from contaminants migrating down to the groundwater from discrete contaminated soil on the Property, or via contaminants migrating from nearby contaminated sites. Air contamination could result from COPCs bound to dust particulates generated when equipment is moving materials or during ground-disturbing activities on the Property.

2 Summary of Work Performed

2.1 Field Activities

Field sampling for the Phase 2 ESA was conducted from October 20, 2020, to October 27, 2020, in accordance with the project Sampling and Analysis Plan (SAP; Anchor QEA 2020b). Figure 1 shows the actual locations of test pit samples and geoprobe boring locations. Up to three soil samples were collected from each of the boring locations and up to two soil samples were collected from each of the test pit locations. While 15 test pit samples were originally planned, an additional two were sampled (TP-16 and TP-17) based on field observations.

2.1.1 Test Pits

Anchor QEA, with support from subcontractor Anderson Environmental Contracting, collected samples from TP-4 through TP-12 and TP-16 via excavator. Anchor QEA collected samples from TP-1 through TP-3, TP-13 through TP-15, and TP-17 via hand auger, as access was not able to be cleared for the excavator to enter the wooded portions of the site. Test pit sampling details are summarized in Table 1. Test pits were used for observation of soil conditions, and for collection of surficial and subsurface soil samples. Sample intervals were collected following the procedures in the SAP (Anchor QEA 2020b) and were based on visual observations of the soils and through discussions with ABC Recycling and the project team. Sample material from the selected sample interval(s) was characterized before placement in sample jars. Each test pit was filled in, compacted with the excavator bucket, and surface graded by the excavator to the extent practicable following sampling. Test pit logs are included in Appendix A and sample photographs are included in Appendix B.

2.1.2 Soil Borings

Anchor QEA, with Anderson Environmental Contracting, advanced and collected soil borings via geoprobe at all six proposed locations (Figure 1). Due to dense surface conditions encountered in the yard area during test pits, a larger geoprobe rig than originally anticipated was used. Soil boring sampling details are summarized in Table 1. Soil borings were used for observation of subsurface soil conditions, and for collection of soil samples. Sample intervals were collected following the procedures in the SAP (Anchor QEA 2020b) based on field observations. Sample material from the selected interval(s) was characterized before placement in sample jars. Boring cuttings were characterized, contained in a 55-gallon drum on site, and will be disposed of at an appropriate disposal facility. Soil boring logs are included in Appendix A and sample photographs are included in Appendix B.

2.1.3 Groundwater

Groundwater samples were collected from temporary wells installed following the collection of soil samples from the soil borings. Groundwater sampling details are summarized in Table 2. Prior to groundwater sampling, the depth to water (below ground surface [bgs]) was measured at each location using an electronic depth-to-water indicator and recorded. Groundwater was purged with a peristaltic pump equipped with dedicated polyethylene tubing until the water quality parameters (pH, specific conductivity, dissolved oxygen, and temperature) stabilized. Once field-measured water quality parameters stabilized, groundwater was then sampled with the peristaltic pump near the bottom of the well screen interval using a low-flow sampling rate (less than 0.5 liter per minute).

Groundwater sampling was attempted at all six geoprobe locations; however, sufficient water for sampling was only found at two locations: GP-3 and GP-6 (Figure 1). Groundwater sample collection logs are included in Appendix A.

2.2 Laboratory Analysis

Following review of field observations, select samples were chosen for analysis through discussions with ABC Recycling regarding the number and type of samples collected, along with the rationale for how the sample fit with ABC Recycling's development goals. All soil samples selected for analysis were analyzed for metals, total solids, PAHs, and TPHs including gasoline, diesel, and residual range hydrocarbons (NWTPH-Gx and NWTPH-Dx). Three soil samples were selected for additional PCBs, dioxin/furan, and toxicity characteristic leaching procedure (TCLP) metals analysis. All groundwater samples were analyzed for dissolved metals, PAHs, and TPHs including NWTPH-Gx and NWTPH-Dx.

Discrete soil samples were collected from each test pit and soil boring at the sample intervals listed in Table 1. Sample containers were kept on ice for transport to the analytical laboratory. All laboratory analyses with the exception of dioxin/furan analyses, were performed at Onsite Environmental Inc. in Redmond, Washington. Dioxin/furan analyses were performed at Vista Analytical Laboratory in El Dorado Hills, California.

A summary of groundwater testing at each monitoring well is provided in Table 2. Sample containers were kept on ice for transport to the analytical laboratory. Laboratory analyses, except as noted, were performed at Onsite Environmental Inc. in Redmond, Washington.

Per the SAP, one field duplicate sample was collected for every 20 samples (Anchor QEA 2020b). A laboratory error during analysis resulted in only one field duplicate being analyzed for the 25 soil samples triggered for analysis, instead of the intended two duplicates. This error is not anticipated to affect the data quality because one field duplicate was analyzed and the standard laboratory quality control samples provide precision measurements. Additional details on sample analysis, validation, and the associated laboratory reports are provided in Appendices C and D.

3 Results

Results of the investigation are summarized in the following subsections. Soil and groundwater sampling logs are included in Appendix A. Data validation reports are included in Appendix C. Laboratory reports are included in Appendix D.

3.1 Physical Features

The samples collected from the wooded area on the northern side of the Property were generally composed of moist, fine-grained soils, with the exception of TP-3 (Figure 1). Unique soil characteristics identified at TP-3 are detailed below.

- TP-3 was selected to document conditions in a mound of fill in the woods noted during the September 30 site walk. The mound was composed of fine, limestone-like material. Debris were present on the mound and within the surrounding area.

The majority of samples collected from the yard were composed of dry, compacted gravel material that makes up the surface backfill of the yard. Native material was encountered in the yard between 4.5 and 5 feet bgs. Samples with unique soil characteristics are detailed below.

- TP-4 is along the northeastern edge of the yard and is the only location in the yard area to have native material at surface through to the depth of the bottom of the test pit (4 feet bgs). Material in this test pit contained brown grey fine-grained soil at the surface and contained more clayey soil with trace organics (wood pieces) towards the bottom of the test pit. Material from the surficial layer (0 to 0.5 feet bgs) was sampled and analyzed.
- TP-5 is located near the northwestern corner of the yard and was chosen for sampling based on observations of creosote-treated debris and creosote odor noted during the September 30 site walk. Surficial material from TP-5 (0 to 0.5 feet bgs) was sampled and analyzed.
- TP-6 is located near TP-4 on the northeastern side of the yard. This test pit was unique in that a slight metallic sheen was noted in the darkly colored fine-grained soil in the top 0 to 0.5 feet. Anthropogenic debris (e.g., hose, tarp, and fabric) was also observed compacted within the material along the test pit sidewall. The unique surficial layer was sampled and analyzed.
- TP-7 is located on the northwestern side of the yard. Native material was encountered at 4.5 feet and the 4.5- to 5-foot interval was sampled and submitted for analysis.
- TP-16 is a location added to the sampling scheme based on field observations. Surficial material was wet, and dark brown in color with coarse-grained soil, as opposed to the fine-grained soil found in surficial samples elsewhere around the yard. Native material was also encountered at this test pit starting at 5 feet bgs. The unique surficial layer and native layer were sampled and the native layer was analyzed.

Samples collected from the wooded area on the southern side of the Property typically consisted of dry to moist fine-grained soil underneath a surficial layer of leaves and organic matter. No test pits from this portion of the Property had significant variations, and there were no test pits with unique materials or debris observed.

Additional notes regarding the lithology of sampled intervals can be found in Table 1. Test pit and soil boring field logs are included in Appendix A and sample photographs are included in Appendix B.

3.2 Soil Samples

Soil samples were collected from 17 test pit and six soil boring locations (Figure 1). Soil samples were collected from the locations and intervals shown in Table 1. Twenty-six soil samples from 21 stations, including two field duplicates, were submitted for analytical testing as shown in Table 1.

Soil samples were screened against the following Washington Model Toxics Control Act (MTCA) criteria and included in Table 3. MTCA cleanup regulation (Chapter 173-340 Washington Administrative Code) provides soil cleanup levels based on the reasonable maximum exposure expected to occur under both current and future site use conditions. MTCA specifies two types of land use: unrestricted land use and industrial land use. For unrestricted land use, soil cleanup levels are based on the reasonable maximum exposure expected to occur under residential land use conditions, which are determined based on a child exposure scenario. No restrictions on future use of the land are required when soil concentrations are below the unrestricted cleanup levels.

Soil cleanup levels for unrestricted land use can be determined using Method A or Method B, as described below:

- **Method A Unrestricted:** These criteria are based on the most stringent of the unrestricted and industrial land uses, and the most stringent of the applicable state and federal laws. The goal of these criteria values is to have no significant adverse effects for the protection and propagation of terrestrial ecological receptors (plants and animals). These are the most conservative criteria and are used as the first screening step for evaluating if a site has any potential contamination.
- **Method B Unrestricted, Direct Contact:** These criteria are based on similar inputs as Method A, but standard Method B protective values are additionally calculated for hazardous substances for which health-based concentrations have not been established, based on the direct contact pathway (i.e., ingestion and dermal absorption). For the purposes of this report, these values should only be considered for those contaminants where a Method A value does not exist.
- **Method B Unrestricted, Protection of Groundwater:** These criteria are calculated to be protective of the highest beneficial use of groundwater, namely drinking water. The

calculation considers the soil-to-groundwater leaching pathway and depends on the mobility of contaminants. The value included in Table 3 is the more stringent of the non-carcinogenic and carcinogenic values. These standard criteria are highly conservative and should be evaluated in conjunction with the empirical site groundwater data, which can be used, together with MTCA groundwater cleanup levels, to demonstrate protection of human health.

Industrial soil cleanup levels in MTCA should only be used at sites that meet the definition of an industrial property under MTCA (Washington Administrative Code 173-340-200), as this property does. These criteria are based on the reasonable maximum exposure expected to occur under industrial land use conditions, which are determined based on an adult worker exposure scenario. Restrictions on future use of the land (e.g., covenants) are required when soil concentrations are above the unrestricted land use criteria, but below the industrial land use criteria. Either Method A or Method C can be used to determine soil cleanup levels for industrial land use, if required, as described below:

- **Method A Industrial:** These criteria are largely equivalent to the Method A Unrestricted values because they are based on the protection of groundwater. The contaminants that have less stringent cleanup levels (e.g., lead) are based on protection of human health under the adult worker scenario as opposed to the child exposure scenario.
- **Method C Industrial:** These criteria are similar to the Method B Unrestricted values but are calculated using a less stringent target cancer risk and less stringent default exposure assumptions. Additionally, Method C values that are protective of the environment only need to be protective of wildlife (e.g., deer), not plants or soil biota. To qualify for use of Method C cleanup levels, the site must include appropriate institutional controls to limit exposure to residual hazardous substances (e.g., a covenant restricting future property use to industrial uses).

Leachable metals in soil (TCLP samples) were additionally screened against toxicity characteristic thresholds for hazardous waste (Table 4). Documentation of the field sampling is provided in Appendix A. Sample photographs are provided in Appendix B. Data validation and laboratory reports are included in Appendix C and Appendix D.

Results for all stations are summarized below. Soil testing results are provided in Tables 3 and 4.

- **Metals:** Metals were detected in all samples, and all samples were above at least one of the MTCA screening levels for at least one analyte. Antimony results exceed MTCA Method B for direct contact at the surface for TP-5, TP-8, and TP-12, as well as in subsurface soils at TP-3 and TP-7. Additionally, surface samples from TP-4 and TP-9 exceed MTCA Method B soil criteria for protection of groundwater. Arsenic results are above MTCA Method B direct contact and protection of groundwater criteria for all soil samples. Arsenic results are above

MTCA Method A (unrestricted and industrial) criteria in surface samples at TP-8 and TP-12, as well as in the subsurface sample at TP-7. Arsenic results are above the MTCA Method C industrial criterion in surface samples at TP-4 and TP-9, as well as in the subsurface sample at TP-3. Arsenic results range from 3.6 to 160 milligrams per kilogram (mg/kg), averaging 25.8 mg/kg. Cadmium was detected in a majority of the samples, and was above Method A (unrestricted and industrial) criteria in the surface at TP-4 and in the subsurface at TP-3 and TP-7. Cadmium results are above MTCA Method B protection of groundwater criteria in the surface at TP-5, TP-6, TP-8, and TP-12, and in the subsurface at GP-4 (7.8 to 8.7 feet bgs), TP-16, and TP-17. Results range from 0.064 to 79 mg/kg, averaging 3.65 mg/kg. Lead was detected in all samples, and results exceed the MTCA Method A industrial criterion for TP-3. Chromium, copper, nickel, mercury, and zinc were detected in all samples, and below all screening criteria. Beryllium was detected but below screening criteria in all samples with the exception of TP-8 and TP-12 where it was not detected. Silver was detected in five samples, and was below screening criteria for all five. Selenium and thallium were non-detect for all samples with the exception of TP-3. Selenium was detected above the MTCA Method B protection of groundwater criterion and thallium was detected above MTCA Method B direct contact criterion.

- **TCLP Metals:** TCLP metals were analyzed at GP-1 (5.7 to 9.7 feet bgs), TP-5, TP-7, and TP-17 (Table 4). All samples were non-detect for TCLP metals with the exception of barium, which was detected in all four samples. Barium concentrations ranged from 450 to 1,500 micrograms per liter (µg/L), averaging 720 µg/L, but were well below screening values indicating that no hazardous waste material was encountered.
- **PAHs:** In the soil boring samples, PAHs were only detected in GP-2 (25 to 27 feet bgs), and GP-4 (7.8 to 8.7 feet bgs). A range of PAHs were detected in all test pit samples, with the exception of TP-2, TP-14, and TP-15. Of the locations with detected results, only three locations have results that exceed MTCA screening criteria. Benzo(a)pyrene is above the MTCA Method A Unrestricted criterion at TP-5 and TP-6, and is above the MTCA Method B direct contact criterion at TP-9. Total carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxic equivalents quotient (TEQ) is detected above the MTCA Method B direct contact criterion at TP-5, TP-6, and TP-9. Total naphthalene is also above the MTCA Method A (unrestricted and industrial) criteria at TP-6. All samples with results above MTCA screening criteria are surficial samples from 0 to 0.5 feet bgs.
- **PCB:** Select samples were submitted for PCB Aroclor analysis. Locations submitted for PCB analysis include GP-1 (5.7 to 9.7 feet bgs), TP-5, TP-6, and TP-7 (Table 1). PCB Aroclors were only detected in the TP-5 sample, which is below all screening criteria for Aroclor 1260 and total PCB Aroclors.
- **NWTPH-Dx:** Diesel and residual range hydrocarbons were detected only in test pit samples. Diesel range hydrocarbons were detected in surficial soils at TP-4, TP-5, and TP-6, and range

from 34 to 71 mg/kg. Residual range hydrocarbons were detected in near-surficial (0.5 to 1.5 feet bgs) soil at TP-1, and in surficial soil (0 to 0.5 feet bgs) at TP-4, TP-5, TP-6, and TP-9. Concentrations for residual range hydrocarbons range from 95 to 410 mg/kg and all are below available screening criteria.

- **NWTPH-Gx:** Gasoline range hydrocarbons were only detected at TP-6. The result was 19 mg/kg, below the 30 mg/kg MTCA Method A (unrestricted and industrial) screening criteria (Table 3).
- **Dioxins/furans:** Select samples were submitted for dioxin/furan analysis. Locations include GP-1 (5.7 to 9.7 feet bgs), TP-5, and TP-6 (Table 1). Dioxin/furans were detected at all tested locations. At TP-5 and TP-6 results were detected for all 26 analytes, while results were detected for seven analytes from GP-1. At TP-5, both Total HxCDD and Total Dioxin/Furan TEQ exceed MTCA Method B direct contact criteria (Table 3).

3.2.1 Deviation from Sampling Plan

For a few test pits, sampled intervals were collected from the bucket of the excavator when samplers were unable to collect sufficient material from the side walls of the test pit due to depth or the consolidated nature of the material. To protect the sample the excavator bucket was cleaned with alconox and rinsed with deionized water before collecting and sampling the material from the bucket.

3.3 Groundwater Samples

Groundwater sampling was attempted at each of the six soil boring locations (Figure 1). A total of three groundwater samples, including one field duplicate, were collected from two locations and submitted for analytical testing as summarized in Table 2. Groundwater samples were screened against the following MTCA criteria and are shown in Table 5.

- **MTCA Method A:** These default criteria are used to establish cleanup levels for potable groundwater at routine sites and sites with relatively few hazardous substances. They are based on the most stringent of the applicable state and federal laws and must be at least as stringent as the surface water cleanup level established. These are the most conservative criteria and should be used as the first screening step for evaluating if a site has any potential contamination.
- **MTCA Method B:** These criteria may be used to establish cleanup levels for potable groundwater at any site. These criteria are based on similar inputs as the Method A, but standard Method B protective values are additionally calculated for hazardous substances for which health-based concentrations have not been established. For the purposes of this report, these values should only be used for those contaminants where a Method A value does not exist.

Documentation of the field sampling is provided in Appendix A. Data validation and laboratory reports are included in Appendix C and Appendix D.

Results for both locations are summarized below. Groundwater testing results are provided in Table 5.

- **Dissolved metals:** Dissolved metals for both samples and the duplicate are below both MTCA Method A and Method B criteria available for groundwater. All samples were detect for arsenic, nickel, selenium, and zinc. Arsenic concentrations range from 0.56 to 0.76 µg/L, well below the Method A Unrestricted criterion of 5 µg/L and the Method B direct contact criterion of 4.8 µg/L. Nickel concentrations range from 13 to 17 µg/L. Selenium ranges from 1.4 to 5.6 µg/L. Zinc concentrations range from 3 to 7 µg/L.
- **PAHs:** PAHs were only above detection limits for the duplicate sample at GP-3-GW. Benzo(b)fluoranthene and total cPAH TEQ were detected in the sample. No MTCA criteria are available for benzo(b)fluoranthene, and the total cPAH TEQ result is below both MTCA Method A and Method B criteria for groundwater.
- **NWTPH-Dx:** Diesel range hydrocarbons and residual range hydrocarbons were detected in the sample and duplicate sample at GP-3-GW. Diesel range hydrocarbons range from 0.11 to 0.12 mg/L, and are below the MTCA Method A Unrestricted criterion (0.5 mg/L). Residual range hydrocarbons range from 0.27 to 0.29 mg/L and are also below the MTCA Method A criterion (0.5 mg/L). No Method B criteria are available for either of these analytes.
- **NWTPH-Gx:** Gasoline range hydrocarbons were not detected in either of the two groundwater samples or the duplicate.

3.3.1 Deviations from Sampling Plan

No deviations occurred during groundwater sampling. Details regarding groundwater sampling are included in Appendix A.

3.4 Potential Exposure Pathways

For a COPC to present a risk to human health or the environment, there must be a pathway from the COPC to the receptor. The COPC-to-receptor pathways judged to be present at the site are discussed by medium in this section.

3.4.1 Soil

Direct ingestion of or dermal contact with soil containing metals, PAHs, TPHs, PCBs, or dioxins/furans is considered a potential exposure pathway. The results indicate exceedances of various screening criteria for both metals and PAHs. As surface soils contain contamination and the Property is not covered with a clean soil cap or an impervious covering such as asphalt or cement, soil containing COPCs on the Property remains available for potential direct contact or ingestion. The surface soil is also susceptible to potential wind- or water-based erosion that could carry COPCs to wetlands on the Property or to surface water drainage ditches that run along the site borders.

3.4.2 Groundwater

Potential exposure pathways exist on the site for shallow groundwater. Contaminants could filter down to groundwater from undiscovered discrete contaminated soil on the Property or migrate from nearby contaminated sites. Based on the topography of the Property and surrounding area, any migration via groundwater would be expected to flow west from Marine Drive. Based on the lithology and site observations noted during the sampling effort, however, there is a limited ability for migration through the surface soils of the yard due to the highly compacted nature of the surficial gravel fill and confining nature of the subsurface clay-like layers.

3.4.3 Air

Generation of airborne dust while moving equipment or materials around, or from soil that is not removed or otherwise contained, could be a direct-contact exposure pathway. Given the highly consolidated nature of the fill material in the yard, airborne dust could likely be managed with implementation of best management practices during ground-disturbing activities on the Property.

4 Conclusions

In general, the results of the sampling agree with the expected site CSM, in that there is surficial surface contamination associated with the backfill material in the yard and the remainder of the areas sampled exhibit indicators of minimal impact from contamination. Based on data collected, there does not appear to be a source of contamination to the Property coming from off-Property sources. Some of the noted exceedances of screening levels are likely attributed to regional background, in particular arsenic, cadmium, and chromium, which are known to be naturally occurring in Whatcom County (Ecology 1994).

4.1 Soils

In the yard area, the surficial compacted gravel material (0 to 0.5 feet bgs) generally exceeded one or more MTCA screening criteria for antimony, arsenic, and cadmium. A few discrete locations exceeded the Method A (unrestricted) criteria for benzo(a)pyrene (TP-5 and TP-6) and total naphthalene (TP-6), and the Method B (direct contact) criteria for benzo(a)pyrene (TP-9) and total cPAH TEQ (TP-5, TP-6, and TP-9).

Shallow native material (approximately 4.5 to 5.5 feet) from the two analyzed subsurface samples in the yard were found to have metals concentrations exceeding the MTCA Method A and Method B (protection of groundwater) criteria (TP-7 and TP-16). However, since groundwater contamination was not detected in shallow groundwater in the vicinity of the yard (see below), this suggests that the presence of metals above the MTCA Method B level is not necessarily impacting groundwater. Native material below 6 feet in the yard and in the forested areas were generally below the MTCA Method A (unrestricted) screening criteria for all COPCs, except for exceedances likely attributed to regional natural background.

Presence of a discrete mound and debris off the northwestern corner of the yard prompted a sample to be collected (TP-3). This sample has numerous screening criteria exceedances (Table 3) and was the only sample to exceed MTCA criteria for lead (Method A), selenium (Method B protection of groundwater), and thallium (Method B direct contact).

The results of TCLP sampling indicate that if portions of the site where samples were collected were to be excavated requiring off-site disposal of excavated material, the soils from these areas would not be classified as hazardous waste. However, the fill soil in the yard areas and debris that are excavated as part of potential development would require the material be managed as "contaminated" for purposes of excavation and disposal.

4.2 Groundwater

Groundwater samples were all below the most conservative MTCA screening levels. This suggests the shallow groundwater below the yard is not contaminated from previous or current site activities. Groundwater was only collected to 16.3 feet bgs, and the possibility of deeper groundwater contamination on site remains. However, based on current data and observed soil units, it suggests that it is unlikely contamination would be present in deeper groundwater due to previous or current activities on the Property.

The possibility of contaminant migration from off site remains as a potential path to soil and groundwater at depths that are below what was sampled on the Property for this effort and should be considered an overall data gap in a full understanding of environmental site conditions. There is also the potential for point sources (i.e., drums) to be buried in the wooded portions of the Property that were not identified in sampling efforts.

The objectives of this sampling effort (Section 1.1) were accomplished in the Phase 2 environmental assessment. Sampling identified a small stockpile of on-site contamination (TP-3), a few discrete locations with PAH contamination in shallow soil intervals, as well as elevated metals concentrations at numerous locations in the fill soils located throughout the yard.

5 References

Anchor QEA, LLC (Anchor QEA), 2020a. *Phase 1 Environmental Site Assessment.* Prepared for ABC Recycling. October 2020.

Anchor QEA, 2020b. *Sampling and Analysis Plan*. Prepared for ABC Recycling. October 2020.

Washington State Department of Ecology (Ecology), 1994. *Natural Background Soil Metals Concentrations in Washington State*. Ecology Publication #94-115.

Tables

Table 1
Soil Collection Summary

Sample Location	Location (NAD83 WA North)		Sample ID	Date Collected	Depth Sampled (ft)	Lithology	Sample Status	
	Northing	Easting					Analyzed [1]	On Hold
Test Pit Soil Samples								
TP-1	1232044.2	650713.1	TP-1-0.5-1.5	10/22/2020 11:45	0.5-1.5	Dry to moist, medium brown, fine grained soil, trace silt, trace gravel (coarse), occasional organics (roots), no odor.	X	
TP-2	1232042.5	650527.9	TP-2-1.5-2	10/22/2020 12:14	1.5-2	Dry to moist, grey-brown, fine grained soil, slight silt, trace clay, no odor.	X	
TP-3	1232184.2	650311.5	TP-3-1.5-2	10/22/2020 12:56	1.5-2	Dry, light grey. fine grained limestone-like material with limestone-like pieces (coarse, angular), chalky odor.	X	
TP-4	1232463.7	650406.8	TP-4-0-0.5	10/21/2020 11:11	0-0.5	Moist, medium brown grey, fine grained soil, trace gravel (fine), slight organics (roots), no odor. Pocket of light grey clayey soil.	X	
			TP-4-3.5-4	10/21/2020 11:33	3.5-4	Moist, light grey, clayey fine grained soil, trace gravel (fine), trace organics (wood pieces), no odor. Interspersed rust-colored soil, trace potentially metallic flakes.		X
TP-5	1232330.0	650233.7	TP-5-0-0.5	10/20/2020 9:57	0-0.5	Moist, dark brown, soft, fine grained soil with gravel (coarse), trace sand, trace organics (wood debris), no odor.	X [2,3]	
TP-6	1232543.6	650283.0	TP-6-0-0.5	10/21/2020 12:13	0-0.5	Moist, light black, fine grained soil, moderate gravel (fine), trace organics (wood), no odor. Slight sheen (metallic). One discrete pocket with metallic flakes.	X [2]	
TP-7	1232515.9	650083.5	TP-7-4.5-5	10/21/2020 10:16	4.5-5	Moist, medium brown, fine grained soil, trace gravel (fine to coarse), trace organics (roots), no odor.	X [2]	
TP-8	1232657.513	650184.4	TP-8-0-0.5	10/20/2020 11:50	0-0.5	Dry, light brown fine grained soil with gravel (fine to coarse), no odor.	X	
			TP-8-2.5-3	10/20/2020 12:17	2.5-3	Moist, light grey brown, fine grained soil with gravel (fine to coarse), trace sand, no odor. Slight rust-like staining.		X
TP-9	1232718.6	649975.9	TP-9-0-0.5	10/20/2020 8:37	0-0.5	Dry, light brown, fine grained soil with gravel (fine to coarse), slight anthropogenic material (potting soil-like pellets) no odor.	X	
TP-10	1232837.6	650104.3	TP-10-2-2.5	10/20/2020 14:35	2-2.5	Moist, light brown grey, gravelly fine grained soil, no odor.		X
TP-11	1232794.6	649899.3	TP-11-0-0.5	10/20/2020 15:12	0-0.5	Dry to moist, light brown, fine grained soil with gravel (fine to coarse), slight anthropogenic material (potting soil-like pellets), no odor.		X
			TP-11-1.5-2	10/20/2020 15:31	1.5-2	Moist, light grown, fine grained soil with sand, trace gravel (fine), no odor.		X
TP-12	1232860.0	649821.7	TP-12-0-0.5	10/20/2020 16:13	0-0.5	Moist, light brown grey, fine grained clayey soil, trace gravel (fine to coarse), trace organics (roots), no odor.	X	
			TP-12-3-3.5	10/20/2020 16:38	3-3.5	Moist, light brown, fine grained soil, trace silt, trace clay, trace organics (wood-like), no odor.		X
TP-13	1233066.3	649872.3	TP-13-1.5-2	10/22/2020 8:37	1.5-2	Moist, light brown, fine grained soil, trace gravel (fine), slightly clayey, trace organics (fine roots), no odor. Pockets of gray, fine sand.	X	
TP-14	1233136.1	649748.0	TP-14-1.5-2	10/22/2020 10:34	1.5-2	Dry to moist, medium brown, fine grained soil, moderate silt, trace gravel (fine), trace organics (roots), no odor.	X	
TP-15	1233072.7	649748.2	TP-15-1-1.5	10/22/2020 10:10	1-1.5	Dry to moist, medium brown, fine grained soil, slight clay, trace gravel (fine to coarse), trace organics (fine roots), no odor.	X	
TP-16	1232942.9	650049.0	TP-16-0-0.5	10/21/2020 14:10	0-0.5	Wet, dark brown, coarse grained soil with sand and gravel (fine to coarse), trace organics (roots), no odor.		X
			TP-16-5-5.5	10/21/2020 15:27	5-5.5	Moist, dark brown, fine grained soil, moderate silt, moderate organics (fine roots), no odor. Trace pockets of light grey, fine grained soil.	X	
TP-17	1233035.6	649785.6	TP-17-1.5-2	10/22/2020 9:26	1.5-2	Dry to moist, dark brown, fine grained soil, trace gravel (fine to coarse, subrounded), moderate silt, moderate organics (fine roots), trace biota (worms), no odor.	X [2]	

Table 1
Soil Collection Summary

Sample Location	Location (NAD83 WA North)		Sample ID	Date Collected	Depth Sampled (ft)	Lithology	Sample Status	
	Northing	Easting					Analyzed [1]	On Hold
Soil Boring Samples								
GP-1	1232389.1	650439.2	GP-1-5.7-9.7	10/26/2020 13:15	5.7-9.7	5.7-9.3 ft: Dry, medium dense, grey with rust-colored spots, clay. @ 9.3 ft: Thin layer of moist, brown grey, sand (fine), trace clay. @ 9.6 ft: Grades to dry, hard, brown clay.	X [2]	
			GP-1-10-12.3	10/26/2020 13:20	10-12.3	10-12 ft: Dry, hard brown clay. 12-12.3 ft: Moist, medium dense, brown sandy clay.		X
			GP-1-20-22	10/26/2020 13:30	20-22	20-20.8 ft: Wet, loose, brown, slightly silty sand (fine). Sand and moisture decreasing. @ 20.8 ft: Grades to no sand. 20.8-22 ft: Dry, hard, brown clay.	X [3]	
GP-2	1232265.9	650233.2	GP-2-8-9	10/26/2020 10:30	8-9	8-9 ft: Dry, light brown with pockets of grey, clayey, silty sand.	X	
			GP-2-14-20	10/26/2020 10:45	14-20	14-20 ft: Dry, hard, brown clay.		X
			GP-2-25-27	10/26/2020 10:50	25-27	25-27 ft: Wet, loose, brown, sand (fine).	X	
GP-3	1232725.4	650246.4	GP-3-12.7-13.4	10/27/2020 12:05	12.7-13.4	12.7-13.4 ft: Moist, dense, grey and brown sandy silt (fine).		X
			GP-3-14.4-15.9	10/27/2020 12:15	14.4-15.9	14.4-15.9 ft: Moist, medium dense, brown, sand (fine).	X	
GP-4	1232625.2	650044.4	GP-4-7.8-8.7	10/27/2020 10:20	7.8-8.7	7.8-8.7 ft: Moist, medium stiff, black, clayey silt, trace organics (fibers). Color grades to brown.	X	
			GP-4-15-18.7	10/27/2020 10:30	15-18.7	15-18.7 ft: Wet, loose, brown, sand (fine), trace silt. Moisture decreases to moist.	X	
GP-5	1233018.8	650012.5	GP-5-6.9-7.5	10/26/2020 15:15	6.9-7.5	6.9-7.5 ft: Moist, medium dense, dark grey, silty clay. Moisture increases in interval.	X	
			GP-5-10-11	10/26/2020 15:25	10-11	10-11 ft: Wet, loose, grey, silty sand (fine).		X
			GP-5-20-22	10/26/2020 15:30	20-22	20-22 ft: Wet, soft, grey, sandy silt with moderate clay. @ 20.5-20.9 ft: Transitions to silty clay.	X	
GP-6	1232952.4	649764.8	GP-6-10.8-15	10/26/2020 16:50	10.8-15	10.8-15 ft: Wet, loose, brown, sand (fine), trace silt. @ 12-12.3 ft: Void space.	X	

Notes:
1. All soil samples were analyzed for metals, total solids, PAHs, NWTPH-Dx, and NWTPH-Gx.
2. Select samples were analyzed for PCBs, dioxins and furans, and/or TCLP metals.
3. Field duplicates collected.

Abbreviations:
ft: feet
NAD83 WA North: State Plane Washington North, North American Datum 83
NWTPH-Dx: diesel and heavy oil range organics
NWTPH-Gx: gasoline range organics
PAHs: polycyclic aromatic hydrocarbons
PCBs: polychlorinated biphenyls
TCLP: toxicity characteristic leaching procedure
TPH: total petroleum hydrocarbons

Table 2
Groundwater Collection Summary

Sample Location	Location (NAD83 WA North)		Sample ID	Date Collected	Depth to Groundwater (ft)	Depth Sampled (ft)	Flow Rate (L/min)
	Easting	Northing					
GP-2	1232265.9	650233.2	--	--	24.0	--	--
GP-3	1232725.4	650246.4	GP-3-GW	10/27/2020 13:15	12.0	16.3	0.50
GP-4	1232625.2	650044.4	--	--	14.0	--	--
GP-6	1232952.4	649764.8	GP-6-GW	10/26/2020 17:50	8.5	12.0	0.50

Notes:

All groundwater samples were analyzed for PAHs, dissolved metals, NWTPH-Dx, and NWTPH-Gx.

Field parameters were monitored to identify when ambient groundwater conditions were reached. Parameters included pH, specific conductivity, temperature, and dissolved oxygen.

Groundwater found but well dried up during purging at GP-2 and GP-4.

Field duplicate collected at GP-3-GW.

Abbreviations:

--: not applicable

ft: feet

L: liter

min: minute

NAD83 WA North: State Plane Washington North, North American Datum 83

NWTPH-Dx: diesel and heavy oil range organics

NWTPH-Gx: gasoline range organics

PAHs: polycyclic aromatic hydrocarbons

Table 3
Soil Analytical Results

					Task	ABC_Recycling_2020	ABC_Recycling_2020	ABC_Recycling_2020
					Location ID	GP-1_2020	GP-1_2020	GP-1_2020
					Sample ID	GP-1-20-22	GP-1-20-22-DUP	GP-1-5.7-9.7
					Sample Date	10/26/2020	10/26/2020	10/26/2020
					Depth	20 - 22 ft	20 - 22 ft	5.7 - 9.7 ft
					Sample Type	N	FD	N
					Matrix	SO	SO	SO
					X	1232389.113	1232389.113	1232389.113
					Y	650439.1881	650439.1881	650439.1881
	MTCA Method A Unrestricted	MTCA Method B Direct Contact	MTCA Method B Protection of Groundwater	MTCA Method A Industrial	MTCA Method C Industrial			
Metals (mg/kg)								
Antimony		32	5.4		1400	3.4 U	3.5 U	3.2 U
Arsenic	20	0.67	2.9	20	88	**6**	**6.3**	**9.3**
Beryllium		160	63		7000	**0.18**	**0.19**	**0.33**
Cadmium	2	80	0.69	2	3500	**0.13**	**0.11**	0.064 U
Chromium	2000	120000	480000	2000	5300000	**42**	**44**	**55**
Copper		3200	280		140000	**35**	**35**	**48**
Lead	250		3000	1000		**2**	**2**	**3.2**
Mercury	2		2.1	2		**0.037**	**0.045**	**0.062**
Nickel		1600	130		70000	**46**	**46**	**58**
Selenium		400	5.2		18000	3.4 U	3.5 U	3.2 U
Silver		400	14		18000	0.17 U	0.18 U	0.16 U
Thallium		0.8	0.23		35	3.4 U	3.5 U	3.2 U
Zinc		24000	6000		1100000	**64**	**62**	**64**
Polycyclic Aromatic Hydrocarbons (µg/kg)								
1-Methylnaphthalene		34000			4500000	4.6 U	4.7 U	4.3 U
2-Methylnaphthalene		320000			14000000	4.6 U	4.7 U	4.3 U
Acenaphthene		4800000	98000		210000000	4.6 U	4.7 U	4.3 U
Acenaphthylene			--			4.6 U	4.7 U	4.3 U
Anthracene		24000000	2300000		1100000000	4.6 U	4.7 U	4.3 U
Benzo(a)anthracene						4.6 U	4.7 U	4.3 U
Benzo(a)pyrene	100	190	3900	2000	130000	4.6 U	4.7 U	4.3 U
Benzo(b)fluoranthene						4.6 U	4.7 U	4.3 U
Benzo(g,h,i)perylene						4.6 U	4.7 U	4.3 U
Benzo(j,k)fluoranthene						4.6 U	4.7 U	4.3 U
Chrysene						4.6 U	4.7 U	4.3 U
Dibenzo(a,h)anthracene						4.6 U	4.7 U	4.3 U
Fluoranthene		3200000	630000		140000000	4.6 U	4.7 U	4.3 U
Fluorene		3200000	100000		140000000	4.6 U	4.7 U	4.3 U
Indeno(1,2,3-c,d)pyrene						4.6 U	4.7 U	4.3 U
Naphthalene	5000	1600000	4500		70000000	4.6 U	4.7 U	4.3 U
Phenanthrene						4.6 U	4.7 U	4.3 U
Pyrene		2400000	650000		110000000	4.6 U	4.7 U	4.3 U
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	100	190	3900	2000		4.6 U	4.7 U	4.3 U
Total Naphthalene (1- and 2-Methyl and Naph) (U = 1/2)	5000			5000		4.6 U	4.7 U	4.3 U

Table 3
Soil Analytical Results

	ABC_Recycling_2020 GP-2_2020 GP-2-25-27 10/26/2020 25 - 27 ft N SO 1232265.941 650233.1583	ABC_Recycling_2020 GP-2_2020 GP-2-8-9 10/26/2020 8 - 9 ft N SO 1232265.941 650233.1583	ABC_Recycling_2020 GP-3_2020 GP-3-14.4-15.9 10/27/2020 14.4 - 15.9 ft N SO 1232725.441 650246.3624	ABC_Recycling_2020 GP-4_2020 GP-4-15-18.7 10/27/2020 15 - 18.7 ft N SO 1232625.216 650044.3943	ABC_Recycling_2020 GP-4_2020 GP-4-7.8-8.7 10/27/2020 7.8 - 8.7 ft N SO 1232625.216 650044.3943	ABC_Recycling_2020 GP-5_2020 GP-5-20-22 10/26/2020 20 - 22 ft N SO 1233018.799 650012.5131	ABC_Recycling_2020 GP-5_2020 GP-5-6.9-7.5 10/26/2020 6.9 - 7.5 ft N SO 1233018.799 650012.5131
Metals (mg/kg)							
Antimony	3.3 U	3.3 U	3 U	3.4 U	**4.6**	3.1 U	3.2 U
Arsenic	**5.3**	**9.8**	**3.9**	**6**	**14**	**5**	**7.5**
Beryllium	**0.15**	**0.43**	**0.11**	**0.21**	**0.37**	**0.16**	**0.36**
Cadmium	**0.12**	**0.077**	**0.078**	**0.13**	**0.9**	**0.093**	**0.093**
Chromium	**31**	**60**	**28**	**41**	**37**	**31**	**43**
Copper	**21**	**49**	**16**	**28**	**30**	**19**	**22**
Lead	**2.9**	**4.8**	**1.3**	**2.4**	**44**	**2**	**4.7**
Mercury	**0.038**	**0.085**	**0.016**	**0.03**	**0.095**	**0.024**	**0.059**
Nickel	**29**	**58**	**24**	**39**	**38**	**28**	**33**
Selenium	3.3 U	3.3 U	3 U	3.4 U	3.8 U	3.1 U	3.2 U
Silver	0.16 U	0.17 U	0.15 U	0.17 U	**0.22**	0.15 U	0.16 U
Thallium	3.3 U	3.3 U	3 U	3.4 U	3.8 U	3.1 U	3.2 U
Zinc	**42**	**72**	**30**	**53**	**120**	**36**	**61**
Polycyclic Aromatic Hydrocarbons (µg/kg)							
1-Methylnaphthalene	**8.4**	4.4 U	4 U	4.6 U	**42**	4.1 U	4.2 U
2-Methylnaphthalene	**13**	4.4 U	4 U	4.6 U	**50**	4.1 U	4.2 U
Acenaphthene	**24**	4.4 U	4 U	4.6 U	4 U	4.1 U	4.2 U
Acenaphthylene	4.4 U	4.4 U	4 U	4.6 U	4 U	4.1 U	4.2 U
Anthracene	**25**	4.4 U	4 U	4.6 U	**5.3**	4.1 U	4.2 U
Benzo(a)anthracene	**66**	4.4 U	4 U	4.6 U	**13**	4.1 U	4.2 U
Benzo(a)pyrene	**21**	4.4 U	4 U	4.6 U	**13**	4.1 U	4.2 U
Benzo(b)fluoranthene	**55**	4.4 U	4 U	4.6 U	**15**	4.1 U	4.2 U
Benzo(g,h,i)perylene	**4.8**	4.4 U	4 U	4.6 U	**12**	4.1 U	4.2 U
Benzo(j,k)fluoranthene	**16**	4.4 U	4 U	4.6 U	4 U	4.1 U	4.2 U
Chrysene	**65**	4.4 U	4 U	4.6 U	**20**	4.1 U	4.2 U
Dibenzo(a,h)anthracene	4.4 U	4.4 U	4 U	4.6 U	**4.7**	4.1 U	4.2 U
Fluoranthene	**200**	4.4 U	4 U	4.6 U	**10**	4.1 U	4.2 U
Fluorene	**37**	4.4 U	4 U	4.6 U	4 U	4.1 U	4.2 U
Indeno(1,2,3-c,d)pyrene	**5.8**	4.4 U	4 U	4.6 U	**7.7**	4.1 U	4.2 U
Naphthalene	**7.8**	4.4 U	4 U	4.6 U	**43**	4.1 U	4.2 U
Phenanthrene	**110**	4.4 U	4 U	4.6 U	**28**	4.1 U	4.2 U
Pyrene	**140**	4.4 U	4 U	4.6 U	**9.4**	4.1 U	4.2 U
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**36.15**	4.4 U	4 U	4.6 U	**17.44**	4.1 U	4.2 U
Total Naphthalene (1- and 2-Methyl and Naph) (U = 1/2)	**29.2**	4.4 U	4 U	4.6 U	**135**	4.1 U	4.2 U

Table 3
Soil Analytical Results

	ABC_Recycling_2020 GP-6_2020 GP-6-10.8-15 10/26/2020 10.8 - 15 ft N SO 1232952.405 649764.8397	ABC_Recycling_2020 TP-1_2020 TP-1-0.5-1.5 10/22/2020 0.5 - 1.5 ft N SO 1232044.174 650713.0992	ABC_Recycling_2020 TP-2_2020 TP-2-1.5-2 10/22/2020 1.5 - 2 ft N SO 1232042.502 650527.9031	ABC_Recycling_2020 TP-3_2020 TP-3-1.5-2 10/22/2020 1.5 - 2 ft N SO 1232184.227 650311.4637	ABC_Recycling_2020 TP-4_2020 TP-4-0-0.5 10/21/2020 0 - 0.5 ft N SO 1232463.701 650406.845	ABC_Recycling_2020 TP-5_2020 TP-5-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232330.012 650233.7296	ABC_Recycling_2020 TP-6_2020 TP-6-0-0.5 10/21/2020 0 - 0.5 ft N SO 1232543.611 650282.9897	ABC_Recycling_2020 TP-7_2020 TP-7-4.5-5 10/21/2020 4.5 - 5 ft N SO 1232515.934 650083.4632
Metals (mg/kg)								
Antimony	3.1 U	**3.4**	3.2 U	**26**	**46**	**6**	**5.3**	**8.8**
Arsenic	**3.6**	**11**	**11**	**93**	**100**	**20 J**	**19**	**25**
Beryllium	**0.13**	**0.37**	**0.49**	**0.25**	**0.36**	**0.23**	**0.26**	**0.19**
Cadmium	**0.092**	**0.44**	0.13 U	**79**	**3.8**	**1**	**1.6**	**3**
Chromium	**27**	**28**	**64**	**28**	**26**	**23**	**11**	**25**
Copper	**15**	**17**	**53**	**59**	**90**	**44**	**37**	**40**
Lead	**1.4**	**14**	**6.9**	**2600**	**130**	**90 J**	**15**	**39**
Mercury	**0.022**	**0.039**	**0.067**	**0.25**	**0.25**	**0.47**	**0.11**	**0.11**
Nickel	**28**	**27**	**58**	**8.1**	**17**	**21**	**9**	**22**
Selenium	3.1 U	3.2 U	3.2 U	**30**	3.1 U	2.8 U	2.8 U	3.5 U
Silver	0.16 U	0.32 U	0.32 U	**11**	**0.5**	0.28 U	0.28 U	0.35 U
Thallium	3.1 U	3.2 U	3.2 U	**8.9**	3.1 U	2.8 U	2.8 U	3.5 U
Zinc	**29**	**98**	**87**	**290**	**250**	**210**	**65**	**140**
Polycyclic Aromatic Hydrocarbons (µg/kg)								
1-Methylnaphthalene	4.2 U	**16**	4.3 U	**35**	**540**	**730 J**	**2500**	**78**
2-Methylnaphthalene	4.2 U	**19**	4.3 U	**50**	**800**	**1100 J**	**4400**	**88**
Acenaphthene	4.2 U	4.4 U	4.3 U	4.1 U	82 U	**73 J**	360 U	**4.7**
Acenaphthylene	4.2 U	4.4 U	4.3 U	4.1 U	82 U	**78 J**	76 U	**7**
Anthracene	4.2 U	4.4 U	4.3 U	4.1 U	**82**	**160 J**	**130**	**14**
Benzo(a)anthracene	4.2 U	4.4 U	4.3 U	**6.4**	**130**	**300 J**	**410**	**27**
Benzo(a)pyrene	4.2 U	4.4 U	4.3 U	**4.4**	82 U	**140 J**	**170**	**23**
Benzo(b)fluoranthene	4.2 U	**7.7**	4.3 U	**8.2**	**130**	**340 J**	**330**	**37**
Benzo(g,h,i)perylene	4.2 U	**6.4**	4.3 U	**4.7**	82 U	**120 J**	**170**	**30**
Benzo(j,k)fluoranthene	4.2 U	4.4 U	4.3 U	4.1 U	82 U	**92 J**	76 U	**7.3**
Chrysene	4.2 U	**7.9**	4.3 U	**14**	**220**	**500 J**	**940**	**40**
Dibenzo(a,h)anthracene	4.2 U	4.4 U	4.3 U	4.1 U	82 U	**47 J**	**87**	**8.3**
Fluoranthene	4.2 U	**7.3**	4.3 U	**7.5**	**170**	**530 J**	**350**	**40**
Fluorene	4.2 U	4.4 U	4.3 U	4.1 U	84 U	**90 J**	**410**	**9.3**
Indeno(1,2,3-c,d)pyrene	4.2 U	4.4 U	4.3 U	4.1 U	82 U	**96 J**	76 U	**22**
Naphthalene	4.2 U	**15**	4.3 U	**22**	**280**	**510 J**	**1200**	**77**
Phenanthrene	4.2 U	**15**	4.3 U	**40**	**620**	**870 J**	**3600**	**89**
Pyrene	4.2 U	**6.2**	4.3 U	**6.6**	**180**	**500 J**	**490**	**37**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	4.2 U	**3.929**	4.3 U	**6.615**	**81.5**	**232.5 J**	**269.7**	**33.56**
Total Naphthalene (1- and 2-Methyl and Naph) (U = 1/2)	4.2 U	**50**	4.3 U	**107**	**1620**	**2340 J**	**8100**	**243**

Table 3
Soil Analytical Results

	ABC_Recycling_2020 TP-8_2020 TP-8-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232657.513 650184.4187	ABC_Recycling_2020 TP-9_2020 TP-9-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232718.597 649975.912	ABC_Recycling_2020 TP-12_2020 TP-12-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232859.97 649821.6908	ABC_Recycling_2020 TP-13_2020 TP-13-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233066.29 649872.2961	ABC_Recycling_2020 TP-14_2020 TP-14-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233136.099 649748.0338	ABC_Recycling_2020 TP-15_2020 TP-15-1-1.5 10/22/2020 1 - 1.5 ft N SO 1233072.659 649748.2293	ABC_Recycling_2020 TP-16_2020 TP-16-5-5.5 10/21/2020 5 - 5.5 ft N SO 1232942.891 650049.0335	ABC_Recycling_2020 TP-17_2020 TP-17-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233035.603 649785.6025
Metals (mg/kg)								
Antimony	**16**	**75**	**32**	3.2 U	3 U	3 U	3.7 U	4.1 U
Arsenic	**42 J**	**160**	**70 J**	**6.5**	**7.2**	**9.9**	**6.4**	**13**
Beryllium	0.11 U	**0.17**	0.11 U	**0.34**	**0.29**	**0.34**	**0.52**	**1.8**
Cadmium	**0.76**	**0.47**	**0.95**	0.13 U	**0.13**	**0.17**	**0.79**	**0.71**
Chromium	**9.1**	**74**	**16**	**50**	**44**	**45**	**43**	**16**
Copper	**38**	**240**	**89**	**41**	**27**	**43**	**30**	**36**
Lead	**26 J**	**110**	**29 J**	**3.9**	**3.8**	**4**	**16**	**31**
Mercury	**0.3**	**0.14**	**0.26**	**0.051**	**0.042**	**0.047**	**0.048**	**0.34**
Nickel	**7.6**	**52**	**13**	**48**	**35**	**48**	**41**	**18**
Selenium	2.6 U	2.6 U	2.7 U	3.2 U	3 U	3 U	3.7 U	4.1 U
Silver	0.26 U	**0.41**	0.27 U	0.32 U	0.3 U	0.3 U	**0.38**	0.41 U
Thallium	2.6 U	2.6 U	2.7 U	3.2 U	3 U	3 U	3.7 U	4.1 U
Zinc	**85**	**280**	**100**	**64**	**49**	**77**	**130**	**42**
Polycyclic Aromatic Hydrocarbons (µg/kg)								
1-Methylnaphthalene	**23 J**	70 U	**31 J**	4.2 U	4 U	4 U	**39**	**250**
2-Methylnaphthalene	**41 J**	**87**	**56 J**	**4.4**	4 U	4 U	**48**	**250**
Acenaphthene	**5.4 J**	70 U	**4.2 J**	4.2 U	4 U	4 U	4.9 U	12 U
Acenaphthylene	3.5 UJ	70 U	3.6 UJ	4.2 U	4 U	4 U	**5.5**	14 U
Anthracene	**8.4 J**	70 U	3.6 UJ	4.2 U	4 U	4 U	**7.1**	**29**
Benzo(a)anthracene	**61 J**	**840**	**13 J**	4.2 U	4 U	4 U	**11**	**43**
Benzo(a)pyrene	**53 J**	**960**	**8.6 J**	4.2 U	4 U	4 U	**11**	**20**
Benzo(b)fluoranthene	**83 J**	**1300**	**18 J**	4.2 U	4 U	4 U	**30**	**25**
Benzo(g,h,i)perylene	**43 J**	**760**	**8.8 J**	4.2 U	4 U	4 U	**23**	**18**
Benzo(j,k)fluoranthene	**20 J**	**410**	3.6 UJ	4.2 U	4 U	4 U	**6**	4.4 U
Chrysene	**72 J**	**770**	**27 J**	4.2 U	4 U	4 U	**25**	**37**
Dibenzo(a,h)anthracene	**11 J**	**180**	3.6 UJ	4.2 U	4 U	4 U	4.9 U	**5.3**
Fluoranthene	**78 J**	**790**	**18 J**	4.2 U	4 U	4 U	**49**	**36**
Fluorene	**8 J**	70 U	**11 J**	4.2 U	4 U	4 U	4.9 U	16 U
Indeno(1,2,3-c,d)pyrene	**40 J**	**740**	**6.7 J**	4.2 U	4 U	4 U	**17**	**9.1**
Naphthalene	**15 J**	250 U	**20 J**	4.2 U	4 U	4 U	**86**	**98**
Phenanthrene	**66 J**	**380**	**58 J**	4.2 U	4 U	4 U	**66**	**160**
Pyrene	**77 J**	**790**	**17 J**	4.2 U	4 U	4 U	**32**	**39**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	**75.22 J**	**1314.7**	**13 J**	4.2 U	4 U	4 U	**17.895**	**28.83**
Total Naphthalene (1- and 2-Methyl and Naph) (U = 1/2)	**79 J**	**247**	**107 J**	**8.6**	4 U	4 U	**173**	**598**

Table 3
Soil Analytical Results

	MTCA Method A Unrestricted	MTCA Method B Direct Contact	MTCA Method B Protection of Groundwater	MTCA Method A Industrial	MTCA Method C Industrial			
					Task	ABC_Recycling_2020	ABC_Recycling_2020	ABC_Recycling_2020
					Location ID	GP-1_2020	GP-1_2020	GP-1_2020
					Sample ID	GP-1-20-22	GP-1-20-22-DUP	GP-1-5.7-9.7
					Sample Date	10/26/2020	10/26/2020	10/26/2020
					Depth	20 - 22 ft	20 - 22 ft	5.7 - 9.7 ft
					Sample Type	N	FD	N
					Matrix	SO	SO	SO
					X	1232389.113	1232389.113	1232389.113
					Y	650439.1881	650439.1881	650439.1881
Dioxin Furans (ng/kg)								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)		13			1700	--	--	0.0323 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)						--	--	0.0816 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)						--	--	0.14 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)						--	--	0.147 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)						--	--	0.165 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)						--	--	**2.6**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)						--	--	**34.6**
Total Tetrachlorodibenzo-p-dioxin (TCDD)						--	--	**0.134**
Total Pentachlorodibenzo-p-dioxin (PeCDD)						--	--	**0.194**
Total Hexachlorodibenzo-p-dioxin (HxCDD)		160				--	--	**1.38 EMPC**
Total Heptachlorodibenzo-p-dioxin (HpCDD)						--	--	**6.48**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)						--	--	0.0247 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)						--	--	0.0301 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)						--	--	0.0256 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)						--	--	0.0403 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)						--	--	0.0387 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)						--	--	0.0675 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)						--	--	0.0418 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)						--	--	0.0849 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)						--	--	0.0805 U
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)						--	--	0.101 U
Total Tetrachlorodibenzofuran (TCDF)						--	--	**0.0999**
Total Pentachlorodibenzofuran (PeCDF)						--	--	0.0301 U
Total Hexachlorodibenzofuran (HxCDF)						--	--	0.0675 U
Total Heptachlorodibenzofuran (HpCDF)						--	--	0.0849 U
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)		13			1700	--	--	**0.13171365**

Table 3
Soil Analytical Results

	ABC_Recycling_2020 GP-2_2020 GP-2-25-27 10/26/2020 25 - 27 ft N SO 1232265.941 650233.1583	ABC_Recycling_2020 GP-2_2020 GP-2-8-9 10/26/2020 8 - 9 ft N SO 1232265.941 650233.1583	ABC_Recycling_2020 GP-3_2020 GP-3-14.4-15.9 10/27/2020 14.4 - 15.9 ft N SO 1232725.441 650246.3624	ABC_Recycling_2020 GP-4_2020 GP-4-15-18.7 10/27/2020 15 - 18.7 ft N SO 1232625.216 650044.3943	ABC_Recycling_2020 GP-4_2020 GP-4-7.8-8.7 10/27/2020 7.8 - 8.7 ft N SO 1232625.216 650044.3943	ABC_Recycling_2020 GP-5_2020 GP-5-20-22 10/26/2020 20 - 22 ft N SO 1233018.799 650012.5131	ABC_Recycling_2020 GP-5_2020 GP-5-6.9-7.5 10/26/2020 6.9 - 7.5 ft N SO 1233018.799 650012.5131
Dioxin Furans (ng/kg)							
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	--	--	--	--	--	--
Total Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	--	--
Total Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	--	--
Total Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--
Total Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	--	--	--	--	--
Total Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	--	--
Total Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--
Total Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--
Total Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	--	--	--	--	--	--	--

Table 3
Soil Analytical Results

	ABC_Recycling_2020 GP-6_2020 GP-6-10.8-15 10/26/2020 10.8 - 15 ft N SO 1232952.405 649764.8397	ABC_Recycling_2020 TP-1_2020 TP-1-0.5-1.5 10/22/2020 0.5 - 1.5 ft N SO 1232044.174 650713.0992	ABC_Recycling_2020 TP-2_2020 TP-2-1.5-2 10/22/2020 1.5 - 2 ft N SO 1232042.502 650527.9031	ABC_Recycling_2020 TP-3_2020 TP-3-1.5-2 10/22/2020 1.5 - 2 ft N SO 1232184.227 650311.4637	ABC_Recycling_2020 TP-4_2020 TP-4-0-0.5 10/21/2020 0 - 0.5 ft N SO 1232463.701 650406.845	ABC_Recycling_2020 TP-5_2020 TP-5-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232330.012 650233.7296	ABC_Recycling_2020 TP-6_2020 TP-6-0-0.5 10/21/2020 0 - 0.5 ft N SO 1232543.611 650282.9897	ABC_Recycling_2020 TP-7_2020 TP-7-4.5-5 10/21/2020 4.5 - 5 ft N SO 1232515.934 650083.4632
Dioxin Furans (ng/kg)								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	**0.761 EMPC**	**0.0977 EMPC**	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	**6.41**	**0.665 J**	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	**11.4**	**0.812 EMPC**	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	**110**	**12.6**	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	**32.2**	**5.14**	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	**2350**	**187**	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	--	--	--	--	**23400**	**1720**	--
Total Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	**13.8 EMPC**	**1.96 EMPC**	--
Total Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	**45**	**4.79 EMPC**	--
Total Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	**669**	**90.1 EMPC**	--
Total Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	**6130**	**409**	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	**1.1**	**0.17 J**	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	**2.99**	**0.189 J**	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	**5.52**	**0.361 J**	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	**10.4**	**0.504 J**	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	**4.97**	**0.332 J**	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	**1.6 J**	**0.0933 J**	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	**8**	**0.225 J**	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	**149**	**10.2**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	**7.02**	**0.509 J**	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	--	--	--	**433**	**43.1**	--
Total Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	**17.6 EMPC**	**0.69 EMPC**	--
Total Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	**65.4**	**4.32 EMPC**	--
Total Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	**264**	**15.1**	--
Total Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	**561**	**41.1**	--
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	--	--	--	--	--	**59.0938 J**	**5.37032 J**	--

Table 3
Soil Analytical Results

	ABC_Recycling_2020 TP-8_2020 TP-8-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232657.513 650184.4187	ABC_Recycling_2020 TP-9_2020 TP-9-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232718.597 649975.912	ABC_Recycling_2020 TP-12_2020 TP-12-0-0.5 10/20/2020 0 - 0.5 ft N SO 1232859.97 649821.6908	ABC_Recycling_2020 TP-13_2020 TP-13-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233066.29 649872.2961	ABC_Recycling_2020 TP-14_2020 TP-14-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233136.099 649748.0338	ABC_Recycling_2020 TP-15_2020 TP-15-1-1.5 10/22/2020 1 - 1.5 ft N SO 1233072.659 649748.2293	ABC_Recycling_2020 TP-16_2020 TP-16-5-5.5 10/21/2020 5 - 5.5 ft N SO 1232942.891 650049.0335	ABC_Recycling_2020 TP-17_2020 TP-17-1.5-2 10/22/2020 1.5 - 2 ft N SO 1233035.603 649785.6025
Dioxin Furans (ng/kg)								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	--	--	--	--	--	--	--
Total Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	--	--	--	--
Total Pentachlorodibenzo-p-dioxin (PeCDD)	--	--	--	--	--	--	--	--
Total Hexachlorodibenzo-p-dioxin (HxCDD)	--	--	--	--	--	--	--	--
Total Heptachlorodibenzo-p-dioxin (HpCDD)	--	--	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	--	--	--	--	--	--
Total Tetrachlorodibenzofuran (TCDF)	--	--	--	--	--	--	--	--
Total Pentachlorodibenzofuran (PeCDF)	--	--	--	--	--	--	--	--
Total Hexachlorodibenzofuran (HxCDF)	--	--	--	--	--	--	--	--
Total Heptachlorodibenzofuran (HpCDF)	--	--	--	--	--	--	--	--
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	--	--	--	--	--	--	--	--

Table 3
Soil Analytical Results

Notes:

- Detected concentration is greater than MTCA Method A Unrestricted screening level.
- Detected concentration is greater than MTCA Method B Direct Contact screening level.
- Detected concentration is greater than MTCA Method B Protection of Groundwater screening level.
- Detected concentration is greater than MTCA Method A Industrial screening level.
- Detected concentration is greater than MTCA Method C Industrial screening level.

Bold: Detected result
-- : not applicable
µg/kg: micrograms per kilogram
cPAH: carcinogenic polycyclic aromatic hydrocarbon
EMPC: estimated maximum possible concentration
FD: field duplicate
ft: feet
J: Estimated value
mg/kg: miligrams per kilogram
MTCA: Model Toxics Control Act
N: Presumptive Evidence
ng/kg: nanogram per kilogram
SO: soil
TEQ: toxic equivalents quotient
U: Compound analyzed, but not detected above detection limit
UJ: Compound analyzed, but not detected above estimated detection limit

Table 4
Soil TCLP Metals Analytical Results

	Task	ABC_Recycling_2020	ABC_Recycling_2020	ABC_Recycling_2020	ABC_Recycling_2020
	Location ID	GP-1_2020	TP-17_2020	TP-5_2020	TP-7_2020
	Sample ID	GP-1-5.7-9.7	TP-17-1.5-2	TP-5-0-0.5	TP-7-4.5-5
	Sample Date	10/26/2020	10/22/2020	10/20/2020	10/21/2020
	Depth	5.7 - 9.7 ft	1.5 - 2 ft	0 - 0.5 ft	4.5 - 5 ft
	Sample Type	N	N	N	N
	Matrix	SO	SO	SO	SO
	X	1232389.1	1233035.6	1232330.0	1232515.9
	Y	650439.2	649785.6	650233.7	650083.5
	Toxicity Characteristic Threshold for Hazardous Waste				
Leachable Metals (µg/L)					
Arsenic	5000	400 U	400 U	400 U	400 U
Barium	100000	**470**	**1500**	**450**	**460**
Cadmium	1000	20 U	20 U	20 U	20 U
Chromium	5000	20 U	20 U	20 U	20 U
Lead	5000	200 U	200 U	200 U	200 U
Mercury	200	5 U	5 U	5 U	5 U
Selenium	1000	400 U	400 U	400 U	400 U
Silver	5000	40 U	40 U	40 U	40 U

Notes:

Detected concentration is greater than Toxicity Characteristic Threshold for Hazardous Waste

Bold: Detected result

U: Compound analyzed, but not detected above detection limit

N: normal sample

µg/L: micrograms per liter

ft: feet

SO: soil

Table 5
Groundwater Analytical Results

	MTCA Method A	MTCA Method B	ABC_Recycling_2020	ABC_Recycling_2020	ABC_Recycling_2020
Location ID			GP-3_2020	GP-3_2020	GP-6_2020
Sample ID			GP-3-GW	GP-3-GW-DUP	GP-6-GW
Sample Date			10/27/2020	10/27/2020	10/26/2020
Depth			16.3 - 16.3 ft	16.3 - 16.3 ft	12 - 12 ft
Sample Type			N	FD	N
Matrix			WG	WG	WG
X			1232725.4	1232725.4	1232952.4
Y			650246.4	650246.4	649764.8
Metals, Dissolved (µg/L)					
Antimony		6.4	1 U	1 U	1 U
Arsenic	5	4.8	**0.68**	**0.56**	**0.76**
Beryllium		32	0.2 U	0.2 U	0.2 U
Cadmium	5	8	0.2 U	0.2 U	0.2 U
Chromium	50	--	1 U	1 U	1 U
Copper		640	1 U	1 U	1 U
Lead	15		0.5 U	0.5 U	0.5 U
Mercury	2		0.025 U	0.025 U	0.025 U
Nickel		320	**13**	**15**	**17**
Selenium		80	**1.4**	**1.4**	**5.6**
Silver		80	0.2 U	0.2 U	0.2 U
Thallium		0.16	0.2 U	0.2 U	0.2 U
Zinc		4800	**7**	**6.6**	**3**
Polycyclic Aromatic Hydrocarbons (µg/L)					
1-Methylnaphthalene		1.5	0.056 U	0.051 U	0.06 U
2-Methylnaphthalene		32	0.056 U	0.051 U	0.06 U
Acenaphthene		960	0.056 U	0.051 U	0.06 U
Acenaphthylene			0.056 U	0.051 U	0.06 U
Anthracene		4800	0.056 U	0.051 U	0.06 U
Benzo(a)anthracene			0.0056 U	0.0051 U	0.006 U
Benzo(a)pyrene	0.1	0.2	0.0056 U	0.0051 U	0.006 U
Benzo(b)fluoranthene			0.0056 U	**0.0053**	0.006 U
Benzo(g,h,i)perylene			0.0056 U	0.0051 U	0.006 U
Benzo(j,k)fluoranthene			0.0056 U	0.0051 U	0.006 U
Chrysene			0.0056 U	0.0051 U	0.006 U
Dibenzo(a,h)anthracene			0.0056 U	0.0051 U	0.006 U
Fluoranthene		640	0.056 U	0.051 U	0.06 U
Fluorene		640	0.056 U	0.051 U	0.06 U
Indeno(1,2,3-c,d)pyrene			0.0056 U	0.0051 U	0.006 U
Naphthalene	160	160	0.056 U	0.051 U	0.06 U
Phenanthrene			0.056 U	0.051 U	0.06 U
Pyrene		480	0.056 U	0.051 U	0.06 U
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)	0.1	0.2	0.0056 U	**0.004126**	0.006 U
Total Naphthalene (1- and 2-Methyl and Naph) (U = 1	160		0.056 U	0.051 U	0.06 U
Total Petroleum Hydrocarbons (mg/L)					
Diesel range hydrocarbons	0.5		**0.12**	**0.11**	0.1 U
Gasoline range hydrocarbons	0.8		0.1 U	0.1 U	0.1 U
Residual range hydrocarbons	0.5		**0.29**	**0.27**	0.2 U

Notes:

Detected concentration is greater than MTCA Method A Groundwater screening level

Detected concentration is greater than MTCA Method B Groundwater Direct Contact screening level

Bold: Detected result

µg/L: micrograms per liter

cPAH: carcinogenic polycyclic aromatic hydrocarbon

FD: field duplicate

ft: feet

mg/L: miligrams per liter

MTCA: Model Toxics Control Act

N: normal sample

TEQ: toxic equivalents quotient

U: Compound analyzed, but not detected above detection limit

WG: groundwater

Figures

LEGEND:

- Geoprobe Boring Location
- Geoprobe Boring Locations with Groundwater Sample
- Test Pit Location (Analysis Triggered)
- Test Pit Location (No Analysis Triggered)
- Extent of Observed Fill
- Approximate Site Boundary

Publish Date: 2020/11/13, 10:34 AM | User: jsfox
Filepath: \\orcas\GIS\Jobs\ABC_Recycling_2005\MarineDrive\Maps\Phase_II_Report\AQ_PhaseII_SampleLocations.mxd

ANCHOR QEA

Figure 1
Actual Sample Locations
Phase 2 Environmental Assessment Report
Marine Drive Property

Appendix A
Field Forms

Daily Log

~~Esquimalt Harbour Remediation Project~~ TK

PROJECT NAME: ABC Recycling **DATE:** 10-19-2020

SITE LOCATION: 741 Marine Drive **PERSONNEL:** TK

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW — LIGHT | MEDIUM | HEAVY

SUNNY | CLOUDY | RAIN | ? — **TEMPERATURE:** °F 53 °C [Circle appropriate units]

TIME	COMMENTS
See Notes on bottom of page for detailed logging	
Equipment on site:	
0756	Arrive onsite, Marker Const. on site check-in @ Lehigh office, sign to Dave Parsons about week/logistics, approval of access paths
0808	Drive over to yard, H+S tailgate, discuss access path w/ Marker Const.
0812	Begin utility locate, check main access points (driveways) - no utilities entering property
0824	continue utility locate checking edges of yard, check along Marine Drive - confirm gas line off edge of sidewalk.
0853	APS done w/ survey - wraps up + departs site
*0756	note from discussion w/ Dave Parsons - NW Recycling is current tenant for the property ABC is considering purchasing
0956	walked paths cut by Marker - arrive first at "Y" in path - L = TP2, R = continue on path to clearing w/ cedar, old encampment. Go on L path out of clearing to location near TP1
1017	Move to southern portion of yard for walk paths
1139	End brush clearing on souther potion - moving TP4 to more mid-location to test mound area
1141	sign out @ main office + depart site
~~Samples delivered to lab:~~	

TK

Notes: Work performed, Phone calls made, Problems Issues/Resolutions, Visitors on site, Deviations from the Workplan Safety infractions, Important comments/instructions to contractors

Signature: Tanna Kamila

pg 1 of 1

Daily Log

ANCHOR QEA

PROJECT NAME: ABC Recycling Phase 2 **DATE:** 10-20-2020

SITE ADDRESS: 741 Marine Drive **PERSONNEL:** MH, TK, JP

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW | LIGHT | MEDIUM | HEAVY

SUNNY | CLOUDY | RAIN | ? **TEMPERATURE:** °F 52 °C

(Circle appropriate units)

TIME	COMMENTS
0838	Arrive onsite, check-in @ Lenigh office
0857	Drive over to yard, H+S tailgate, orientation
	to site/sample locations
0931	on location @ ~~TB~~-5, prep gear
0957	collect TP-5-0-0.5 (6 jars + 1 vial)
1016	~~collect~~ TP-5- @ 1 ft, concrete - no penetration
	w/ bucket of excavator. photo taken
1019	Move/adjust location ~10 ft from 1st attempt (10 ft E)
1041	Attempt #3, ~10 ft N (TP-5-B in GPS) (TP-5-A in GPS)
1053	Attempt #4, ~10 ft S (TP-5-C in GPS)
1101	Fill holes - concrete slab-like surface @ each location
1135	Discuss TP 5/concrete w/ Andy
1140	on location @ TP-8
1150	collect TP-8-0-0.5 (6 jars + 1 vial)
1217	collect TP-8-2.5-3 (9 jars + 1 vial) PCBs + D/F tested
1322	on location @ TP-10
~~1332~~ 1435	collect TP-10-2-2.5, very compact material. collected
	from deionned bucket of excavator to collect suffiant
	material given extremely compact/glacial-till-like
	nature of material. collected dup (12 jars + 2 vials)
1508	on location @ TP-11
1512	collect TP-11-0-0.5 (6 jars + 1 vial)
1531	collect TP-11-1.5-2 (6 jars + 1 vial)
1608	on location @ TP-12
1613	collect TP-12-0-0.5 (9 jars + 1 vial) D/F + PCBs tested
1638	collect TP-12-3-3.5 (6 jars + 1 vial)
1658	Wrap up for day, pack up gear

Signature: Tamara Kamiler

pg 1 of 1

Daily Log

ANCHOR QEA

PROJECT NAME: ARC Recycling Ph 2 **DATE:** 10/21/2020

SITE ADDRESS: 741 Marine Drive **PERSONNEL:** MH, TK

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW | LIGHT | MEDIUM | HEAVY

SUNNY | CLOUDY | RAIN | ? **TEMPERATURE:** °F 51 °C [Circle appropriate units]

TIME	COMMENTS
0758	Arrive onsite, check-in @ Lehigh office
0810	on location @ TP-9, conduct H+S meeting
0837	collect TP-9-0-0.5 (~~4~~ 3 jars + 1 vial) MH
0904	Dig further @ TP-9 to ~2.5 ft
0932	on location @ TP-7, begin digging
1000	Call w/ Matt to discuss sample intervals. Agree
	to proceed and continue sampling intervals
	w/ native/soil material and no longer collect
	surficial samples provided material @ surface is
	the same gravelly fill and highly consolidated
	material found during 10/20/20 sampling. will
	note surficial material at location and sample
	when native material is ~~M~~ found
1016	collect TP-7-4.5-5 (~~4~~ 3 jars + 1 vial) testing
	for PCBs/DF. Native-like material @ 4.5 ft bgs
1053	on location TP-4. PID non-functional
1111	collect TP-4-0-0.5 (~~4~~ 3 jars + 1 vial) test PCBs/DF MH
1133	collect TP-4-3.5-4 (~~4~~ 3 jars + 1 vial) test PCBs/DF MH
1156	on location TP-6
1213	collect ~~FB~~ TP-6-0-0.5 (~~4~~ 3 jars + 1 vial) test PCBs/DF MH
1300	~~collect TP-6~~ Abandon deeper sample - refusal @ 4'
1311	Train passing yard on RR spur
1401	on location TP-16
1410	collect TP-16-0-0.5 (~~4~~ 3 jars + 1 vial) test PCBs/DF MH
1527	collect TP-16-5-5.5 (2 jars + 1 vial)
1540	site walk w/ Matt and Andy
1639	wrap up day/pack up gear
	TK

Signature: Tammy Kamila

pg. 1 of 1

Daily Log

ANCHOR QEA

PROJECT NAME: ABC Recycling **DATE:** Oct. 22, 2020
SITE ADDRESS: 741 Marine Drive **PERSONNEL:** MH, TK

WEATHER:	WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
		SUNNY		CLOUDY		RAIN			?	TEMPERATURE: °F 51 . °C (circle appropriate units)		

TIME	COMMENTS
0727	Arrive onsite, check in @ Lehigh office, prep gear
	for TPs in wooded areas, H+S meeting
0822	on location TP-13
0837	collect TP-13-1.5-2 (3 jars + 1 vial)
0855	Derek Ormerod, Andy Anthony, Brandon Hausmann
	arrive onsite, conduct site walk
0914	on location TP-17
0926	collect TP-17-1.5-2 (3 jars + 1 vial)
0953	on location TP-15
1010	collect TP-15-1-1.5 (3 jars + 1 vial)
1020	on location TP-14
1034	collect TP-14-1.5-2 (3 jars + 1 vial)
1125	on location TP-1
1145	collect TP-1-0.5-1.5 (3 jars + 1 vial)
1155	Hand augered + characterized mound leading
	into wood from under large cedar (adjacent
	to TP-1 location
1202	on location TP-2
1214	collect TP-2-1.5-2 (3 jars + 1 vial)
1240	on location TP-3
1256	collect TP-3-1.5-2 (3 jars + 1 vial)
1310	Packing up sampler
1501	depart site/sign out @ Lehigh office
	TK

Signature: Tamara Kamich

Daily Log

ANCHOR QEA

PROJECT NAME: ABC Recycling **DATE:** 10.26.20

SITE ADDRESS: 741 Marine Drive **PERSONNEL:** MH, DP

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW | ? — LIGHT | MEDIUM | HEAVY

SUNNY | CLOUDY | RAIN **TEMPERATURE:** °F 37 °C (Circle appropriate units)

TIME	COMMENTS
0800	On site, H&S meeting, set up for drilling, station GP-2
1100	Drill to 30'. Samples collected 8-9', 14-20', 25-27'.
	Install screen to develop groundwater 24'-27'.
1145	No groundwater developed. Pack up. Mob to GP-1.
1215	On location, drilling begins.
1340	Reached 30' depth. Three samples collected: 5.7'-9.7', 10'-12.3',
	20'-22'. Duplicate collected on bottom interval sample. Allow
	time for well to develop
1410	Groundwater sample attempted. Filled YSI flow-through cell,
	went dry. Clean up, mobilize to GP-5
1425	On station, start drilling.
1510	Reached 30'. Three samples collected: 6.9-7.5, 10-11, 20-22. Allow
	groundwater to develop.
1550	Groundwater purged ~1/2 gallon and stopped. No GW collected.
	Clean up and mobilize to GP-6.
1615	On station, start drilling.
1650	Reached 30', one sample collected: 10.8-15
1750	Groundwater sample collected from 12'. Cleanup.
1830	Depart site.
	DP

Signature: [signature]

Daily Log

ANCHOR QEA

PROJECT NAME: ABC Recycling **DATE:** 10-27-20

SITE ADDRESS: 741 Marine Drive **PERSONNEL:** MH, DP

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW — LIGHT | MEDIUM | HEAVY

SUNNY | CLOUDY | RAIN | ? — **TEMPERATURE:** °F 45 °C (Circle appropriate units)

TIME	COMMENTS
0830	On site, H&S meeting. Set up on GP-4.
0915	Start drilling. Hard drilling, probe stuck, use auger to
	extract boring. Easy pushing at ~5'. Water encountered ~15'.
1015	Drop casing in hole. Water depth = 14'. Pumped for a few
	minutes then went dry.
1050	Let well recharge for 10 mins. Pumped clear then went
	dry.
1100	Leave probes in ground to let GW recharge. Mob
	geoprobe to GP-3.
1128	Start drilling. Drill to 20', break for lunch and let well
	charge.
1250	Attempt to pump groundwater from GP-4. Purged ~2L &
	went dry.
1300	Set up on GP-3 for groundwater
1305	Start pumping. Sample collected @ 1315 for at 16.3' depth.
	Duplicate collected @ 1320, extra vol. for MS/MSD.
1415	Clean up, pack samples & gear.
1540	Depart site.

DP

Signature: [signature]

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
PROJECT NUMBER 202005-01.01
GEOLOGIST MH
EXCAVATION CONTRACTOR AQ (TB) —
EXCAVATION METHOD hand auger
PIT DIAMETER 3.5"

TEST PIT # TP-1
DATE BEGAN 10/22/20
DATE COMPLETED 10/22/20
TOTAL DEPTH 1.5 ft
SHEET 1 OF 1

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
hand auger	TP-1-0.5-1.5	—	—	.5-1.5	1		dry-moist, medium brown, fine grained soil, trace silt, occasional organics (roots), trace gravel (coarse), no odor
					2		@1.5ft: Refusal @ substantial layer of gravel
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		TB

Notes: Collected archive. 3 jars + 1 vial

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
TEST PIT #: TP-2
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 1/22/20
GEOLOGIST: MH
DATE COMPLETED: 1/22/20
EXCAVATION CONTRACTOR: —
TOTAL DEPTH: 2'
EXCAVATION METHOD: hand auger
SHEET 1 OF 1
PIT DIAMETER: 3.5"

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
							0-0.75' moist dark brwn, organic layer
				~~0.75-2~~ MH	1		0.75-2' dry to moist gray brwn fine
hand auger	TP-2-1.5-2	—	—	1.5-2			grained soil with slight silt, trace clay
					2		no odor, no organics
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		TK

Notes: collected arsenic. 3 jars + 1 vial

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
TEST PIT # TP3
PROJECT NUMBER 202005-01.01
DATE BEGAN 10/22/20
GEOLOGIST MH
DATE COMPLETED 10/22/20
EXCAVATION CONTRACTOR —
TOTAL DEPTH 2 ft
EXCAVATION METHOD hand auger
SHEET 1 OF 1
PIT DIAMETER 3.5"

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
							0-1' medium gray
					1		
hand auger	TP-3-1.5-2	—	—	1.5-2	2		dry, light gray, fine grained, limestone like with coarse angular limestone pieces chalky, odor, no organics
					3		
					4		2' hit refusal w/ coarse piece layer
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		MH

Notes: collected archive. Total = 3 jars + 1 vial

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
PROJECT NUMBER 202005-01.01
GEOLOGIST MH
EXCAVATION CONTRACTOR AEC
EXCAVATION METHOD excavator
PIT DIAMETER 3 Ft

TEST PIT # TP 4
DATE BEGAN 10/21/20
DATE COMPLETED 10/21/20
TOTAL DEPTH 4 Ft
SHEET 1 OF 1

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-4-0-0.5	–	–	0-0.5			0-0.5: moist, medium brown grey, fine grained soil, trace gravel (fine), pocket of light grey clayey soil, ~~trace debris~~ slight organics (roots), no odor
					1		
					2		
					3		
excavator	TP-4-3.5-4	–	–	3.5-4			3.5-4: moist, light grey, clayey fine grained soil, trace fine gravel, trace organics (wood pieces), interspersed rust-colored soil, potentially metallic flakes (trace), no odor
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: ~~4~~ 3 jars + 1 vial for each interval

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling Ph.2
TEST PIT #: TP-5
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10/20/2020
GEOLOGIST: MH
DATE COMPLETED: 10/20/2020
EXCAVATION CONTRACTOR: AEC
TOTAL DEPTH: 1 ft
EXCAVATION METHOD: excavator
SHEET 1 OF 1
PIT DIAMETER: 3 ft

Field location of test pit: NW corner of yard

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-5-0-0.5	0	—	0-0.5			moist, dark brown, soft, fine
					1		grained soil, trace (5%) sand, trace
							wood debris, w/ gravel (coarse), no odor
					2		
							@ 1 ft concrete present
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 6 x 8oz jars + 1 vial

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SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST: MH
EXCAVATION CONTRACTOR: AEC
EXCAVATION METHOD: excavator
PIT DIAMETER: 3 ft

TEST PIT #: TP 6
DATE BEGAN: 10/21/20
DATE COMPLETED: 10/21/20
TOTAL DEPTH: 4 ft
SHEET 1 OF 1

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-6-0-0.5	—	—	0-0.5			0-0.5ft: moist, light black, fine grained soil, trace organics (wood), moderate coarse gravel, moderate fine gravel, one discrete pocket w/ metallic flakes, no odor. Slight sheen (metallic) @ 1'-2' anthro material in fill @ 3'9" - still in compacted gravel - fill material @ 4' - refusal
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: ~~4~~ 3 jars + 1 vial. Anthropogenic material (hose, tarp, fabric) in consolidated fill ~1-3 ft in depth)

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling TEST PIT # TP 7
PROJECT NUMBER 202005-01.01 DATE BEGAN 10/21/20
GEOLOGIST MH DATE COMPLETED 10/21/20
EXCAVATION CONTRACTOR AEC TOTAL DEPTH 5 ft
EXCAVATION METHOD excavator SHEET 1 OF 1
PIT DIAMETER 3 ft

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
	N/A						surface - 4.5 ft was same
					1		gravelly fill (very consolidated)
							same as 10/20/2020 sample
					2		locations - not sampled
					3		
excavator	TP-7-4.5-5	0		4.5-5	4		moist, medium brown, fine grained
							soil, trace fine gravel, trace
					5		coarse gravel, trace organics
							(root-like), no odor
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		TK

Notes: TK 3 jars + 1 vial

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SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling TEST PIT # TP8

PROJECT NUMBER 202005-01.01 DATE BEGAN 10/20/20

GEOLOGIST MH DATE COMPLETED 10/20/20

EXCAVATION CONTRACTOR AEC TOTAL DEPTH 3 ft

EXCAVATION METHOD excavator SHEET 1 OF 1

PIT DIAMETER 3 ft

Field location of test pit

~~NW corner of yard~~ TK

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-8-0-0.5	0	—	0-0.5			dry, light brown, fine grained soil
					1		w/ gravel (fine - coarse), no odor
					2		
							moist, light grey brown, fine
excavator	TP-8-2.5-3	0	—	2.5-3	3		grained soil w/ gravel (fine-coarse)
							trace sand, no odor, slight
					4		staining, rust-like
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes:

9-8oz jars, 1 vial

*PCBs + D/Fs tested

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SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
TEST PIT #: TP 9
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10/2/20
GEOLOGIST: MH
DATE COMPLETED: 10/2/20
EXCAVATION CONTRACTOR: AEC
TOTAL DEPTH: 2 Ft
EXCAVATION METHOD: excavator
SHEET 1 OF 1
PIT DIAMETER: 4 Ft

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-9-0-0.5	0	–	0-0.5			dry, light brown, fine grained
					1		soil w/ gravel (f-c), ~~trace~~ slight
							anthropogenic material (potting
					2		soil like - pelets). Rust-colored
							soil streak approx 10 inches bgs
					3		refusal @ ~2 Ft
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 6 jars + 1 vial

MH

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST: MH
EXCAVATION CONTRACTOR: AEC
EXCAVATION METHOD: excavator
PIT DIAMETER: 3 ft

TEST PIT #: TP-10
DATE BEGAN: 10/20/20
DATE COMPLETED: 10/20/20
TOTAL DEPTH: 2.5 ft
SHEET 1 OF 1

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
—	~~TP-10-0-0.5~~	0	~~TP~~	~~0-0.5~~			no sample collected
					1		
excavator	TP-10-2-2.5	0	—	2-2.5	2		@2.5: moist light brown grey, ~~fine grad~~ dense to very dense, gravelly fine grained soil, no odor. collected dup sample. Deconned bucket of excavator and sampled from bucket to get sufficient volume for sample
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: material very compacted throughout 0-2.5 ft interval
collected dup

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
TEST PIT #: TP-11
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10/20/20
GEOLOGIST: MH
DATE COMPLETED: 10/20/20
EXCAVATION CONTRACTOR: AEC
TOTAL DEPTH: 2 ft
EXCAVATION METHOD: excavator
SHEET 1 OF 1
PIT DIAMETER: 4 ft

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-11-0-0.5	0	—	0-0.5			0-0.5: dry to moist, light brown,
					1		fine grained soil w/ fine to coarse
							gravel (~15% fine, 15% coarse)
excavator	TP-11-1.5-2	0	—	1.5-2	2		slight anthro material, no odor
							anthro = like white beads in potting soil
					3		1.5-2 ft: moist, light brown
							fine grained soil, slight w/ sand,
					4		trace (~10%) gravel, no odor
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

TB

Notes: 6 jars + 1 vial for each interval

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
TEST PIT #: TP 12
PROJECT NUMBER: 202005-01-01
DATE BEGAN: 10/20/2020
GEOLOGIST: MH
DATE COMPLETED: 10/20/20
EXCAVATION CONTRACTOR: AEC
TOTAL DEPTH: 3.5
EXCAVATION METHOD: excavator
SHEET 1 OF 1
PIT DIAMETER: 2 ft

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-12-0-0.5	0		0-0.5			moist, light brown-grey,
					1		fine grained, clayey soil, trace
							~~biota~~ organics (roots), trace gravel
					2		(fine to coarse), no odor
excavator	TP-12-3-3.5	0		3-3.5	3		moist, light brown, fine grained
							soil, trace silt, trace clay, trace
					4		~~biota~~ (wood-like), no odor
							organics
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 0-0.5 ft interval tested for D/F + PCBs

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
PROJECT NUMBER 202005-01.01
GEOLOGIST MH
EXCAVATION CONTRACTOR —
EXCAVATION METHOD hand auger
PIT DIAMETER 3.5"

TEST PIT # TP13
DATE BEGAN 10/22/20
DATE COMPLETED 10/22/20
TOTAL DEPTH: 2 ft
SHEET 1 OF 1

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
hand auger	TP-13-1.5-2	—	—	1.5-2	1		moist, light brown, pockets of gray fine sand, fine grained soil with trace fine gravel, trace organics (fine roots), slightly dry, no odor
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 3 jars + 1 vial. Archive collected

MH

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
PROJECT NUMBER 202005-01.01
GEOLOGIST MH
EXCAVATION CONTRACTOR —
EXCAVATION METHOD hand auger
PIT DIAMETER 3.5"

TEST PIT # TP-14
DATE BEGAN 10/22/20
DATE COMPLETED 10/22/20
TOTAL DEPTH 2
SHEET 1 OF 1

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
							organic layer more gray and clayey
					1		
hand auger	TP-14-1.5-2	—	—	1.5-2			dry to moist, medium brown, fine grained soil moderate silt trace organics (thin and thick roots), trace fine gravel, no odor
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 3 jars + 1 vial. collected archive

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling

TEST PIT #: TP15

PROJECT NUMBER: 202005-01.01

DATE BEGAN: 10/22/20

GEOLOGIST: MH

DATE COMPLETED: 10/22

EXCAVATION CONTRACTOR: —

TOTAL DEPTH: 2 ft

EXCAVATION METHOD: hand auger

SHEET 1 OF 1

PIT DIAMETER: 3.5"

Field location of test pit

SAMPLING DATA							
SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
							Same as below
hand auger	TP-15-1-1.5	—	—	1-1.5	1		dry to moist, medium brown fine grained soil slight ~~moderate~~ clayey, very trace organics (fine roots) trace fine to coarse gravel, no odor
					2		Same down to 2'
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: 3 jars + 1 vial. Archive collected

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
TEST PIT # TP16
PROJECT NUMBER 202005-01-01
DATE BEGAN 10/21/20
GEOLOGIST MH
DATE COMPLETED 10/21/20
EXCAVATION CONTRACTOR AEC
TOTAL DEPTH 5.5ft
EXCAVATION METHOD excavator
SHEET 1 OF 1
PIT DIAMETER 3 ft

Field location of test pit: S end of yard adjacent to gate/driveway to Marine DR.

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
excavator	TP-16-0-05	0	—	0-0.5			0-0.5: wet, dark brown, coarse grained soil w/ sand and w/ f-c gravel, trace organics (roots), no odor
					1		
					2		
					3		
					4		Native starts @ ~5 ft
excavator	TP-16-5-5.5	0	—	5-5.5	5		5-5.5ft: moist, dark brown, fine grained soil, moderate silt, moderate organics (fine roots) trace pockets of light grey fine grained soil
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		MH

Notes:
3 jars + 1 vial for 0-0.5 ft interval
2 jars + 1 vial for 5-5.5ft interval

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME ABC Recycling
TEST PIT # TP 17
PROJECT NUMBER 202005-01.01
DATE BEGAN 10/22/20
GEOLOGIST MH
DATE COMPLETED 10/22/20
EXCAVATION CONTRACTOR —
TOTAL DEPTH 3.5 ft
EXCAVATION METHOD hand auger
SHEET 1 OF 1
PIT DIAMETER 3.5"

Field location of test pit

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
							Same as below
					1		
hand auger	TP-17-1.5-2	0.0	~	1.5-2			dry to moist dark brown fine grained soil with
					2		trace fine to coarse subrounded gravel
							moderate silt, moderate organics (fine roots)
					3		no odor, trace biota (worm)
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		TE

Notes: 3 Jars + 1 vial ~~archive~~ Archive collected TE

ANCHOR QEA

SOIL TEST PIT LOG

CLIENT/PROJECT NAME: ABC Recycling
TEST PIT #: N/A
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10/22/20
GEOLOGIST: MH
DATE COMPLETED: 10/22
EXCAVATION CONTRACTOR: —
TOTAL DEPTH: 1 ft
EXCAVATION METHOD: hand auger
SHEET 1 OF 1
PIT DIAMETER: 3.5"

Field location of test pit: mound under cedar tree adjacent to TP-1

SAMPLING METHOD	SAMPLE NUMBER	FID / PID (ppm)	RECOVERY (feet)	DEPTH SAMPLED (feet)	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION
hand auger	N/A	—	—	N/A	1		0-1 ft: dry to moist, reddish brown, fine grained soil, hit refusal w/ roots - multiple locations attempted
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		

Notes: ~~SOT~~ hand augered + characterized only added per Derek's recommendation

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
BORING #: GP-1
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10.26.20
GEOLOGIST/ENGINEER: MH, DP
DATE COMPLETED: 10-26-20
DRILLING CONTRACTOR: AEC
TOTAL DEPTH: 32.5 ft
DRILLING METHOD: Geoprobe
PAGE 1 OF 3
WATER DEPTH: NA
TIME: 1215
HOLE DIAMETER ____ inches
SAMPLING METHOD ____ in. by ____ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		0-25" - Void						
					2		@25" - Wet, soft, slightly						
					3		silty, medium brown,						
							f-c sandy organic matter, trace gravel						
					4		@29" - Dry, black, silty,						
					5		charcoaly, gravel.						
		GP-1-5.7-9.7			6		@33" - Dry, grey, sand						
					7		with trace clay, occasional,						
					8		peach & white, chalky						
							conglomerates.						
					9		@41" - Moist, grey to						
					10		black clayey sand.						
					1		@46" - Black, medium						
					2		stiff clay, trace organics						
					3		4" piece of nylon rope.						
					4		@53" - Medium-dense,						
					5		dry, grey w/rust spots						
							clay						
					6		@57" - Moist, med-dense						
					7		brown organic clay.						
					8		@61" - SAA @53"						
					9		@112" - Moist, brown &						
					0		grey f-sand, trace clay						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 5.7-9.7 ft, 10-12.3 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST/ENGINEER: MH, DP
DRILLING CONTRACTOR: AEC
DRILLING METHOD: Geoprobe
WATER DEPTH: NA
HOLE DIAMETER: inches
BORING #: GP-1
DATE BEGAN: 10/26/20
DATE COMPLETED: 10/26/20
TOTAL DEPTH: 32.5 ft
PAGE 2 OF 3
TIME: 1215
SAMPLING METHOD: in. by ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	Field location of boring / LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@115"- Dry, hard, brown clay.						
					2		@144"- Moist, medium-dense, brown sandy						
					3		clay.						
					4		@152"- Increasing						
					5		moisture content to wet.						
					6		157"-173"- Void						
					7		@173"- Wet, loose, brown						
					8		slightly silty f-sand						
					9		Decreasing sand, decreasing moisture						
					0		@187"- SAA @115"						
					1		@230"- SAA @173"						
					2		@250"-255"- ~~fP~~ decreasing sand to none						
					3								
					4		255"- SAA @115"						
					5		@269"- Dry, medium dense, dark brown silt						
					6		@271"- Dry, loose, grey						
					7		and brown f-sand.						
					8		276"-288"- Void						
					9		@288"- Wet, loose, f-sand, brown & grey. Occasional						
					0		clay balls, trace gravel						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 5.7-9.7 ft, 10-12.3 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling

PROJECT NUMBER: 202005-01.01

GEOLOGIST/ENGINEER: MH/DP

DRILLING CONTRACTOR: AEC

DRILLING METHOD: Geoprobe

WATER DEPTH NA

HOLE DIAMETER ______ inches

BORING # GP-1

DATE BEGAN 10/26/20

DATE COMPLETED 10/26/20

TOTAL DEPTH 32.5 ft

PAGE 3 OF 3

TIME 1215

SAMPLING METHOD ______ in. by ______ ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLING DATA: SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	Field location of boring / LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@320" - Moist, loose, brown & grey f-sand						
					2		@323" - Layer of Dry, grey, hard gravel						
					3								
					4		@328" - Dry, med-dense, brown clayey, gravelly sand						
					5								
					6		@331 - SAA @115"						
					7		@336 - Dry, loose, grey & brick-colored gravelly f-c sand						
					8								
					9								
					0		338-340 - layer of SAA @115"						
					1								
					2		@340" = Dry, loose grey angular gravel, transitions to f-c sand						
					3								
					4								
					5		@390" - End of boring.						
					6								
					7								
					8								
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 5.7-9.7 ft, 10-12.3 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME:	ABC. Recycling	BORING #	GP-2
PROJECT NUMBER:	202005-01.01	DATE BEGAN	10.26.20
GEOLOGIST/ENGINEER:	MH, DP	DATE COMPLETED	10.26.20
DRILLING CONTRACTOR:	AEC	TOTAL DEPTH	30'
DRILLING METHOD:	Geoprobe	PAGE 1 OF 3	
WATER DEPTH	NA	TIME	1100
HOLE DIAMETER	2 inches	SAMPLING METHOD	in. by ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
GP							Moist, dark grey sand						
					1		@ 2'. 22" of wood						
					2		@ 29"- 32" Moist, hard,						
					3		brown clay.						
					4		Grey & black gravelly						
							silt						
					5		@35" light grey-brown						
					6		sand. slightly gravelly						
					7		@37" Dry, grey, gravelly						
					8		sand						
					9		@42" - Black, charcoaly						
							sandy						
					0		@48" - Dry, reddish						
					1		grey clay						
					2		@51" - SAA @ 42"						
					3		@52" - SAA @ 35"						
							@55" - SAA - @48"						
					4		@58" - SAA@42"						
					5		@59" - wood waste						
					6		@61" - SAA@37"						
							@64" - SAA @ 42" w/						
					7		~~rock~~ gravel						
					8		@69" - Dry, medium brown ~~silt~~, silty sand, moderate						
		GP2-8-9 @ 1030			9		organic matter						
					0		@ 82". Dry, light brown						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled: 8-9 ft,
14-20 ft,
25-27 ft

w/ pockets of grey, clayey silty sand

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
BORING # GP-2
PROJECT NUMBER: 202005-01.01
DATE BEGAN 10.26.20
GEOLOGIST/ENGINEER: MH, DP
DATE COMPLETED 10.26.20
DRILLING CONTRACTOR: AEC
TOTAL DEPTH 30'
DRILLING METHOD: Geoprobe
PAGE 2 OF 3
WATER DEPTH NA
TIME 1100
HOLE DIAMETER 2 inches
SAMPLING METHOD ___ in. by ___ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		~105" increasing clay content						
					2								
					3		@120" - Dry, dark grey gravelly sand.						
					4								
					5		128" - Wood						
					6		@132" - Dry, hard, brown clay.						
					7		@147" - Damp, brown,						
					8		f sand.						
		GP2-14-20 @ 1045			9		@151" - Damp, brown,						
					0		silty f-sand.						
					1		@163" - SAA @ 132"						
					2		@240" - Wet, brown,						
					3		fine-grain sand, trace angular gravel.						
					4		@254" - Dry, hard, brown						
					5		clay.						
					6		@269 - Dry, medium						
		GP2-25-27			7		dense, brown f-sand.						
					8		@271" - Dry, loose, brown M. Sand						
					9		@298" - Wet, loose, brown						
					0		f-sand						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled: 8-9 ft, 14-20 ft, 25-27 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST/ENGINEER: MH, DP
DRILLING CONTRACTOR: AEC
DRILLING METHOD: Geoprobe
WATER DEPTH: NA
HOLE DIAMETER ______ inches

BORING # GP-2
DATE BEGAN 10-26-20
DATE COMPLETED 10-26-20
TOTAL DEPTH 30'
PAGE 3 OF 3
TIME 1100
SAMPLING METHOD ______ in. by ______ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@324" - Dry, loose, brown m-sand.						
					2								
					3		@350" - End of boring.						
					4								
					5								
					6								
					7								
					8								
					9								
					0								
					1								
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 8-9 ft, 14-20 ft, 25-27 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
BORING #: GP-3
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10.27.20
GEOLOGIST/ENGINEER: MH, DP
DATE COMPLETED: 10.27.20
DRILLING CONTRACTOR: AEC
TOTAL DEPTH: 20'
DRILLING METHOD: Geoprobe
PAGE 1 OF 2
WATER DEPTH
TIME: ~~1100~~ 1128
HOLE DIAMETER ___ inches
SAMPLING METHOD ___ in. by ___ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		0-19" - Void.						
					2		@19": Moist, medium-dense, gravelly sand, brown & grey.						
					3		@24" - Grades to dry						
					4		37"-39": Color changes						
					5		to ~~tan~~.						
					6		@43"-45" - 2 x 1" angular						
					7		gravel.						
					8		@56" - Moist, med-stiff,						
					9		black, clayey silt, trace organic fibers.						
					0								
					1		@67": Dry, dense, grey with rust colored						
					2		mottling clayey silt.						
					3		@120": Damp, dense,						
					4		grey & brown silty clay.						
					5		130"-132" - Occasional gravel						
					6		~132" - grades to clayey silt						
					7		@152" - grades to f-sandy silt						
					8								
					9		@160": Dry, med-dense, brown, slightly f-sandy,						
					0		clayey silt.						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 12.7 - 13.4 ft, 14.4 - 15.9 ft

GW also sampled. See GW log GW dup collected

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
BORING #: GP-3
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10.27.20
GEOLOGIST/ENGINEER: MH, DP
DATE COMPLETED: 10.27.20
DRILLING CONTRACTOR: AEC
TOTAL DEPTH: 20'
DRILLING METHOD: Geoprobe
PAGE 2 OF 2
WATER DEPTH
TIME: 1128
HOLE DIAMETER ___ inches
SAMPLING METHOD ___ in. by ___ ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLING DATA: SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	Field location of boring / LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@163 - SAA @120"						
					2		@168" - SAA 152" w/ interbedded layers of brown clay.						
					3								
					4		@171" - SAA @163"						
					5		@173 - Moist, med-dense brown f-sand.						
					6		@190" - Damp, dense, grey clay						
					7								
					8		@210" - Grades to med dense.						
					9								
					0		@240" - End of boring						
					1								
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled 12.7 - 13.4 ft, 14.4 - 15.9 ft

GW also sampled, see GW log. GW dup collected.

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
BORING #: GP-4
PROJECT NUMBER: 202005-01.01
DATE BEGAN: 10.27.20
GEOLOGIST/ENGINEER: MH, DP
DATE COMPLETED: 10.27.20
DRILLING CONTRACTOR: AEC
TOTAL DEPTH: 20'
DRILLING METHOD: Geoprobe
PAGE 1 OF 2
WATER DEPTH: NA
TIME: 0915
HOLE DIAMETER ____ inches
SAMPLING METHOD ____ in. by ____ ft

Field location of boring:

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@0": Dry, hard, grey & white gravelly silt, moderate f-e sand.						
					2								
					3		@55": Dry, hard, grey silty clay.						
					4								
					5		60-78": Void						
					6		@78": Damp, loose, brown gravelly f-sand, trace silt.						
					7								
					8		@80 - SAA @0"						
					9		@93": Damp, med-stiff, black, clayey silt, trace organic fibers						
					0								
					1								
					2		@ Grades to brown						
					3		@104": Damp, hard, greenish grey clay.						
					4								
					5		120"-128": Void.						
					6		@128": SAA @0"						
					7		@135": ~~SAA @104~~" Dry hard grey silt.						
					8		@147": Grades to brown dry, hard silt						
					9		@180": Wet, loose, brown f-sand, trace silt.						
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 7.8-8.7 ft, 15-18.7 ft.

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST/ENGINEER: MH DP
DRILLING CONTRACTOR: AEC
DRILLING METHOD: Geoprobe
WATER DEPTH N/A
HOLE DIAMETER ____ inches

BORING # GP-4
DATE BEGAN 10.27.20
DATE COMPLETED 10.27.20
TOTAL DEPTH 20'
PAGE 2 OF 2
TIME 0915
SAMPLING METHOD ____ in. by ____ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLING DATA: SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		Decreasing moisture content to moist.						
					2		@22'- Damp, med-stiff brown clay.						
					3								
					4		@24.0'- End of boring.						
					5								
					6								
					7								
					8								
					9								
					0								
					1								
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled 7.8-8.7 ft, 15-18.7 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005-01.01
GEOLOGIST/ENGINEER: MH, DP
DRILLING CONTRACTOR: AEC
DRILLING METHOD: Geoprobe
WATER DEPTH N/A
HOLE DIAMETER ____ inches

BORING # GP-5
DATE BEGAN 10.26.20
DATE COMPLETED 10.26.20
TOTAL DEPTH 30 ft
PAGE 1 OF 3
TIME 1425
SAMPLING METHOD ____ in. by ____ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		0-21" - Void						
					2		@21" - Wet, loose, grey & brown sand.						
					3		@24" - Dry, white w/ gravelly silt.						
					4								
					5		@43" - Dry, dense, grey vf-sand, trace c-sand.						
					6								
					7		@48" - Dry, hard, grey, silt w/trace c-sand						
					8		@60-79" - Void.						
					9		@79" - Dry, med-dense, white, silt.						
					0								
		GP-5-6.9-7.5			1		@83" - Moist, med-dense dark grey, silty clay.						
					2								
					3		@86" - increasing moisture content						
					4								
					5		@90"-111" - Dry, grey, hard clay.						
					6		~100" - color changes to brown						
					7								
					8		@111" - Moist, loose, grey & brown clayey f-sand.						
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled 6.9-7.5 ft, 10-11 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME:	ABC Recycling	BORING #	GP-5
PROJECT NUMBER:	202005-01.01	DATE BEGAN	10/26/20
GEOLOGIST/ENGINEER:	MM, DP	DATE COMPLETED	10/26/20
DRILLING CONTRACTOR:	AEC	TOTAL DEPTH	30 ft
DRILLING METHOD:	GeoProbe	PAGE	2 OF 3
WATER DEPTH	NA	TIME	1425
HOLE DIAMETER ____ inches		SAMPLING METHOD	____ in. by ____ ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	Field location of boring / LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		@120": Wet, loose, grey silty f-sand.						
					2		133"-135" - pocket of clay.						
					3								
					4		@136": Moist, dense, brown, clay w/ trace silt						
					5								
					6								
					7		165"-167" - pocket of sandy clay.						
					8								
					9		@229": 1" pocket of dark brown slightly silty f-sand						
					0								
					1		@231": Damp, loose, grey f-c sand w/ trace gravel.						
					2								
					3		@234-240" - void.						
					4		@240": wet, soft grey sandy silt w/ moderate clay.						
					5								
					6		@246" - transitions to silty clay,						
					7								
					8		@251": SAA @ 240"						
					9		@264: Moist, loose, dark grey, m-sand.						
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 6.9-7.5 ft, 10-11 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling	BORING # GP-5
PROJECT NUMBER: 202005-01.01	DATE BEGAN 10/26/20
GEOLOGIST/ENGINEER: MH / DP	DATE COMPLETED 10/26/20
DRILLING CONTRACTOR: AEC	TOTAL DEPTH 30 ft
DRILLING METHOD: Geoprobe	PAGE 3 OF 3
WATER DEPTH N/A	TIME 1425
HOLE DIAMETER ___ inches	SAMPLING METHOD ___ in. by ___ ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLING DATA: SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	Field location of boring / LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	RESIDUAL	POCKET PEN. (TSF)
					1		300"-312" - Void						
					2		@312" - moist, loose, grey silty sand.						
					3		320"-328" - Void						
					4		@328 - Damp, med-dense,						
					5		grey f-c sand, trace						
					6		gravel.						
					7		@348" - Dry, med-dense,						
					8		gravelly, f-c sand.						
					9		@360" end of boring.						
					0								
					1								
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled 6.9-7.5 ft, 10-11 ft, 20-22 ft

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling
PROJECT NUMBER: 202005.01.01
GEOLOGIST/ENGINEER: MH, DP
DRILLING CONTRACTOR: AEC
DRILLING METHOD: Geoprobe
WATER DEPTH
HOLE DIAMETER ______ inches

BORING # GP-6
DATE BEGAN 10.26.20
DATE COMPLETED 10.26.20
TOTAL DEPTH 30'
PAGE 1 OF 2
TIME 1615
SAMPLING METHOD ______ in. by ______ ft

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
					1		0-18" Void						
					2		@ 18" - Moist, med-dense, grey, silty, gravelly f sand.						
					3								
					4		@22" - Moist, med-dense, siltly sand, trace gravel.						
					5								
					6								
					7		@24" - Dry, dense, light grey, f-c sandy silt.						
					8		@50" - Moist, stiff, black charcoaly clayey silt w/ moderate rusty colored sand.						
					9								
					0								
					1		@55 - Moist, stiff, black, silty clay						
					2								
					3		@60" - Damp, med-stiff, brown silty, f-sand.						
					4								
					5		@69" - Dry, stiff, brown clay						
					6								
					7		@111" - Moist, med-dense, grey gravelly, sand silt.						
					8								
					9		@118" - SAA @ 55"						
					0								

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: sampled 10.8 - 15 ft

GW also sampled, see GW log

ANCHOR QEA

BORING LOG

CLIENT/PROJECT NAME: ABC Recycling	BORING #: GP-6
PROJECT NUMBER: 202005-01.01	DATE BEGAN: 10.26.20
GEOLOGIST/ENGINEER: MH, DP	DATE COMPLETED: 10.26.20
DRILLING CONTRACTOR: AEC	TOTAL DEPTH: 30'
DRILLING METHOD: Geoprobe	PAGE 2 OF 2
WATER DEPTH	TIME: 1615
HOLE DIAMETER ____ inches	SAMPLING METHOD ____ in. by ____ ft

Field location of boring

SAMPLING METHOD	BLOW COUNTS (140-lb Hammer)	SAMPLE ID	RECOVERY (ft recovered/ft driven)	DEPTH SAMPLED	DEPTH IN FEET	SOIL GROUP SYMBOL (USCS)	LITHOLOGIC DESCRIPTION (see key)	GRVL %	SND %	FNS %	TORVANE (TSF) PEAK	TORVANE (TSF) RESIDUAL	POCKET PEN. (TSF)
		GP-6-10.8-15			1		@120-129" - Void						
					2		@129" - Wet, loose, brown f-sand, trace silt.						
					3		144-148" - Void.						
					4		@148" - SAA @ 129"						
					5		@208 - Moist, med-dense, brown, clayey f-sand.						
					6		@221 - Moist, med-stiff, grey clay.						
					7								
					8		277-280" - Diagonal contact transitions to wet, loose brown f-sand, trace silt						
					9								
					0		280"-293" - Void.						
					1		@293 - Wet, loose, brown f-sand, trace silt						
					2								
					3		@300 - Dry, loose, grey gravelly f-c sand.						
					4		@317 - Damp, stiff brown clay						
					5								
					6		@331 - transitions to grey						
					7		@346 - Wet, loose, grey, slightly clayey silt.						
					8		@352 - Interbedded layers of material @331 & 346"						
					9								
					0		@360 - End of boring.						

Remarks: No O = No Odor AOPP = As on Previous Page SAA = Same as above Δ = change

Notes: Sampled 10.8-15 ft

GW also sampled, see GW log

GROUNDWATER SAMPLING DATA SHEET

ANCHOR QEA

720 Olive Way, Suite 1900
Seattle, Washington 98101
Office: 206.287.9130 Fax: 206.287.9131

PROJECT NAME: ABC Recycling **WELL ID:** GP-3-GW
SITE ADDRESS: 741 Marine Drive **BLIND ID:** NA
DUP ID: GP-3-GW-DUP NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN	?	**TEMPERATURE:**	°F 50.	°C				

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
10/27/20	13:15	.	.	12. ft	.	.	X 1	.
/ /	:	.	.	.	.		X 3	.

Gal/ft = (dia./2)² x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth: 16.3'

Bottle Type	Date	Time	Method§	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	10/27/20	13:15	GRO	6	40 ml	HCl	YES	NO		✓
Amber Glass	10/27/20	13:15		14	250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	10/27/20	13:15		3	250, 500, 1L	HNO_3	YES	YES		-
Amber Glass	10/27/20	13:15		6	250, 500, 1L		YES			
	Total Bottles (include duplicate count):									

Analysis Allowed per Bottle Type

BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
VOA - Glass	(8021) (8260B) (BTEX) (NWTPH-G)
AMBER - Glass	(PAH) (TPH-HCID) (NWTPH-D) (TPH-418.1) (Oil &Grease) (8081A) 1613B 8082A
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: 1300 mS/cm
Pump/Bailer Inlet Depth:

Meas. [Casing]	Method§ [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (mS/cm)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	B	1.5	6.53	1.281	13.3		0.34	Cloudy
2	B	1.0	6.60	1.299	13.3		0.45	Cloudy
1	B	0.5	6.70	1.316	13.4		0.66	Cloudy
0	B	0.00	6.99	1.329	13.5		4.65	Muddy brown

SAMPLER: Delaney Peterson (PRINTED NAME) [signature] (SIGNATURE)

GROUNDWATER SAMPLING DATA SHEET

ANCHOR QEA
720 Olive Way, Suite 1900
Seattle, Washington 98101
Office: 206.287.9130 Fax: 206.287.9131

PROJECT NAME: ABC Recycling **WELL ID:** GP-6
SITE ADDRESS: 741 Marine Drive **BLIND ID:** N/A
DUP ID: N/A NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN	?	TEMPERATURE:	°F 47 .	°C				

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
10/26/20	17:50	.	.	8.5 ft	.	.	X 1	.
~~10/26/20~~	:	.	.	.	.	.	X 3	.

Gal/ft = $(dia./2)^2 \times 0.163$	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample) Sample Depth: 12'

Bottle Type	Date	Time	Method §	Amount	Volume mL	Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	10/26/20	17:50	GRO	2	40 ml	HCl	YES	NO		✓
Amber Glass	10/26/20	17:50		6	250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	~~10/26/20~~	~~17:50~~			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	~~10/26/20~~	~~17:50~~			250, ~~500~~, 1L	HNO_3	YES	NO		
Red Diss. Poly	10/26/20	17:50		1	~~250~~, 500, 1L	HNO_3	YES	YES		
Amber glass	10/26/20	17:50		2	250, 500, 1L		YES			
Total Bottles (include duplicate count):										

Analysis Allowed per Bottle Type

BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
VOA - Glass	(8021) (8260B) (BTEX) (NWTPH-Gx)
AMBER - Glass	(PAH) (TPH-HCID) (NWTPH-Dx) (TPH-418.1) (Oil &Grease) (8081A) 8613D 8082A
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Be) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA Purge Start Time: 17:27 Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (L) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4	B	0.2	6.52	1.402	13.3		0.99	
3	B	0.5	6.42	1.393	13.3		0.73	
2	B	0.75	6.39	1.392	13.3		0.64	
1		.	.	.	.		.	
0		0.00	.	.	.		.	

SAMPLER: Delaney Peterson (PRINTED NAME) [signature] (SIGNATURE)

Chain of Custody Record & Laboratory Analysis Request

Laboratory Name: Onsite
Date: 10/20/2020
Project Name: ABC Recycling Phase 2
Project Number: 202005-01.01
Project Manager: Derek Ormerod
Phone Number: 206-331-1738
Shipment Method: FedEx

ANCHOR QEA

Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Mercury/Metals	Total Solids/PAHs	Grain Size	Total Organic Carbon	Dioxin/Furans	Archive	TPHDx/ETPH	GRO	PCBs	TCLP metals									Comments/Preservation
1	TP-5-0-0.5	10/20/20 0957	S	7	X	X			X		X	X	X	X									DUP HOLD
2	TP-8-0-0.5	10/20/20 1150	S	7	X	X					X	X											
3	TP-8-2.5-3	10/20/20 1217	S	10	X	X			X		X	X	X										
4	TP-10-2-2.5	10/20/20 1435	S	7	X	X					X	X											
5	TP-10-2-2.5-DUP	10/20/20 1435	S	7	X	X					X	X											
6	TP-11-0-0.5	10/20/20 1512	S	7	X	X					X	X											
7	TP-11-1.5-2	10/20/20 1531	S	7	X	X					X	X											
8	TP-12-0-0.5	10/20/20 1618	S	10	X	X			X		X	X	X										
9	TP-12-3-3.5	10/20/20 1638	S	7	X	X					X	X											
10																							
11																							
12																							
13																							
14																							
15																							
16																							
17																							
18																							

Notes: HOLD ALL SAMPLES UNTIL FURTHER INSTRUCTION PROVIDED

Relinquished By:	Company: Anchor QEA, LLC	Received By:	Company:
Tanner Kamila	10/20/20 1801		
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Chain of Custody Record & Laboratory Analysis Request

Laboratory Name: OnSite
Date: 10/22/2020
Project Name: ABC Recycling Phase 2
Project Number: 202005-01.01
Project Manager: Derek Ormerod
Phone Number: 206-331-1738
Shipment Method: FedEx

ANCHOR QEA

Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Mercury/Metals	Total Solids/PAHs	Grain Size	Total Organic Carbon	Dioxin/Furans	Archive	TPHDx/ETPH	GRO	MS/MSD	PCBs	TCLP metals	Comments/Preservation
1	TP-9-0-0.5	10/21/2020 0837	S	4	X	X			X	X	X	X				HOLD
2	TP-7-4.5-5	10/21/2020 1016	S	4	X	X			X	X	X	X	X	X	X	MS/MSD
3	TP-4-0-0.5	10/21/2020 1111	S	4	X	X			X	X	X	X				
4	TP-4-3.5-4	10/21/2020 1133	S	4	X	X			X	X	X	X				
5	TP-6-0-0.5	10/21/2020 1213	S	4	X	X			X	X	X	X		X		
6	TP-16-0-0.5	10/21/2020 1410	S	4	X	X			X	X	X	X				
7	TP-16-5-5.5	10/21/2020 1527	S	3	X	X			X		X	X				
8	TP-13-1.5-2	10/22/2020 0837	S	4	X	X			X	X	X	X				
9	TP-17-1.5-2	10/22/2020 0926	S	4	X	X			X	X	X	X			X	
10	TP-15-1-1.5	10/22/2020 1010	S	4	X	X			X	X	X	X				
11	TP-14-1.5-2	10/22/2020 1034	S	4	X	X			X	X	X	X				
12	TP-1-0.5-1.5	10/22/2020 1145	S	4	X	X			X	X	X	X				
13	TP-2-1.5-2	10/22/2020 1214	S	4	X	X			X	X	X	X				
14	TP-3-1.5-2	10/22/2020 1256	S	4	X	X			X	X	X	X				
15																
16																
17																
18																

Notes: Hold until further instruction provided

Relinquished By:	Company: Anchor QEA, LLC
Signature/Printed Name: Tanner Kamila	Date/Time: 10/22/2020 1402

Received By:	Company:
Signature/Printed Name	Date/Time

Relinquished By:	Company:
Signature/Printed Name	Date/Time

Received By:	Company:
Signature/Printed Name	Date/Time

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Please analyze for the analyses indicated below.
JM for AQ 10.28.20

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Company: Anchor QEA
Project Number: 202005-01.01
Project Name: ABC Recycling
Project Manager: Derek Ormerod
Sampled by: MH / DP

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [X] Standard (7 Days)
- [ ] ______ (other)

Laboratory Number:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals (6010C/7471A)	TCLP Metals	HEM (oil and grease) 1664A	Dioxin/Furans	MS/MSD		HOLD	% Moisture
	GP-2-8-9	10.26.20	1030	Soil	3			●	●					●	X					●			X				●
	GP-2-14-20	↓	1045	↓	3			X	X					X	X					X			X			●	X
	GP-2-25-27		1050		3			●	●					●	X					●			X				●
	GP-1-~~10-12.3~~ 5.7-9.7		1315		3			●	●					●	●					●	●		●				●
	GP-1-10-12.3		1320		3			X	X					X	X					X			X			●	X
	GP-1-20-22		1330		3			●	●					●	X					●			X				●
	GP-1-20-22-Dup		1331		3			●	●					●	X					●			X				●
	GP-5-6.9-7.5		1515		3			●	●					●	X					●			X				●
	GP-5-10-11		1525		3			X	X					X	X					X			X			●	X
	GP-5-20-22	↓	1530	↓	3			●	●					●	X					●			X	●			●

	Signature	Company	Date	Time
Relinquished	[signature]	Anchor QEA	10/28/20	0820
Received	[signature]	Speedy	10-28-20	0820
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn

Hold all samples pending further instructions.

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Company: Anchor QEA

Project Number: 202005-01.01

Project Name: ABC Recycling

Project Manager: Derek Ormerod

Sampled by: MH / DP

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Days ☐ 3 Days

☐ Standard (7 Days)

☐ ________ (other)

Laboratory Number:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals (6010C/7471A)	TCLP Metals	HEM (oil and grease) 1664A	Dioxin/Furans	Diss. Metals (6010C/7470A)	MS/MSD	HOLD	% Moisture
	GP-6-10.8-15	10.26.20	1650	Soil	3			●	●					●	X					●			X				●
	GP-6-GW	↓	1750	GW	11			●	●					●	X								X	●			
	GP-4-7.8-8.7	10.27.20	1026	Soil	3			●	●					●	X					●			X				●
	GP-4-15-18.7		1030		3			●	●					●	X					●			X				●
	GP-3-12.7-13.4		1205		3			X	X					X	X					X			X			●	X
	GP-3-14.4-15.9		1215	↓	3			●	●					●	X					●			X				●
	GP-3-GW		1315	GW	23			●	●					●	X					~~X~~			X	●	●		
	GP-3-GW-Dup	↓	1320	↓	11			●	●					●	X					~~X~~			X	●			
	TB-201026	10.26.20	1015	W	2			●																			

	Signature	Company	Date	Time
Relinquished	[signature]	Anchor QEA	10/28/20	0820
Received	[signature]	Speedy	10-28-20	0820
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

Appendix B
Photograph Log

Photograph 1
TP-1

Photograph 2
TP-1

Photograph 3
TP-1

Photograph 4
TP-1

Photograph 5
TP-1

Photograph 6
TP-1

Photograph 7
TP-2

Photograph 8
TP-2

Photograph 9
TP-2

Photograph 10
TP-3

Photograph 11
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Photograph 12
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Photograph 13
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Photograph 14
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Photograph 15
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Photograph 16
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Photograph 19
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Photograph 20
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Photograph 39
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Photograph 40
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Photograph 41
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Photograph 76
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Photograph 77
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Photograph 78
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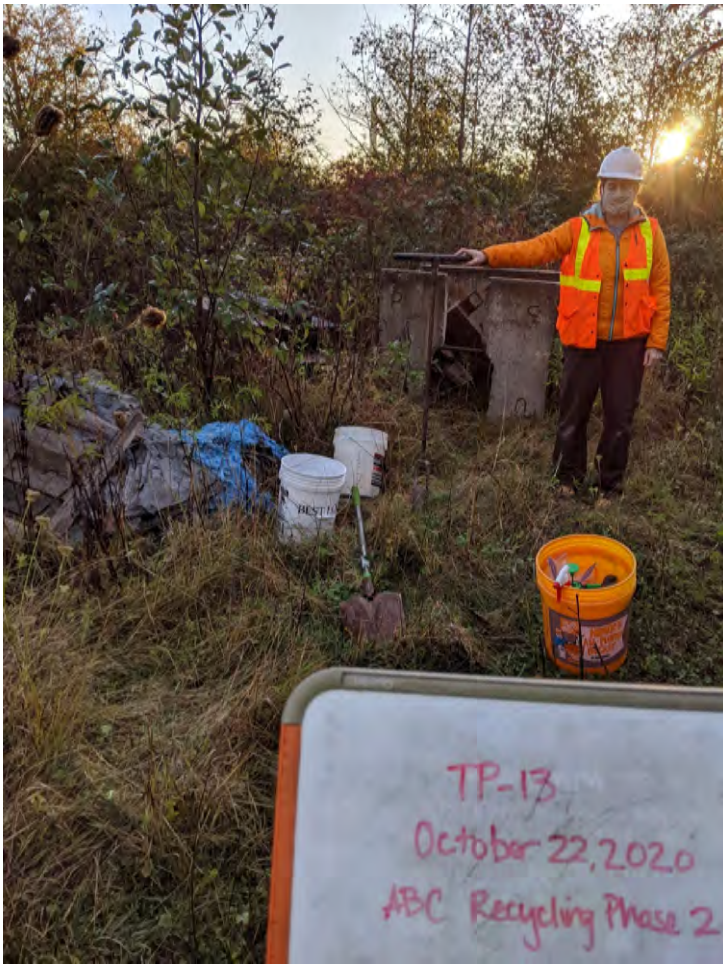
Photograph 79
TP-12

Photograph 80
TP-12

Photograph 81
TP-13

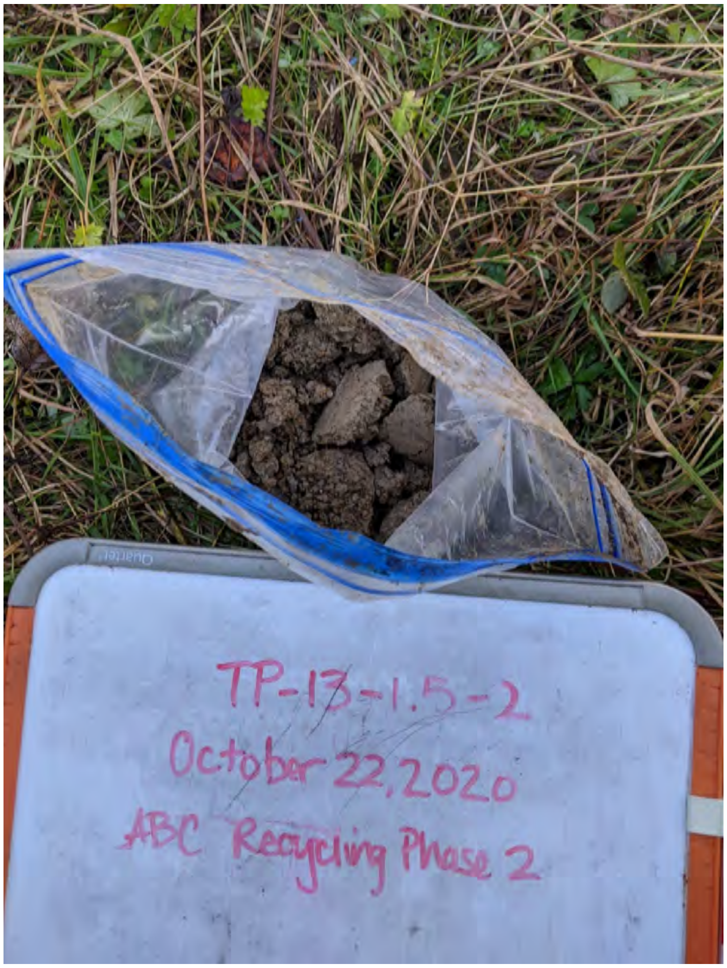
Photograph 82
TP-13



Photograph 83
TP-13

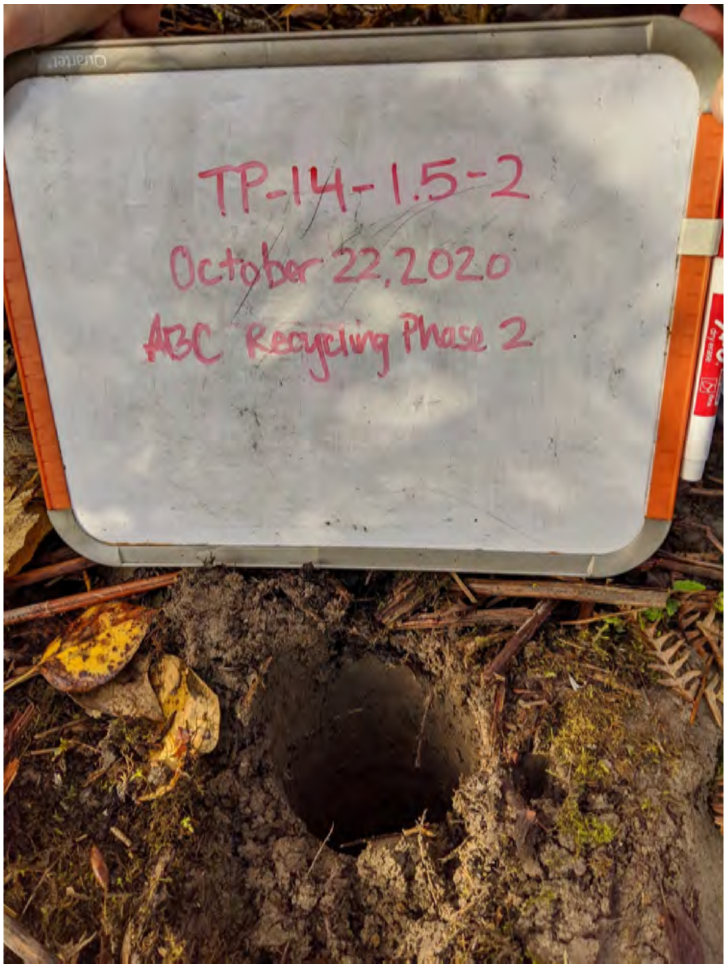
Photograph 84
TP-13

Photograph 85
TP-13



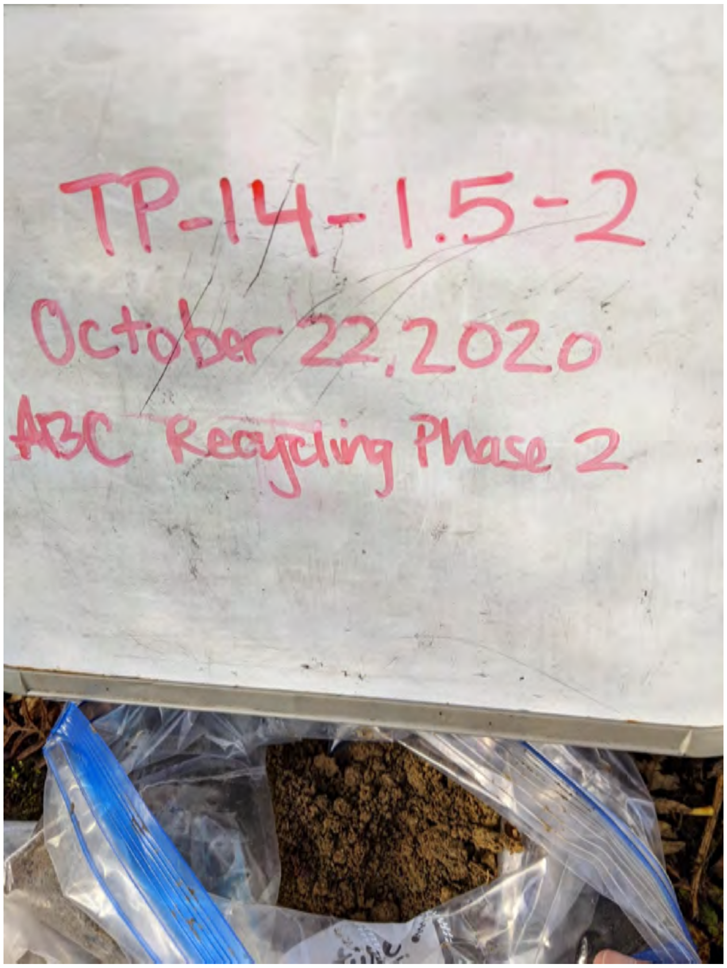
Photograph 86
TP-14

Photograph 87
TP-14



Photograph 88
TP-14

Photograph 89
TP-14



Photograph 90
TP-15

Photograph 91
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Photograph 92
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Photograph 93
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Photograph 94
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Photograph 95
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Photograph 100
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Photograph 101
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Photograph 102
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Photograph 103
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Photograph 104
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Photograph 105
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Photograph 106
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Photograph 107
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Photograph 108
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Photograph 109
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Photograph 110
GP-1

Photograph 111
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Photograph 112
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Photograph 113
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Photograph 114
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Photograph 115
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Photograph 135
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Photograph 136
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Photograph 137
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Photograph 138
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Photograph 139
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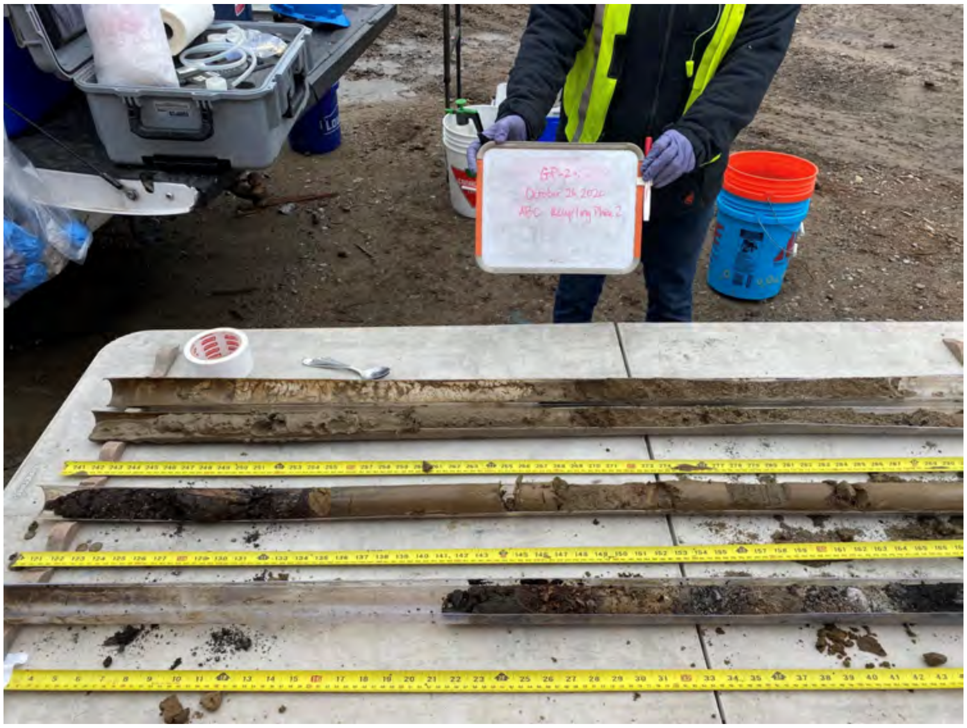
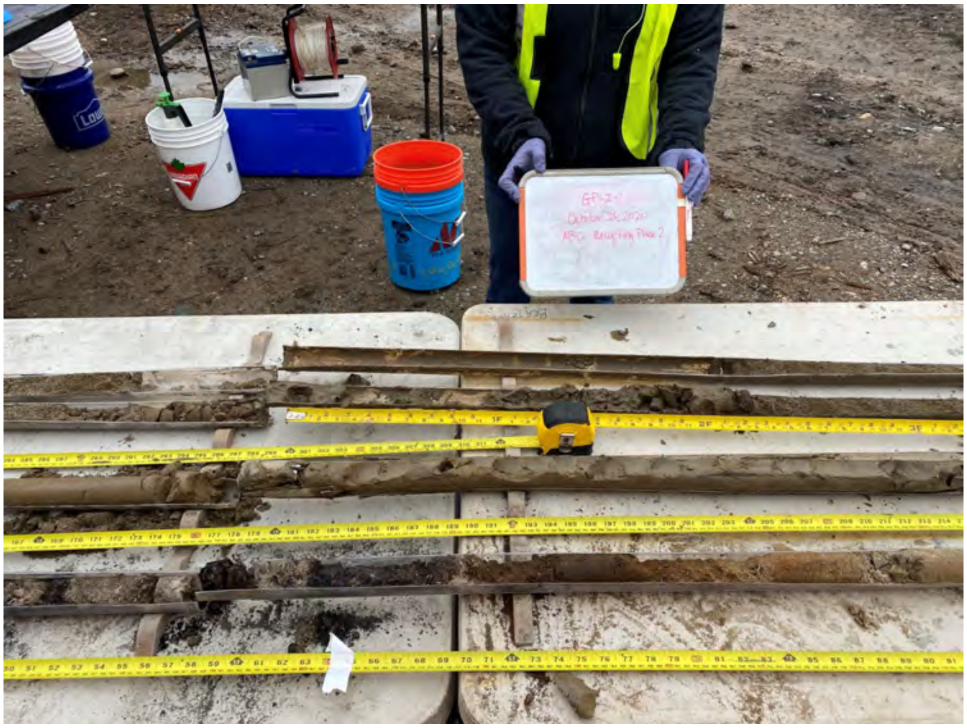
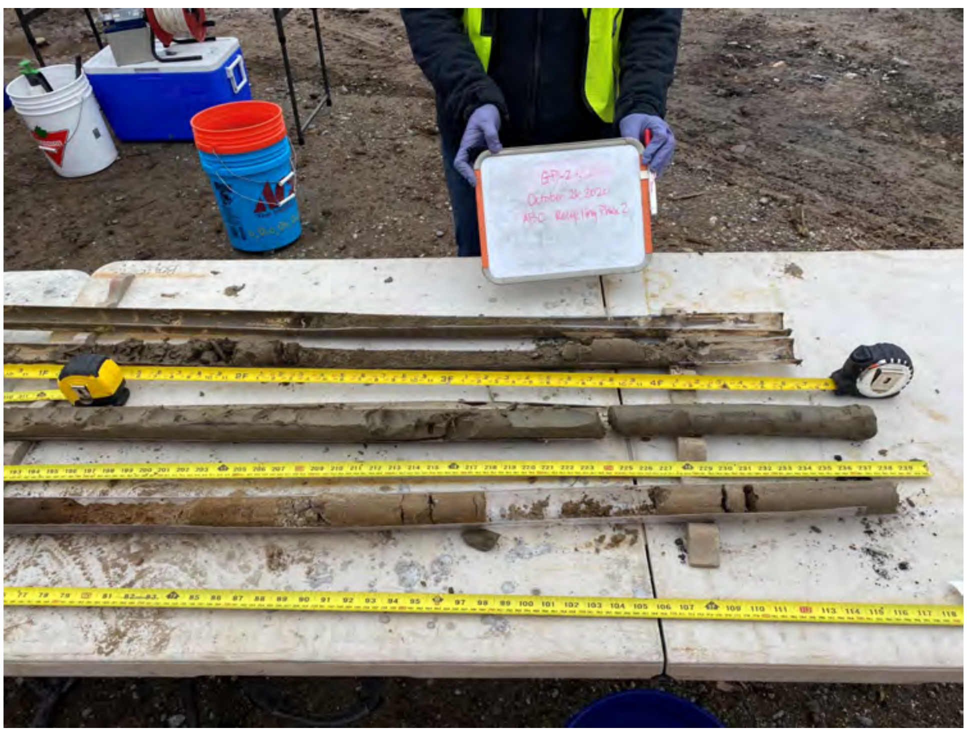
Photograph 140
GP-2



Photograph 141
GP-2



Photograph 142
GP-2



Photograph 143
GP-3

Photograph 144
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Photograph 145
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Photograph 146
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Photograph 186
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Photograph 187
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Photograph 188
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Photograph 189
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Photograph 190
GP-6

Photograph 191
GP-6

Appendix C
Data Validation Report

1201 3rd Ave Suite 2600
Seattle, Washington 98101
206.287.9130

ANCHOR QEA

Data Validation Report – EPA Stage 2A

November 24, 2020

Project: Marine Drive Property

Project Number: 202005-01.01

This report summarizes the review of analytical results for 25 soil samples, two water samples, two duplicate samples, and one trip blank collected in October 2020. The samples were collected by Anchor QEA, LLC, and submitted to OnSite Environmental Inc. (OnSite) in Redmond, Washington. Aliquots of three soil samples were sent to Vista Analytical Laboratory (Vista) in El Dorado Hills, California. The following analytical parameter results were reviewed in this report:

- Diesel range organics (DRO), residual range organics (RRO) and gasoline range organics (GRO) by the Northwest Total Petroleum Hydrocarbons method for extended diesel (NWTPH-Dx) and gasoline (NWTPH-Gx) ranges
- Total metals by U.S. Environmental Protection Agency (USEPA) methods 6010D, 6020B, 200.8, 7470A, and 7471B
- Toxicity Characteristic Leaching Procedure (TCLP) metals by USEPA 1311
- Polycyclic aromatic hydrocarbons (PAHs) by USEPA method 8270E select ion monitoring
- Polychlorinated biphenyl (PCB) Aroclors by USEPA method 8082A
- Total solids (TS) by Standard Method 2540G
- Polychlorinated dibenzo-p-dioxins (PCDD)/dibenzofurans (PCDF) by USEPA method 1613B

OnSite sample delivery group numbers (SDGs) 2010-264, 2010-279, and 2010-327 were reviewed in this report. Sample IDs, matrices, and analyses are presented in Table 1.

Table 1
Sample IDs, SDGs, Matrices, and Analyses

Sample ID	Lab Sample ID	Matrix	Analyses
GP-1-20-22	2010-327-06	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-1-20-22-DUP	2010-327-07	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-1-5.7-9.7	2010-327-04	Soil	DRO, RRO, GRO, total and TCLP metals, PAHs, PCBs, TS, PCDD/PCDF
GP-2-25-27	2010-327-03	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-2-8-9	2010-327-01	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-3-14.4-15.9	2010-327-16	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-3-GW	2010-327-17	Water	DRO, RRO, GRO, total metals, PAHs
GP-3-GW-DUP	2010-327-18	Water	DRO, RRO, GRO, total metals, PAHs

Sample ID	Lab Sample ID	Matrix	Analyses
GP-4-15-18.7	2010-327-14	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-4-7.8-8.7	2010-327-13	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-5-20-22	2010-327-10	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-5-6.9-7.5	2010-327-08	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-6-10.8-15	2010-327-11	Soil	DRO, RRO, GRO, total metals, PAHs, TS
GP-6-GW	2010-327-12	Water	DRO, RRO, GRO, total metals, PAHs
TB-201026	2010-327-19	Trip Blank	GRO
TP-1-0.5-1.5	2010-279-12	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-12-0-0.5	2010-264-08	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-13-1.5-2	2010-279-08	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-14-1.5-2	2010-279-11	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-15-1-1.5	2010-279-10	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-16-5-5.5	2010-279-07	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-17-1.5-2	2010-279-09	Soil	DRO, RRO, GRO, total and TCLP metals, PAHs
TP-2-1.5-2	2010-279-13	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-3-1.5-2	2010-279-14	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-4-0-0.5	2010-279-03	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-5-0-0.5	2010-264-01	Soil	DRO, RRO, GRO, total and TCLP metals, PAHs, PCBs, TS, PCDD/PCDF
TP-6-0-0.5	2010-279-05	Soil	DRO, RRO, GRO, total metals, PAHs, PCBs, TS, PCDD/PCDF
TP-7-4.5-5	2010-279-02	Soil	DRO, RRO, GRO, total and TCLP metals, PAHs, PCBs, TS
TP-8-0-0.5	2010-264-02	Soil	DRO, RRO, GRO, total metals, PAHs, TS
TP-9-0-0.5	2010-279-01	Soil	DRO, RRO, GRO, total metals, PAHs, TS

Data Validation and Qualifications

The following comments refer to the laboratory's performance in meeting the quality assurance/quality control (QA/QC) guidelines outlined in the analytical procedures. Laboratory results were reviewed using the laboratory quality control limits and the following guidelines:

- ABC Recycling Phase II Environmental Assessment Sampling and Analysis Plan (SAP; Anchor QEA 2020)
- USEPA 1986 (SW-846, Third Edition), Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
- USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA 2017a)
- National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2017b)

- National Functional Guidelines for High Resolution Superfund Methods Data Review (USEPA 2016)

Unless noted in this report, laboratory results for the samples listed above were within QC criteria.

Field Documentation

Field documentation was checked for completeness and accuracy. The chain-of-custody (COC) forms were signed by Onsite and Vista the time of sample receipt. Samples were received in good condition and within the recommended temperature range, with the exception of one cooler received at OnSite on October 22, 2020. The cooler temperature was 11°C and the laboratory did not note which samples were affected, so associated volatile or semivolatile results were qualified "J" or "UJ" to indicate a potentially low bias. Metal and PCB results are considered environmentally stable, so no data were qualified. Sample jars submitted for PCDD/PCDF analysis were clear glass. Amber glass jars are recommended for PCDD/PCDF analysis, however, since samples were stored at ≤ 6°C, in the dark, from the time of collection until extraction, no data were qualified.

Sample Preservation and Holding Times

Samples were appropriately preserved and analyzed within holding times.

Laboratory Method Blanks

Laboratory method blanks were analyzed at the required frequencies. Method blanks were free of target analytes.

Field Quality Control

Trip Blank

One trip blank was collected in association with the samples collected on October 26 and 27, 2020, and was free of target analytes. The samples collected on October 20, 21, and 22 did not have trip blanks associated with them; however, GRO was detected in only one sample so contamination during sample transport is unlikely and no data were qualified.

Field Duplicates

One soil and one groundwater field duplicate were collected in association with this sample set. The SAP requirement for field duplicates are one per 20 samples collected per matrix; however, only one soil duplicate was collected in association with 25 samples. A second duplicate was not analyzed due to laboratory error. Detected results are summarized in Table 2. Results that were less than five times the method reporting limit (MRL) were assessed by the difference between them instead of the relative percent difference (RPD) value. If a parent or field duplicate result was not detected and the corresponding parent or duplicate result was detected, non-detected results were evaluated using the MRL.

Field duplicate RPD values were assessed using 50% RPD value as a control limit. Field duplicate difference values were assessed using plus or minus twice the MRL for soil samples and plus or minus the RL for water samples. All field duplicate RPD and difference values were within the control limits.

Table 2
Field Duplicates Summary

Analyte	GP-1-20-22	GP-1-20-22-DUP	RPD	Difference	Difference CL
Arsenic	6 mg/kg	6.3 mg/kg	--	0.3 mg/kg	7 mg/kg
Chromium	42 mg/kg	44 mg/kg	5%	--	--
Copper	35 mg/kg	35 mg/kg	0%	--	--
Nickel	46 mg/kg	46 mg/kg	0%	--	--
Zinc	64 mg/kg	62 mg/kg	3%	--	--
Beryllium	0.18 mg/kg	0.19 mg/kg	--	0.01 mg/kg	0.14 mg/kg
Cadmium	0.13 mg/kg	0.11 mg/kg	--	0.02 mg/kg	0.14 mg/kg
Lead	2 mg/kg	2 mg/kg	--	0 mg/kg	1.4 mg/kg
Mercury	0.037 mg/kg	0.045 mg/kg	--	0.008 mg/kg	0.028 mg/kg

Analyte	GP-3-GW	GP-3-GW-DUP	RPD	Difference	Difference CL
Arsenic	0.68 ug/L	0.56 ug/L	--	0.12 ug/L	0.5 ug/L
Nickel	13 ug/L	15 ug/L	14%	--	--
Selenium	1.4 ug/L	1.4 ug/L	--	0 ug/L	1 ug/L
Zinc	7 ug/L	6.6 ug/L	--	0.4 ug/L	2.5 ug/L
DRO	0.12 mg/L	0.11 mg/L	--	0.01 mg/L	0.1 mg/L
RRO	0.29 mg/L	0.27 mg/L	--	0.02 mg/L	0.2 mg/L
Benzo(b)fluoranthene	0.0056U ug/L	0.0053 ug/L	--	0.0003 ug/L	0.0056 ug/L

Notes:
CL = control limit
μg/kg = microgram per kilogram
mg/kg = milligram per kilogram
μg/L = microgram per liter
mg/L = milligram per liter

Surrogate and Labeled Compound Recoveries

Surrogates and labeled compounds were added to each sample as required by the method and recoveries were within laboratory control limits with one exception. The surrogate fluorobenzene recovered above the control limit in the GRO analysis of sample GP-2-25-27. GRO was not detected in the sample, so no data were qualified.

Laboratory Control and Laboratory Control Sample Duplicates

Laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) were analyzed or matrix spike (MS) and matrix spike duplicate (MSD) samples were analyzed in place of LCS/LCSD samples, except for GRO, DRO and RRO. LCS/LCSD samples resulted in recoveries and/or RPD values within project control limits.

Ongoing Precision and Recovery Samples

Ongoing precision and recovery (OPR) samples were analyzed for PCDD/PCDF, and resulted in recoveries within project control limits.

Matrix Spike and Matrix Spike Duplicate Samples

Matrix spike (MS) and matrix spike duplicate (MSD) samples were analyzed at the required frequency, except for GRO, DRO and RRO. Recoveries and/or RPD values were within project-required control limits.

Laboratory Duplicates

Laboratory duplicates were analyzed at the required frequency, or MSD samples were analyzed in place of the duplicate. Sample or duplicate results that were less than five times the reporting limit were evaluated by the difference between them, using the control limit of plus or minus twice the MRL. Duplicate difference or RPD values were within control limits, with the following exceptions:

- SDG 2010-264 total metals: The duplicate RPD was above the project control limit for antimony, arsenic, and lead in the duplicate analyzed on sample TP-5-0-0.5. Antimony results were within five times the reporting limit, and the difference between them was less than two times the MRL so no data were qualified. Associated arsenic and lead results were qualified "J" to indicate they are estimated.
- SDG 2010-279 total metals: The duplicate RPD was above the project control limit for mercury in the duplicate analyzed on sample TP-7-4.5-5, however the sample and duplicate concentration were less than five times the MRL, and the difference between the results was less than two times the MRL, so no data were qualified.

Qualified results are summarized at the end of this report.

Estimated Maximum Potential Concentration

Some PCDD/PCDF results were qualified by the laboratory as estimated maximum potential concentration (EMPC). These results have been qualified "J" to indicate they are estimated.

Method Reporting Limits

Reporting limits were acceptable as reported. All values were reported using the laboratory limits and results below detection were reported to the MRL, except for PCDD/PCDF results, which were reported at the estimated detection limit. Values were reported as undiluted or when diluted, the detection and reporting limits reflect the dilution factor.

Overall Assessment

As was determined by this evaluation, the laboratory followed the specified analytical methods and all requested sample analyses were completed. Accuracy was acceptable as demonstrated by the surrogate, LCS/LCSD, and MS/MSD recovery values. Accuracy was evaluated using the surrogate percent recovery values for GRO, DRO, or RRO. Precision was acceptable as demonstrated by the LCS/LCSD, MS/MSD, laboratory and field duplicate RPD or difference values, with the exceptions noted above. All data are acceptable as reported or as qualified and no data were rejected. Table 3 summarizes the qualifiers applied to the sample results reviewed in this report.

Data Qualifier Definition

U Indicates the compound or analyte was analyzed for but not detected at or above the specified limit.

J Indicates an estimated value.

UJ Indicates the compound or analyte was analyzed for but not detected and the specified limit reported is estimated.

Table 3
Data Qualification Summary

Sample ID	Parameter	Analyte	Reported Result	Qualified Result	Reason
All samples in SDG 2010-264	GRO, DRO, RRO, PAH	All	Various	"J" detects "UJ" non-detects	Cooler temperature above 10°C
GP-1-5.7-9.7	PCDD/PCDF	Total HxCDD	1.38 EMPC ng/kg	1.38J ng/kg	EMPC
TP-12-0-0.5	Total metals	Arsenic	70 mg/kg	70J mg/kg	Duplicate RPD above control limit
		Lead	29 mg/kg	29J mg/kg	
TP-5-0-0.5	Total metals	Arsenic	20 mg/kg	20J mg/kg	Duplicate RPD above control limit
		Lead	90 mg/kg	90J mg/kg	
	PCDD/PCDF	2,3,7,8-TCDD	0.761EMPC ng/kg	0.761J ng/kg	EMPC
		Total TCDD	13.8 EMPC ng/kg	13.8J ng/kg	
		Total TCDF	17.6 EMPC ng/kg	17.6J ng/kg	

Sample ID	Parameter	Analyte	Reported Result	Qualified Result	Reason
TP-6-0-0.5	PCDD/PCDF	2,3,7,8-TCDD	0.0977 EMPC ng/kg	0.0977J ng/kg	EMPC
		1,2,3,4,7,8-HxCDD	0.812 EMPC ng/kg	0.812J ng/kg	
		Total TCDD	1.96 EMPC ng/kg	1.96J ng/kg	
		Total PeCDD	4.79 EMPC ng/kg	4.79J ng/kg	
		Total HxCDD	90.1 EMPC ng/kg	90.1J ng/kg	
		Total TCDF	0.690 EMPC ng/kg	0.690J ng/kg	
		Total PeCDF	4.32 EMPC ng/kg	4.32J ng/kg	
TP-8-0-0.5	Total metals	Arsenic	42 mg/kg	42J mg/kg	Duplicate RPD above control limit
		Lead	26 mg/kg	26J mg/kg	

Notes:
mg/kg = milligram per kilogram
MRL = method reporting limit
RPD = relative percent difference

References

Anchor QEA, 2020. Phase 2 Environmental Assessment Sampling and Analysis Plan. Prepared for ABC Recycling. October 2020.

USEPA (U.S. Environmental Protection Agency), 1986. Test methods for Evaluating Solid Waste: Physical/Chemical Methods. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. EPA-530/SW-846.

USEPA, 2016. National Functional Guidelines for High Resolution Superfund Methods Data Review. EPA 542-B-16-001. April 2016.

USEPA, 2017a. National Functional Guidelines for Inorganic Superfund Methods Data Review. Office of Superfund Remediation and Technology Innovation. United States Environmental Protection Agency. EPA-540-R-2017-001. January 2017.

USEPA, 2017b. National Functional Guidelines for Organic Superfund Methods Data Review. Office of Superfund Remediation and Technology Innovation. United States Environmental Protection Agency. EPA-540-R-2017-002. January 2017.

Appendix D
Laboratory Reports

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 17, 2020

Derek Ormerod
Anchor QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101

Re: Analytical Data for Project 202005-01.01
Laboratory Reference No. 2010-264

Dear Derek:

Enclosed are the analytical results and associated quality control data for samples submitted on October 22, 2020.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

Case Narrative

Samples were collected on October 20, 2020 and received by the laboratory on October 22, 2020. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

<u>PCBs EPA 8082A Analysis</u>

The Sample 10-279-02 was used as the MS/MSD pair. The RPD between the MS/MSD (26%) was above quality control limit of 15%. The sample was re-extracted and rerun with similar results and attributed to matrix effect. All other QC was within their corresponding quality control limits. No further action was performed.

<u>Total Metals EPA 6010D/6020B/7471B Analysis</u>

The duplicate RPD for Arsenic, Lead and Nickel is outside control limits due to sample inhomogeneity.

Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Antimony	**6.0**	2.8	EPA 6010D	10-28-20	10-29-20	
Arsenic	**20**	2.8	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.23**	0.11	EPA 6020B	11-2-20	11-4-20	
Cadmium	**1.0**	0.11	EPA 6020B	11-2-20	11-4-20	
Chromium	**23**	0.56	EPA 6010D	10-28-20	10-29-20	
Copper	**44**	1.1	EPA 6010D	10-28-20	10-29-20	
Lead	**90**	5.6	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.47**	0.028	EPA 7471B	11-4-20	11-4-20	
Nickel	**21**	2.8	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.8	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.28	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	2.8	EPA 6010D	10-28-20	10-29-20	
Zinc	**210**	2.8	EPA 6010D	10-28-20	10-29-20	

Client ID:	**TP-8-0-0.5**					
Laboratory ID:	10-264-02					
Antimony	**16**	2.6	EPA 6010D	10-28-20	10-29-20	
Arsenic	**42**	2.6	EPA 6010D	10-28-20	10-29-20	
Beryllium	**ND**	0.11	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.76**	0.11	EPA 6020B	11-2-20	11-4-20	
Chromium	**9.1**	0.53	EPA 6010D	10-28-20	10-29-20	
Copper	**38**	1.1	EPA 6010D	10-28-20	10-29-20	
Lead	**26**	5.3	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.30**	0.026	EPA 7471B	11-4-20	11-4-20	
Nickel	**7.6**	2.6	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.6	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.26	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	2.6	EPA 6010D	10-28-20	10-29-20	
Zinc	**85**	2.6	EPA 6010D	10-28-20	10-29-20	

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-12-0-0.5**					
Laboratory ID:	10-264-08					
Antimony	**32**	2.7	EPA 6010D	10-28-20	10-29-20	
Arsenic	**70**	2.7	EPA 6010D	10-28-20	10-29-20	
Beryllium	**ND**	0.11	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.95**	0.11	EPA 6020B	11-2-20	11-4-20	
Chromium	**16**	0.54	EPA 6010D	10-28-20	10-29-20	
Copper	**89**	1.1	EPA 6010D	10-28-20	10-29-20	
Lead	**29**	5.4	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.26**	0.027	EPA 7471B	11-4-20	11-4-20	
Nickel	**13**	2.7	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.7	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.27	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	2.7	EPA 6010D	10-28-20	10-29-20	
Zinc	**100**	2.7	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1028SH1					
Antimony	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Arsenic	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Chromium	**ND**	0.50	EPA 6010D	10-28-20	10-29-20	
Copper	**ND**	1.0	EPA 6010D	10-28-20	10-29-20	
Lead	**ND**	5.0	EPA 6010D	10-28-20	10-29-20	
Nickel	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Thallium	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Zinc	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Laboratory ID:	MB1102SM1					
Beryllium	**ND**	0.10	EPA 6020B	11-2-20	11-4-20	
Cadmium	**ND**	0.10	EPA 6020B	11-2-20	11-4-20	
Silver	**ND**	0.25	EPA 6020B	11-2-20	11-4-20	
Laboratory ID:	MB1104S1					
Mercury	**ND**	0.025	EPA 7471B	11-4-20	11-4-20	

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Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	10-264-01									
	ORIG	DUP								
Antimony	**5.35**	**9.10**	NA	NA		NA	NA	52	20	C
Arsenic	**17.7**	**26.3**	NA	NA		NA	NA	39	20	L
Chromium	**20.6**	**18.9**	NA	NA		NA	NA	9	20	
Copper	**38.9**	**43.8**	NA	NA		NA	NA	12	20	
Lead	**80.5**	**44.9**	NA	NA		NA	NA	57	20	L
Nickel	**18.5**	**14.9**	NA	NA		NA	NA	22	20	L
Selenium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Thallium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Zinc	**191**	**165**	NA	NA		NA	NA	15	20	
Laboratory ID:	10-264-01									
Beryllium	**0.204**	**0.191**	NA	NA		NA	NA	7	20	
Cadmium	**0.930**	**1.06**	NA	NA		NA	NA	13	20	
Silver	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	10-264-01									
Mercury	**0.422**	**0.410**	NA	NA		NA	NA	3	20	
Laboratory ID:	10-279-02									
	ORIG	DUP								
Antimony	**6.30**	**7.95**	NA	NA		NA	NA	23	20	C
Arsenic	**18.0**	**20.0**	NA	NA		NA	NA	11	20	
Chromium	**18.2**	**19.9**	NA	NA		NA	NA	9	20	
Copper	**28.9**	**30.7**	NA	NA		NA	NA	6	20	
Lead	**28.2**	**33.5**	NA	NA		NA	NA	17	20	
Nickel	**16.2**	**17.1**	NA	NA		NA	NA	5	20	
Selenium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Thallium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Zinc	**104**	**124**	NA	NA		NA	NA	18	20	
Laboratory ID:	10-279-02									
Beryllium	**0.135**	**0.155**	NA	NA		NA	NA	14	20	
Cadmium	**2.16**	**2.04**	NA	NA		NA	NA	5	20	
Silver	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	10-279-02									
Mercury	**0.0769**	**0.127**	NA	NA		NA	NA	49	20	C

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Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Antimony	**88.0**	**83.5**	100	100	6.30	**82**	**77**	75-125	5	20	
Arsenic	**114**	**111**	100	100	18.0	**96**	**93**	75-125	3	20	
Chromium	**104**	**105**	100	100	18.2	**86**	**86**	75-125	0	20	
Copper	**80.5**	**76.0**	50.0	50.0	28.9	**103**	**94**	75-125	6	20	
Lead	**241**	**233**	250	250	28.2	**85**	**82**	75-125	3	20	
Nickel	**98.5**	**98.0**	100	100	16.2	**82**	**82**	75-125	1	20	
Selenium	**97.5**	**94.5**	100	100	ND	**98**	**95**	75-125	3	20	
Thallium	**44.4**	**43.9**	50.0	50.0	ND	**89**	**88**	75-125	1	20	
Zinc	**190**	**183**	100	100	104	**87**	**79**	75-125	4	20	
Laboratory ID:	10-279-02										
Beryllium	**49.8**	**51.3**	50.0	50.0	0.135	**99**	**102**	75-125	3	20	
Cadmium	**46.8**	**47.3**	50.0	50.0	2.16	**89**	**90**	75-125	1	20	
Silver	**22.5**	**22.3**	25.0	25.0	ND	**90**	**89**	75-125	1	20	
Laboratory ID:	10-279-02										
Mercury	**0.559**	**0.515**	0.500	0.500	0.0769	**96**	**88**	80-120	8	20	

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Laboratory Reference: 2010-264
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Naphthalene	**0.51**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**1.1**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.73**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**0.078**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**0.073**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**0.090**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.87**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.16**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.53**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.50**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.30**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.50**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.34**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**0.092**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.14**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.096**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**0.047**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.12**	0.019	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*84*	*46 - 113*				
Pyrene-d10	*82*	*45 - 114*				
Terphenyl-d14	*86*	*49 - 121*				

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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-8-0-0.5**					
Laboratory ID:	10-264-02					
Naphthalene	**0.015**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.041**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.023**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**0.0054**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**0.0080**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.066**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.0084**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.078**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.077**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.061**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.072**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.083**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**0.020**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.053**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.040**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**0.011**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.043**	0.0035	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*64*	*46 - 113*				
Pyrene-d10	*79*	*45 - 114*				
Terphenyl-d14	*81*	*49 - 121*				

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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-12-0-0.5**					
Laboratory ID:	10-264-08					
Naphthalene	**0.020**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.056**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.031**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**0.0042**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**0.011**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.058**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**ND**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.018**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.017**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.013**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.027**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.018**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.0086**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.0067**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**ND**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.0088**	0.0036	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*67*	*46 - 113*				
Pyrene-d10	*79*	*45 - 114*				
Terphenyl-d14	*76*	*49 - 121*				

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Laboratory Reference: 2010-264
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029S2					
Naphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*75*	*46 - 113*				
Pyrene-d10	*83*	*45 - 114*				
Terphenyl-d14	*82*	*49 - 121*				

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Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.120**	**0.121**	0.0833	0.0833	0.0558	77	78	51 - 115	1	26	
Acenaphthylene	**0.0623**	**0.0653**	0.0833	0.0833	0.00504	69	72	53 - 121	5	24	
Acenaphthene	**0.0677**	**0.0754**	0.0833	0.0833	0.00339	77	86	52 - 121	11	25	
Fluorene	**0.0644**	**0.0705**	0.0833	0.0833	0.00667	69	77	58 - 127	9	23	
Phenanthrene	**0.126**	**0.136**	0.0833	0.0833	0.0641	74	86	46 - 129	8	28	
Anthracene	**0.0732**	**0.0793**	0.0833	0.0833	0.0100	76	83	57 - 124	8	21	
Fluoranthene	**0.0877**	**0.0932**	0.0833	0.0833	0.0287	71	77	46 - 136	6	29	
Pyrene	**0.0859**	**0.0921**	0.0833	0.0833	0.0266	71	79	41 - 136	7	32	
Benzo[a]anthracene	**0.0983**	**0.114**	0.0833	0.0833	0.0191	95	114	56 - 136	15	25	
Chrysene	**0.0890**	**0.102**	0.0833	0.0833	0.0288	72	88	49 - 130	14	22	
Benzo[b]fluoranthene	**0.0813**	**0.0937**	0.0833	0.0833	0.0267	66	80	51 - 135	14	26	
Benzo(j,k)fluoranthene	**0.0686**	**0.0758**	0.0833	0.0833	0.00528	76	85	56 - 124	10	23	
Benzo[a]pyrene	**0.0728**	**0.0833**	0.0833	0.0833	0.0163	68	80	54 - 133	13	26	
Indeno(1,2,3-c,d)pyrene	**0.0727**	**0.0819**	0.0833	0.0833	0.0159	68	79	52 - 134	12	20	
Dibenz[a,h]anthracene	**0.0685**	**0.0791**	0.0833	0.0833	0.00596	75	88	58 - 127	14	17	
Benzo[g,h,i]perylene	**0.0763**	**0.0861**	0.0833	0.0833	0.0215	66	78	54 - 129	12	21	
Surrogate:											
2-Fluorobiphenyl						*62*	*67*	*46 - 113*			
Pyrene-d10						*70*	*77*	*45 - 114*			
Terphenyl-d14						*71*	*80*	*49 - 121*			

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
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Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Diesel Range Organics	**56**	28	NWTPH-Dx	10-29-20	10-29-20	N
Lube Oil	**350**	56	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**TP-8-0-0.5**					
Laboratory ID:	10-264-02					
Diesel Range Organics	**ND**	26	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	53	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**TP-12-0-0.5**					
Laboratory ID:	10-264-08					
Diesel Range Organics	**ND**	27	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	55	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*90*	*50-150*				

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029S2					
Diesel Range Organics	**ND**	25	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*96*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-264-01										
	ORIG	DUP									
Diesel Range Organics	**50.4**	**50.5**	NA	NA		NA		NA	0	NA	N
Lube Oil	**308**	**289**	NA	NA		NA		NA	6	NA	
Surrogate:											
o-Terphenyl						*97*	*91*	*50-150*			

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Gasoline	**ND**	17	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*107*	*58-129*				
Client ID:	**TP-8-0-0.5**					
Laboratory ID:	10-264-02					
Gasoline	**ND**	6.3	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				
Client ID:	**TP-12-0-0.5**					
Laboratory ID:	10-264-08					
Gasoline	**ND**	5.7	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*108*	*58-129*				

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1028S3					
Gasoline	**ND**	5.0	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*58-129*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-264-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*107*	*108*	*58-129*			

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

PCBs EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Aroclor 1016	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1221	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1232	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1242	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1248	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1254	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1260	**0.050**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1262	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Aroclor 1268	**ND**	0.028	EPA 8082A	11-4-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*91*	*46-125*				

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1104S1					
Aroclor 1016	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1221	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1232	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1242	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1248	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1254	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1260	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1262	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1268	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*98*	*46-125*				
Laboratory ID:	MB1104S1					
Aroclor 1016	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1221	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1232	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1242	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1248	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1254	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1260	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1262	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1268	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*97*	*46-125*				

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.224**	**0.292**	0.250	0.250	ND	**89**	**117**	43-125	26	15	L, X
Surrogate:											
DCB						*102*	*102*	*46-125*			
SPIKE BLANKS											
Laboratory ID:	SB1104S1										
	SB	SBD	SB	SBD		SB	SBD				
Aroclor 1260	**0.280**	**0.260**	0.250	0.250	N/A	**112**	**104**	50-134	7	18	
Surrogate:											
DCB						*96*	*96*	*46-125*			
Laboratory ID:	SB1104S1										
	SB	SBD	SB	SBD		SB	SBD				
Aroclor 1260	**0.301**	**0.272**	0.250	0.250	N/A	**120**	**109**	50-134	10	18	X
Surrogate:											
DCB						*102*	*101*	*46-125*			

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**0.45**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1030TM2					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	
Laboratory ID:	MB1030T2					
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-264-01										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Barium	**0.452**	**0.448**	NA	NA		NA		NA	1	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-264-01										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-279-02										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Barium	**0.462**	**0.462**	NA	NA		NA		NA	0	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-279-02										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**3.92**	**3.90**	4.00	4.00	ND	**98**	**98**	75-125	1	20	
Barium	**4.29**	**4.30**	4.00	4.00	0.462	**96**	**96**	75-125	0	20	
Cadmium	**1.82**	**1.81**	2.00	2.00	ND	**91**	**90**	75-125	1	20	
Chromium	**3.80**	**3.78**	4.00	4.00	ND	**95**	**95**	75-125	1	20	
Lead	**9.55**	**9.51**	10.0	10.0	ND	**96**	**95**	75-125	0	20	
Selenium	**4.05**	**4.01**	4.00	4.00	ND	**101**	**100**	75-125	1	20	
Silver	**0.960**	**0.968**	1.00	1.00	ND	**96**	**97**	75-125	1	20	
Laboratory ID:	10-279-02										
Mercury	**0.0488**	**0.0486**	0.0500	0.0500	ND	**98**	**97**	75-125	0	20	

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G

Matrix: Soil
Units: % Solids

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-5-0-0.5**					
Laboratory ID:	10-264-01					
Total Solids	**89**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-8-0-0.5**					
Laboratory ID:	10-264-02					
Total Solids	**95**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-12-0-0.5**					
Laboratory ID:	10-264-08					
Total Solids	**92**	0.50	SM 2540G	10-29-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 22, 2020
Laboratory Reference: 2010-264
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G
QUALITY CONTROL

Matrix: Soil
Units: % Solids

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-264-01								
	ORIG	DUP							
Total Solids	**89.3**	**91.7**	NA	NA	NA	NA	3	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

November 17, 2020

Vista Work Order No. 2002336

Mr. David Baumeister
OnSite Environmental Inc.
14648 NE 95th Street
Redmond, WA 98052

Dear Mr. Baumeister,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on October 28, 2020 under your Project Name '202005-0101'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Work Order No. 2002336
Case Narrative

Sample Condition on Receipt:

One solid sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The sample was received in good condition and within the method temperature requirements. The sample was received in a clear glass jar.

Analytical Notes:

EPA Method 1613B

The sample was extracted and analyzed for tetra-through-octa chlorinated dioxins and furans by EPA Method 1613B using a ZB-5MS GC column.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank. The OPR recoveries were within the method acceptance criteria.

Labeled standard recoveries for all QC and field samples were within method acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2002336-01	TP-5-0-0.5	20-Oct-20 09:57	28-Oct-20 09:49	Clear Glass Jar, 250mL

Vista Project: 2002336 Client Project: 202005-0101

ANALYTICAL RESULTS

Sample ID: Method Blank	**EPA Method 1613B**

Client Data		**Laboratory Data**			
Name:	OnSite Environmental Inc.	Lab Sample:	B0K0041-BLK1		
Project:	202005-0101	QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Matrix:	Solid	Sample Size:	10.0 g	Column:	ZB-DIOXIN

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND	0.0263			13-Nov-20 10:55	1
1,2,3,7,8-PeCDD	ND	0.0497			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDD	ND	0.0568			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDD	ND	0.0574			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDD	ND	0.0721			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDD	ND	0.0573			13-Nov-20 10:55	1
OCDD	ND	0.116			13-Nov-20 10:55	1
2,3,7,8-TCDF	ND	0.0198			13-Nov-20 10:55	1
1,2,3,7,8-PeCDF	ND	0.0288			13-Nov-20 10:55	1
2,3,4,7,8-PeCDF	ND	0.0235			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDF	ND	0.0329			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDF	ND	0.0337			13-Nov-20 10:55	1
2,3,4,6,7,8-HxCDF	ND	0.0389			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDF	ND	0.0698			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDF	ND	0.0487			13-Nov-20 10:55	1
1,2,3,4,7,8,9-HpCDF	ND	0.0568			13-Nov-20 10:55	1
OCDF	ND	0.0915			13-Nov-20 10:55	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	0.00					
Totals						
Total TCDD	ND	0.0263				
Total PeCDD	ND	0.0497				
Total HxCDD	ND	0.0721				
Total HpCDD	ND	0.0573				
Total TCDF	ND	0.0198				
Total PeCDF	ND	0.0288				
Total HxCDF	ND	0.0698				
Total HpCDF	ND	0.0568				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	80.4	25 - 164		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDD	IS	81.8	25 - 181		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDD	IS	88.4	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDD	IS	89.3	28 - 130		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDD	IS	80.0	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDD	IS	80.0	23 - 140		13-Nov-20 10:55	1
13C-OCDD	IS	74.4	17 - 157		13-Nov-20 10:55	1
13C-2,3,7,8-TCDF	IS	83.2	24 - 169		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDF	IS	84.6	24 - 185		13-Nov-20 10:55	1
13C-2,3,4,7,8-PeCDF	IS	90.3	21 - 178		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDF	IS	82.0	26 - 152		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDF	IS	82.7	26 - 123		13-Nov-20 10:55	1
13C-2,3,4,6,7,8-HxCDF	IS	83.8	28 - 136		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDF	IS	71.1	29 - 147		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDF	IS	75.5	28 - 143		13-Nov-20 10:55	1
13C-1,2,3,4,7,8,9-HpCDF	IS	71.1	26 - 138		13-Nov-20 10:55	1
13C-OCDF	IS	71.5	17 - 157		13-Nov-20 10:55	1
37Cl-2,3,7,8-TCDD	CRS	95.5	35 - 197		13-Nov-20 10:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

Sample ID: OPR **EPA Method 1613B**

Client Data		**Laboratory Data**			
Name:	OnSite Environmental Inc.	Lab Sample:	B0K0041-BS1		
Project:	202005-0101	QC Batch:	B0K0041	Date Extracted:	05-Nov-20 06:05
Matrix:	Solid	Sample Size:	10.0 g	Column:	ZB-DIOXIN

Analyte	Amt Found (pg/g)	Spike Amt	% Recovery	Limits	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	21.0	20.0	105	67-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDD	106	100	106	70-142		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDD	101	100	101	70-164		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDD	104	100	104	76-134		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDD	103	100	103	64-162		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDD	102	100	102	70-140		13-Nov-20 09:25	1
OCDD	204	200	102	78-144		13-Nov-20 09:25	1
2,3,7,8-TCDF	19.4	20.0	96.8	75-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDF	102	100	102	80-134		13-Nov-20 09:25	1
2,3,4,7,8-PeCDF	102	100	102	68-160		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDF	103	100	103	72-134		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDF	101	100	101	84-130		13-Nov-20 09:25	1
2,3,4,6,7,8-HxCDF	100	100	100	70-156		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDF	98.9	100	98.9	78-130		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDF	103	100	103	82-122		13-Nov-20 09:25	1
1,2,3,4,7,8,9-HpCDF	100	100	100	78-138		13-Nov-20 09:25	1
OCDF	200	200	100	63-170		13-Nov-20 09:25	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	88.5	20-175		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDD	IS	89.5	21-227		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDD	IS	91.6	21-193		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDD	IS	91.8	25-163		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDD	IS	90.8	21-193		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDD	IS	87.0	26-166		13-Nov-20 09:25	1
13C-OCDD	IS	79.6	13-199		13-Nov-20 09:25	1
13C-2,3,7,8-TCDF	IS	88.7	22-152		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDF	IS	93.6	21-192		13-Nov-20 09:25	1
13C-2,3,4,7,8-PeCDF	IS	95.6	13-328		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDF	IS	84.0	19-202		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDF	IS	85.3	21-159		13-Nov-20 09:25	1
13C-2,3,4,6,7,8-HxCDF	IS	85.0	22-176		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDF	IS	87.1	17-205		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDF	IS	78.0	21-158		13-Nov-20 09:25	1
13C-1,2,3,4,7,8,9-HpCDF	IS	75.8	20-186		13-Nov-20 09:25	1
13C-OCDF	IS	77.7	13-199		13-Nov-20 09:25	1
37Cl-2,3,7,8-TCDD	CRS	106	31-191		13-Nov-20 09:25	1

Sample ID: TP-5-0-0.5	**EPA Method 1613B**

Client Data		**Laboratory Data**			
Name:	OnSite Environmental Inc.	Lab Sample:	2002336-01	Date Received:	28-Oct-20 09:49
Project:	202005-0101	QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Matrix:	Solid	Sample Size:	11.6 g	Column:	ZB-DIOXIN
Date Collected:	20-Oct-20 09:57	% Solids:	87.4		

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND		0.761		14-Nov-20 05:01	1
1,2,3,7,8-PeCDD	6.41				14-Nov-20 05:01	1
1,2,3,4,7,8-HxCDD	11.4				14-Nov-20 05:01	1
1,2,3,6,7,8-HxCDD	110				14-Nov-20 05:01	1
1,2,3,7,8,9-HxCDD	32.2				14-Nov-20 05:01	1
1,2,3,4,6,7,8-HpCDD	2350				14-Nov-20 05:01	1
OCDD	23400			D	14-Nov-20 16:24	20
2,3,7,8-TCDF	1.10				14-Nov-20 05:01	1
1,2,3,7,8-PeCDF	2.99				14-Nov-20 05:01	1
2,3,4,7,8-PeCDF	5.52				14-Nov-20 05:01	1
1,2,3,4,7,8-HxCDF	10.4				14-Nov-20 05:01	1
1,2,3,6,7,8-HxCDF	4.97				14-Nov-20 05:01	1
2,3,4,6,7,8-HxCDF	8.00				14-Nov-20 05:01	1
1,2,3,7,8,9-HxCDF	1.60			J	14-Nov-20 05:01	1
1,2,3,4,6,7,8-HpCDF	149				14-Nov-20 05:01	1
1,2,3,4,7,8,9-HpCDF	7.02				14-Nov-20 05:01	1
OCDF	433				14-Nov-20 05:01	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	58.3					
Totals						
Total TCDD	12.9		13.8			
Total PeCDD	45.0					
Total HxCDD	669					
Total HpCDD	6130					
Total TCDF	17.2		17.6			
Total PeCDF	65.4					
Total HxCDF	264					
Total HpCDF	561					

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	98.5	25 - 164		14-Nov-20 05:01	1
13C-1,2,3,7,8-PeCDD	IS	98.7	25 - 181		14-Nov-20 05:01	1
13C-1,2,3,4,7,8-HxCDD	IS	96.6	32 - 141		14-Nov-20 05:01	1
13C-1,2,3,6,7,8-HxCDD	IS	97.6	28 - 130		14-Nov-20 05:01	1
13C-1,2,3,7,8,9-HxCDD	IS	97.3	32 - 141		14-Nov-20 05:01	1
13C-1,2,3,4,6,7,8-HpCDD	IS	115	23 - 140		14-Nov-20 05:01	1
13C-OCDD	IS	98.1	17 - 157	D	14-Nov-20 16:24	20
13C-2,3,7,8-TCDF	IS	99.3	24 - 169		14-Nov-20 05:01	1
13C-1,2,3,7,8-PeCDF	IS	103	24 - 185		14-Nov-20 05:01	1
13C-2,3,4,7,8-PeCDF	IS	105	21 - 178		14-Nov-20 05:01	1
13C-1,2,3,4,7,8-HxCDF	IS	93.3	26 - 152		14-Nov-20 05:01	1
13C-1,2,3,6,7,8-HxCDF	IS	92.2	26 - 123		14-Nov-20 05:01	1
13C-2,3,4,6,7,8-HxCDF	IS	92.9	28 - 136		14-Nov-20 05:01	1
13C-1,2,3,7,8,9-HxCDF	IS	95.2	29 - 147		14-Nov-20 05:01	1
13C-1,2,3,4,6,7,8-HpCDF	IS	91.3	28 - 143		14-Nov-20 05:01	1
13C-1,2,3,4,7,8,9-HpCDF	IS	98.6	26 - 138		14-Nov-20 05:01	1
13C-OCDF	IS	108	17 - 157		14-Nov-20 05:01	1
37Cl-2,3,7,8-TCDD	CRS	107	35 - 197		14-Nov-20 05:01	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
K	EMPC (specific projects only)
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

OnSite Environmental Inc.

2002336 2.3°C

14648 NE 95th Street, Redmond, WA 98052 · (425) 883-3881

Laboratory Reference #: 10-264

Laboratory: Vista Analytical Laboratory

Attention: Jennifer Miller

Address: 1104 Windfield Way, El Dorado Hills, CA 95762

Phone Number: (916) 673-1520

Turnaround Request

1 Day 2 Day 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 202005-0101

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analyses
	TP-5-0-0.5	10/20/20	9:57	S	1	Dioxin/Furans

Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by: [signature]	O8E	10/27/20	1600	CLIENT QA/QC
Received by:	UPS			
Relinquished by:	UPS			
Received by: [signature]	VAL	10/28/20	09:49	
Relinquished by:				
Received by:				

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2002336 TAT Std

Samples Arrival:	**Date/Time** 10/28/20 09:49		**Initials:** UHW		**Location:** WR-2 **Shelf/Rack:** NA	
Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Techni Ice	Dry Ice	None	
Temp °C: 2.3 **(uncorrected)**	**Probe used:** Y / N		**Thermometer ID:** IR-4			
Temp °C: 2.3 **(corrected)**						

	YES	NO	NA
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			X
Airbill —— Trk # 1Z684E1W0195332127	✓		
Shipping Documentation Present?	✓		
Shipping Container: Vista / Client / Retain / Return / Dispose			
Chain of Custody / Sample Documentation Present?	✓		
Chain of Custody / Sample Documentation Complete?	✓		
Holding Time Acceptable?	✓		

Logged In:	**Date/Time** 10/30/20 1041	**Initials:** VBB	**Location:** WR-2 **Shelf/Rack:** ___

	YES	NO	NA
COC Anomaly/Sample Acceptance Form completed?	✓		

Comments:

ID.: LR – SLC *Rev No.: 6* *Rev Date: 07/16/2020* *Page: 1 of 1*

CoC/Label Reconciliation Report WO# 2002336

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2002336-01	A TP-5-0-0.5 A	☑		20-Oct-20 09:57	☑	Clear Glass Jar, 250mL B	Solid	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)		✓	
Preservation Documented: Na2S2O3 Trizma None Other			✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

Comments:

A Sample label Analysis "Metals"
B Sample rec'd in clear glass jar

Verifed by/Date: BLB 10/30/20

Vista Analytical Laboratory

ANOMALY FORM

Vista Work Order 2002336

Initial/Date — The following checked issues were noted during sample receipt and login:

Initial/Date		
	☐	**1. The samples were received out of temperature at (WI-PHT):** ________ Was Ice present: Yes No Melted Blue Ice
	☐	2. The Chain-of-Custody (CoC) was not relinquished properly.
	☐	3. The CoC did not include collection time(s). 00:00 will be used unless notified otherwise.
	☐	4. The sample(s) did not include a sample collection time. All or Sample Name: ________
	☐	5. A sample ID discrepancy was found. See the Reconciliation report. The CoC Sample ID will be used unless notified otherwise.
	☐	6. A sample date and/or time discrepancy was found. See the Reconciliation report. The CoC Sample date/time will be used unless notified otherwise.
	☐	**7. The CoC did not include a sample matrix. The following sample matrix will be used:** ________
	☐	**8. Insufficent volume received for analysis. All or Sample Name:** ________
	☐	9. The backup bottle was received broken. Sample Name: ________
	☐	**10. CoC not received, illegible or destroyed.**
	☐	**11. The sample(s) were received out of holding time. All or Sample Name:** ________
	☐	**12. The CoC did not include an analysis. All or Sample Name:** ________
	☐	**13. Sample(s) received without collection date. All or Sample Name:** ________
	☐	**14. Sample(s) not received. All or Sample Name:** ________
	☐	**15. Sample(s) received broken. All or Sample Name:** ________
BJB 10/30/20	☑	**16. An incorrect container-type was used. All or Sample Name:** TP-5-0-0.5 *
	☐	17. Other:

* Sample label analysis "Metals"

Bolded items require sign-off

Client Contacted: Yes, via email

Date of Contact: 10/30/2020

Vista Client Manager: KJR

Resolution: Client informed of container type in acknowledgement letter email

10-264

Chain of Custody Record & Laboratory Analysis Request

ANCHOR QEA

Laboratory Name: Onsite
Date: 10/20/2020
Project Name: ABC Recycling Phase 2
Project Number: 202005-01.01
Project Manager: Derek Ormerod/Matt Woltman
Phone Number: 206-331-1738
Shipment Method: FedEX

Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	~~Mercury~~ /Metals (PP Metals)	~~Total Solids~~ DB /PAHS	Grain Size	Total Organic Carbon	Dioxin/Furans	Archive	TPHDx / ETPH DB	GRO	PCBs	TCLP Metals (RCRA 8)	DUPLICATE	Total Solids 2540G	HOLD	Comments/Preservation
1	TP-5-0-0.5	10/20/20 0957	S	7	X	X			X		X	X	X	X	X	X		~~HOLD~~ DUPLICATE
2	TP-8-0-0.5	10/20/20 1150	S	7	X	X					X	X				X		
3	TP-8-2.5-3	10/20/20 1217	S	10	X	X			X		X	X	X	X			X	
4	TP-10-2-2.5	10/20/20 1435	S	7	X	X					X	X					X	
5	TP-10-2-2.5-DUP	10/20/20 1435	S	7	X	X					X	X					X	
6	TP-11-0-0.5	10/20/20 1512	S	7	X	X					X	X					X	
7	TP-11-1.5-2	10/20/20 1531	S	7	X	X					X	X					X	
8	TP-12-0-0.5	10/20/20 1613	S	10	X	X			X		X	X	X			X		
9	TP-12-3-3.5	10/20/20 1638	S	7	X	X					X	X					X	
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		

Notes: HOLD ALL SAMPLES UNTIL FURTHER INSTRUCTION PROVIDED
(X) Added 10/26/2020. DB (STA)

Relinquished By:	Company: Anchor QEA, LLC	Received By:	Company: OSE
Tanner Kamila — Signature/Printed Name	10/20/20 1801 — Date/Time	[signature] — Signature/Printed Name	10/22/20 1000 — Date/Time

Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Sample/Cooler Receipt and Acceptance Checklist

Client: ANC

Client Project Name/Number: A 202005-01.01

OnSite Project Number: 10-264

Initiated by: VL

Date Initiated: 10/22/20

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	Yes	No	N/A	1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	N/A	Temperature: 11.4
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A		
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No	1 2 3 4
2.2 Was the COC legible and written in permanent ink?	Yes	No	1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No	1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No	1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	Yes	No	1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	No	1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	Yes	No		1 2 3 4
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#2		N/A	1 2 3 4

Explain any discrepancies:

2.4 Sample TP-12-0-0.5 1 jar not labeled

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

//SERVER\OSE\Administration\forms\cooler_checklist.xls

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 17, 2020

Derek Ormerod
Anchor QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101

Re: Analytical Data for Project 202005-01.01
Laboratory Reference No. 2010-279

Dear Derek:

Enclosed are the analytical results and associated quality control data for samples submitted on October 23, 2020.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

Case Narrative

Samples were collected on October 21 and 22, 2020 and received by the laboratory on October 23, 2020. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

PCBs EPA 8082A Analysis

The Sample TP-7-4.5-5 was used as the MS/MSD pair. The RPD between the MS/MSD (26%) was above quality control limit of 15%. The sample was re-extracted and rerun with similar results and attributed to matrix effect. All other QC was within their corresponding quality control limits. No further action was performed.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9-0-0.5**					
Laboratory ID:	10-279-01					
Antimony	**75**	2.6	EPA 6010D	10-28-20	10-29-20	
Arsenic	**160**	2.6	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.17**	0.11	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.47**	0.11	EPA 6020B	11-2-20	11-4-20	
Chromium	**74**	0.53	EPA 6010D	10-28-20	10-29-20	
Copper	**240**	1.1	EPA 6010D	10-28-20	10-29-20	
Lead	**110**	5.3	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.14**	0.026	EPA 7471B	11-4-20	11-4-20	
Nickel	**52**	13	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.6	EPA 6010D	10-28-20	10-29-20	
Silver	**0.41**	0.26	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	2.6	EPA 6010D	10-28-20	10-29-20	
Zinc	**280**	13	EPA 6010D	10-28-20	10-29-20	

Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Antimony	**8.8**	3.5	EPA 6010D	10-28-20	10-29-20	
Arsenic	**25**	3.5	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.19**	0.14	EPA 6020B	11-2-20	11-4-20	
Cadmium	**3.0**	0.14	EPA 6020B	11-2-20	11-4-20	
Chromium	**25**	0.69	EPA 6010D	10-28-20	10-29-20	
Copper	**40**	1.4	EPA 6010D	10-28-20	10-29-20	
Lead	**39**	6.9	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.11**	0.035	EPA 7471B	11-4-20	11-4-20	
Nickel	**22**	3.5	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.5	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.35	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.5	EPA 6010D	10-28-20	10-29-20	
Zinc	**140**	3.5	EPA 6010D	10-28-20	10-29-20	

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Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-4-0-0.5**					
Laboratory ID:	10-279-03					
Antimony	**46**	3.1	EPA 6010D	10-28-20	10-29-20	
Arsenic	**100**	3.1	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.36**	0.12	EPA 6020B	11-2-20	11-4-20	
Cadmium	**3.8**	0.12	EPA 6020B	11-2-20	11-4-20	
Chromium	**26**	0.62	EPA 6010D	10-28-20	10-29-20	
Copper	**90**	1.2	EPA 6010D	10-28-20	10-29-20	
Lead	**130**	6.2	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.25**	0.031	EPA 7471B	11-4-20	11-4-20	
Nickel	**17**	3.1	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.1	EPA 6010D	10-28-20	10-29-20	
Silver	**0.50**	0.31	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.1	EPA 6010D	10-28-20	10-29-20	
Zinc	**250**	3.1	EPA 6010D	10-28-20	10-29-20	

Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Antimony	**5.3**	2.8	EPA 6010D	10-28-20	10-29-20	
Arsenic	**19**	2.8	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.26**	0.11	EPA 6020B	11-2-20	11-4-20	
Cadmium	**1.6**	0.11	EPA 6020B	11-2-20	11-4-20	
Chromium	**11**	0.57	EPA 6010D	10-28-20	10-29-20	
Copper	**37**	1.1	EPA 6010D	10-28-20	10-29-20	
Lead	**15**	5.7	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.11**	0.028	EPA 7471B	11-4-20	11-4-20	
Nickel	**9.0**	2.8	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.8	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.28	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	2.8	EPA 6010D	10-28-20	10-29-20	
Zinc	**65**	2.8	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-16-5-5.5**					
Laboratory ID:	10-279-07					
Antimony	**ND**	3.7	EPA 6010D	10-28-20	10-29-20	
Arsenic	**6.4**	3.7	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.52**	0.15	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.79**	0.15	EPA 6020B	11-2-20	11-4-20	
Chromium	**43**	0.74	EPA 6010D	10-28-20	10-29-20	
Copper	**30**	1.5	EPA 6010D	10-28-20	10-29-20	
Lead	**16**	7.4	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.048**	0.037	EPA 7471B	11-4-20	11-4-20	
Nickel	**41**	3.7	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.7	EPA 6010D	10-28-20	10-29-20	
Silver	**0.38**	0.37	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.7	EPA 6010D	10-28-20	10-29-20	
Zinc	**130**	3.7	EPA 6010D	10-28-20	10-29-20	

Client ID:	**TP-13-1.5-2**					
Laboratory ID:	10-279-08					
Antimony	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Arsenic	**6.5**	3.2	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.34**	0.13	EPA 6020B	11-2-20	11-4-20	
Cadmium	**ND**	0.13	EPA 6020B	11-2-20	11-4-20	
Chromium	**50**	0.63	EPA 6010D	10-28-20	10-29-20	
Copper	**41**	1.3	EPA 6010D	10-28-20	10-29-20	
Lead	**3.9**	1.3	EPA 6020B	11-2-20	11-5-20	
Mercury	**0.051**	0.032	EPA 7471B	11-4-20	11-4-20	
Nickel	**48**	3.2	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.32	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Zinc	**64**	3.2	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Antimony	**ND**	4.1	EPA 6010D	10-28-20	10-29-20	
Arsenic	**13**	4.1	EPA 6010D	10-28-20	10-29-20	
Beryllium	**1.8**	0.16	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.71**	0.16	EPA 6020B	11-2-20	11-4-20	
Chromium	**16**	0.82	EPA 6010D	10-28-20	10-29-20	
Copper	**36**	1.6	EPA 6010D	10-28-20	10-29-20	
Lead	**31**	8.2	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.34**	0.041	EPA 7471B	11-4-20	11-4-20	
Nickel	**18**	4.1	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	4.1	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.41	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	4.1	EPA 6010D	10-28-20	10-29-20	
Zinc	**42**	4.1	EPA 6010D	10-28-20	10-29-20	

Client ID:	**TP-15-1-1.5**					
Laboratory ID:	10-279-10					
Antimony	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Arsenic	**9.9**	3.0	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.34**	0.12	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.17**	0.12	EPA 6020B	11-2-20	11-4-20	
Chromium	**45**	0.60	EPA 6010D	10-28-20	10-29-20	
Copper	**43**	1.2	EPA 6010D	10-28-20	10-29-20	
Lead	**4.0**	1.2	EPA 6020B	11-2-20	11-5-20	
Mercury	**0.047**	0.030	EPA 7471B	11-4-20	11-4-20	
Nickel	**48**	3.0	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.30	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Zinc	**77**	3.0	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-14-1.5-2**					
Laboratory ID:	10-279-11					
Antimony	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Arsenic	**7.2**	3.0	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.29**	0.12	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.13**	0.12	EPA 6020B	11-2-20	11-4-20	
Chromium	**44**	0.60	EPA 6010D	10-28-20	10-29-20	
Copper	**27**	1.2	EPA 6010D	10-28-20	10-29-20	
Lead	**3.8**	1.2	EPA 6020B	11-2-20	11-5-20	
Mercury	**0.042**	0.030	EPA 7471B	11-4-20	11-4-20	
Nickel	**35**	3.0	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.30	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.0	EPA 6010D	10-28-20	10-29-20	
Zinc	**49**	3.0	EPA 6010D	10-28-20	10-29-20	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-0.5-1.5**					
Laboratory ID:	10-279-12					
Antimony	**3.4**	3.2	EPA 6010D	10-28-20	10-29-20	
Arsenic	**11**	3.2	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.37**	0.13	EPA 6020B	11-2-20	11-4-20	
Cadmium	**0.44**	0.13	EPA 6020B	11-2-20	11-4-20	
Chromium	**28**	0.65	EPA 6010D	10-28-20	10-29-20	
Copper	**17**	1.3	EPA 6010D	10-28-20	10-29-20	
Lead	**14**	6.5	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.039**	0.032	EPA 7471B	11-4-20	11-4-20	
Nickel	**27**	3.2	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.32	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Zinc	**98**	3.2	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-2-1.5-2**					
Laboratory ID:	10-279-13					
Antimony	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Arsenic	**11**	3.2	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.49**	0.13	EPA 6020B	11-2-20	11-4-20	
Cadmium	**ND**	0.13	EPA 6020B	11-2-20	11-4-20	
Chromium	**64**	0.65	EPA 6010D	10-28-20	10-29-20	
Copper	**53**	1.3	EPA 6010D	10-28-20	10-29-20	
Lead	**6.9**	6.5	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.067**	0.032	EPA 7471B	11-4-20	11-4-20	
Nickel	**58**	3.2	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Silver	**ND**	0.32	EPA 6020B	11-2-20	11-4-20	
Thallium	**ND**	3.2	EPA 6010D	10-28-20	10-29-20	
Zinc	**87**	3.2	EPA 6010D	10-28-20	10-29-20	
Client ID:	**TP-3-1.5-2**					
Laboratory ID:	10-279-14					
Antimony	**26**	5.1	EPA 6010D	10-28-20	10-29-20	
Arsenic	**93**	5.1	EPA 6010D	10-28-20	10-29-20	
Beryllium	**0.25**	0.20	EPA 6020B	11-2-20	11-4-20	
Cadmium	**79**	0.20	EPA 6020B	11-2-20	11-4-20	
Chromium	**28**	1.0	EPA 6010D	10-28-20	10-29-20	
Copper	**59**	2.0	EPA 6010D	10-28-20	10-29-20	
Lead	**2600**	10	EPA 6010D	10-28-20	10-29-20	
Mercury	**0.25**	0.051	EPA 7471B	11-4-20	11-4-20	
Nickel	**8.1**	5.1	EPA 6010D	10-28-20	10-29-20	
Selenium	**30**	5.1	EPA 6010D	10-28-20	10-29-20	
Silver	**11**	0.51	EPA 6020B	11-2-20	11-4-20	
Thallium	**8.9**	5.1	EPA 6010D	10-28-20	10-29-20	
Zinc	**290**	5.1	EPA 6010D	10-28-20	10-29-20	

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TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1102SM1					
Lead	**ND**	1.0	EPA 6020B	11-2-20	11-5-20	
Laboratory ID:	MB1028SH1					
Antimony	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Arsenic	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Chromium	**ND**	0.50	EPA 6010D	10-28-20	10-29-20	
Copper	**ND**	1.0	EPA 6010D	10-28-20	10-29-20	
Lead	**ND**	5.0	EPA 6010D	10-28-20	10-29-20	
Nickel	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Selenium	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Thallium	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Zinc	**ND**	2.5	EPA 6010D	10-28-20	10-29-20	
Laboratory ID:	MB1102SM1					
Beryllium	**ND**	0.10	EPA 6020B	11-2-20	11-4-20	
Cadmium	**ND**	0.10	EPA 6020B	11-2-20	11-4-20	
Silver	**ND**	0.25	EPA 6020B	11-2-20	11-4-20	
Laboratory ID:	MB1104S1					
Mercury	**ND**	0.025	EPA 7471B	11-4-20	11-4-20	

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Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	10-279-02									
	ORIG	DUP								
Antimony	**6.30**	**7.95**	NA	NA		NA	NA	23	20	
Arsenic	**18.0**	**20.0**	NA	NA		NA	NA	11	20	
Chromium	**18.2**	**19.9**	NA	NA		NA	NA	9	20	
Copper	**28.9**	**30.7**	NA	NA		NA	NA	6	20	
Lead	**28.2**	**33.5**	NA	NA		NA	NA	17	20	
Nickel	**16.2**	**17.1**	NA	NA		NA	NA	5	20	
Selenium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Thallium	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Zinc	**104**	**124**	NA	NA		NA	NA	18	20	
Laboratory ID:	10-279-02									
Beryllium	**0.135**	**0.155**	NA	NA		NA	NA	14	20	
Cadmium	**2.16**	**2.04**	NA	NA		NA	NA	5	20	
Silver	**ND**	**ND**	NA	NA		NA	NA	NA	20	
Laboratory ID:	10-279-02									
Mercury	**0.0769**	**0.127**	NA	NA		NA	NA	49	20	
Laboratory ID:	10-279-02									
	ORIG	DUP								
Lead	**14.3**	**13.3**	NA	NA		NA	NA	7	20	

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TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Antimony	**88.0**	**83.5**	100	100	6.30	**82**	**77**	75-125	5	20	
Arsenic	**114**	**111**	100	100	18.0	**96**	**93**	75-125	3	20	
Chromium	**104**	**105**	100	100	18.2	**86**	**86**	75-125	0	20	
Copper	**80.5**	**76.0**	50.0	50.0	28.9	**103**	**94**	75-125	6	20	
Lead	**241**	**233**	250	250	28.2	**85**	**82**	75-125	3	20	
Nickel	**98.5**	**98.0**	100	100	16.2	**82**	**82**	75-125	1	20	
Selenium	**97.5**	**94.5**	100	100	ND	**98**	**95**	75-125	3	20	
Thallium	**44.4**	**43.9**	50.0	50.0	ND	**89**	**88**	75-125	1	20	
Zinc	**190**	**183**	100	100	104	**87**	**79**	75-125	4	20	
Laboratory ID:	10-279-02										
Beryllium	**49.8**	**51.3**	50.0	50.0	0.135	**99**	**102**	75-125	3	20	
Cadmium	**46.8**	**47.3**	50.0	50.0	2.16	**89**	**90**	75-125	1	20	
Silver	**22.5**	**22.3**	25.0	25.0	ND	**90**	**89**	75-125	1	20	
Laboratory ID:	10-279-02										
Mercury	**0.559**	**0.515**	0.500	0.500	0.0769	**96**	**88**	80-120	8	20	
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Lead	**251**	**252**	250	250	14.3	**95**	**95**	75-125	0	20	

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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9-0-0.5**					
Laboratory ID:	10-279-01					
Naphthalene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.087**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.38**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**ND**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.79**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.79**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.84**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.77**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**1.3**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**0.41**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.96**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.74**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**0.18**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.76**	0.070	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*46 - 113*				
Pyrene-d10	*95*	*45 - 114*				
Terphenyl-d14	*100*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Naphthalene	**0.077**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**0.088**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**0.078**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**0.0070**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**0.0047**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**0.0093**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**0.089**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**0.014**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**0.040**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**0.037**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**0.027**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**0.040**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**0.037**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**0.0073**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**0.023**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**0.022**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**0.0083**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**0.030**	0.0046	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*67*	*46 - 113*				
Pyrene-d10	*76*	*45 - 114*				
Terphenyl-d14	*77*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-4-0-0.5**					
Laboratory ID:	10-279-03					
Naphthalene	**0.28**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.80**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.54**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**ND**	0.084	EPA 8270E/SIM	10-29-20	10-31-20	U1
Phenanthrene	**0.62**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.082**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.17**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.18**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.13**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.22**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.13**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**ND**	0.082	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*80*	*46 - 113*				
Pyrene-d10	*84*	*45 - 114*				
Terphenyl-d14	*86*	*49 - 121*				

Date of Report: November 17, 2020
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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Naphthalene	**1.2**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**4.4**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**2.5**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.36	EPA 8270E/SIM	10-29-20	10-31-20	U1
Fluorene	**0.41**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**3.6**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.13**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.35**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.49**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.41**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.94**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.33**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.17**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**0.087**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.17**	0.076	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*105*	*46 - 113*				
Pyrene-d10	*113*	*45 - 114*				
Terphenyl-d14	*121*	*49 - 121*				

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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-16-5-5.5**					
Laboratory ID:	10-279-07					
Naphthalene	**0.086**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.048**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.039**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**0.0055**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**ND**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.066**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.0071**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.049**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.032**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.011**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.025**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.030**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**0.0060**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.011**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.017**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**ND**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.023**	0.0049	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*66*	*46 - 113*				
Pyrene-d10	*69*	*45 - 114*				
Terphenyl-d14	*69*	*49 - 121*				

Date of Report: November 17, 2020
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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-13-1.5-2**					
Laboratory ID:	10-279-08					
Naphthalene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**0.0044**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0042	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*65*	*46 - 113*				
Pyrene-d10	*78*	*45 - 114*				
Terphenyl-d14	*76*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Naphthalene	**0.098**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.25**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.25**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.014	EPA 8270E/SIM	10-29-20	10-31-20	U1
Acenaphthene	**ND**	0.012	EPA 8270E/SIM	10-29-20	10-31-20	U1
Fluorene	**ND**	0.016	EPA 8270E/SIM	10-29-20	10-31-20	U1
Phenanthrene	**0.16**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**0.029**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.036**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.039**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.043**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.037**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.025**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.020**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**0.0091**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**0.0053**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.018**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*51*	*46 - 113*				
Pyrene-d10	*57*	*45 - 114*				
Terphenyl-d14	*65*	*49 - 121*				

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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15-1-1.5**					
Laboratory ID:	10-279-10					
Naphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*72*	*46 - 113*				
Pyrene-d10	*84*	*45 - 114*				
Terphenyl-d14	*83*	*49 - 121*				

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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-14-1.5-2**					
Laboratory ID:	10-279-11					
Naphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0040	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*74*	*46 - 113*				
Pyrene-d10	*85*	*45 - 114*				
Terphenyl-d14	*81*	*49 - 121*				

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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-1-0.5-1.5**					
Laboratory ID:	10-279-12					
Naphthalene	**0.015**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.019**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.016**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.015**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.0073**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.0062**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.0079**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.0077**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**ND**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.0064**	0.0044	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*66*	*46 - 113*				
Pyrene-d10	*70*	*45 - 114*				
Terphenyl-d14	*71*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-2-1.5-2**					
Laboratory ID:	10-279-13					
Naphthalene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0043	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*73*	*46 - 113*				
Pyrene-d10	*81*	*45 - 114*				
Terphenyl-d14	*78*	*49 - 121*				

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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-3-1.5-2**					
Laboratory ID:	10-279-14					
Naphthalene	**0.022**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
2-Methylnaphthalene	**0.050**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
1-Methylnaphthalene	**0.035**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthylene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Acenaphthene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Fluorene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Phenanthrene	**0.040**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Anthracene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Fluoranthene	**0.0075**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Pyrene	**0.0066**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]anthracene	**0.0064**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Chrysene	**0.014**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[b]fluoranthene	**0.0082**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo(j,k)fluoranthene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[a]pyrene	**0.0044**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Dibenz[a,h]anthracene	**ND**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Benzo[g,h,i]perylene	**0.0047**	0.0041	EPA 8270E/SIM	10-29-20	10-31-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*60*	*46 - 113*				
Pyrene-d10	*68*	*45 - 114*				
Terphenyl-d14	*66*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
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Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029S2					
Naphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
2-Methylnaphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
1-Methylnaphthalene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthylene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Acenaphthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Fluorene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Phenanthrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Chrysene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[b]fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo(j,k)fluoranthene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[a]pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Dibenz[a,h]anthracene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Benzo[g,h,i]perylene	**ND**	0.0020	EPA 8270E/SIM	10-29-20	10-30-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*75*	*46 - 113*				
Pyrene-d10	*83*	*45 - 114*				
Terphenyl-d14	*82*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.120**	**0.121**	0.0833	0.0833	0.0558	77	78	51 - 115	1	26	
Acenaphthylene	**0.0623**	**0.0653**	0.0833	0.0833	0.00504	69	72	53 - 121	5	24	
Acenaphthene	**0.0677**	**0.0754**	0.0833	0.0833	0.00339	77	86	52 - 121	11	25	
Fluorene	**0.0644**	**0.0705**	0.0833	0.0833	0.00667	69	77	58 - 127	9	23	
Phenanthrene	**0.126**	**0.136**	0.0833	0.0833	0.0641	74	86	46 - 129	8	28	
Anthracene	**0.0732**	**0.0793**	0.0833	0.0833	0.0100	76	83	57 - 124	8	21	
Fluoranthene	**0.0877**	**0.0932**	0.0833	0.0833	0.0287	71	77	46 - 136	6	29	
Pyrene	**0.0859**	**0.0921**	0.0833	0.0833	0.0266	71	79	41 - 136	7	32	
Benzo[a]anthracene	**0.0983**	**0.114**	0.0833	0.0833	0.0191	95	114	56 - 136	15	25	
Chrysene	**0.0890**	**0.102**	0.0833	0.0833	0.0288	72	88	49 - 130	14	22	
Benzo[b]fluoranthene	**0.0813**	**0.0937**	0.0833	0.0833	0.0267	66	80	51 - 135	14	26	
Benzo(j,k)fluoranthene	**0.0686**	**0.0758**	0.0833	0.0833	0.00528	76	85	56 - 124	10	23	
Benzo[a]pyrene	**0.0728**	**0.0833**	0.0833	0.0833	0.0163	68	80	54 - 133	13	26	
Indeno(1,2,3-c,d)pyrene	**0.0727**	**0.0819**	0.0833	0.0833	0.0159	68	79	52 - 134	12	20	
Dibenz[a,h]anthracene	**0.0685**	**0.0791**	0.0833	0.0833	0.00596	75	88	58 - 127	14	17	
Benzo[g,h,i]perylene	**0.0763**	**0.0861**	0.0833	0.0833	0.0215	66	78	54 - 129	12	21	
Surrogate:											
2-Fluorobiphenyl						*62*	*67*	*46 - 113*			
Pyrene-d10						*70*	*77*	*45 - 114*			
Terphenyl-d14						*71*	*80*	*49 - 121*			

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9-0-0.5**					
Laboratory ID:	10-279-01					
Diesel Range Organics	**ND**	26	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil	**190**	53	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Diesel Range Organics	**ND**	35	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	69	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**TP-4-0-0.5**					
Laboratory ID:	10-279-03					
Diesel Range Organics	**34**	31	NWTPH-Dx	10-29-20	10-29-20	N
Lube Oil	**410**	62	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Diesel Range Organics	**71**	29	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**160**	57	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**TP-16-5-5.5**					
Laboratory ID:	10-279-07					
Diesel Range Organics	**ND**	37	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	73	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**TP-13-1.5-2**					
Laboratory ID:	10-279-08					
Diesel Range Organics	**ND**	32	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	63	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*81*	*50-150*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Diesel Range Organics	**ND**	41	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	82	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				
Client ID:	**TP-15-1-1.5**					
Laboratory ID:	10-279-10					
Diesel Range Organics	**ND**	30	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	61	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*94*	*50-150*				
Client ID:	**TP-14-1.5-2**					
Laboratory ID:	10-279-11					
Diesel Range Organics	**ND**	30	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	60	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				
Client ID:	**TP-1-0.5-1.5**					
Laboratory ID:	10-279-12					
Diesel Range Organics	**ND**	33	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**95**	65	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				
Client ID:	**TP-2-1.5-2**					
Laboratory ID:	10-279-13					
Diesel Range Organics	**ND**	33	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	65	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				
Client ID:	**TP-3-1.5-2**					
Laboratory ID:	10-279-14					
Diesel Range Organics	**ND**	51	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	100	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				

Date of Report: November 17, 2020
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Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029S2					
Diesel Range Organics	**ND**	25	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*96*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-279-02										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*91*	*100*	*50-150*			
Laboratory ID:	10-264-01										
	ORIG	DUP									
Diesel Range Organics	**50.4**	**50.5**	NA	NA		NA		NA	0	NA	N
Lube Oil	**308**	**289**	NA	NA		NA		NA	6	NA	
Surrogate:											
o-Terphenyl						*97*	*91*	*50-150*			

Date of Report: November 17, 2020
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Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9-0-0.5**					
Laboratory ID:	10-279-01					
Gasoline	**ND**	6.0	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*110*	*58-129*				
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Gasoline	**ND**	21	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*120*	*58-129*				
Client ID:	**TP-4-0-0.5**					
Laboratory ID:	10-279-03					
Gasoline	**ND**	7.9	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*109*	*58-129*				
Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Gasoline	**19**	9.2	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*105*	*58-129*				
Client ID:	**TP-16-5-5.5**					
Laboratory ID:	10-279-07					
Gasoline	**ND**	11	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*112*	*58-129*				
Client ID:	**TP-13-1.5-2**					
Laboratory ID:	10-279-08					
Gasoline	**ND**	7.8	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*111*	*58-129*				
Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Gasoline	**ND**	17	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*90*	*58-129*				

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GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15-1-1.5**					
Laboratory ID:	10-279-10					
Gasoline	**ND**	7.3	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*58-129*				
Client ID:	**TP-14-1.5-2**					
Laboratory ID:	10-279-11					
Gasoline	**ND**	7.3	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*113*	*58-129*				
Client ID:	**TP-1-0.5-1.5**					
Laboratory ID:	10-279-12					
Gasoline	**ND**	10	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*111*	*58-129*				
Client ID:	**TP-2-1.5-2**					
Laboratory ID:	10-279-13					
Gasoline	**ND**	9.6	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*113*	*58-129*				
Client ID:	**TP-3-1.5-2**					
Laboratory ID:	10-279-14					
Gasoline	**ND**	22	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*108*	*58-129*				

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GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1028S2					
Gasoline	**ND**	5.0	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*58-129*				
Laboratory ID:	MB1028S3					
Gasoline	**ND**	5.0	NWTPH-Gx	10-28-20	10-28-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*58-129*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-279-02										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*120*	*121*	*58-129*			
Laboratory ID:	10-264-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*107*	*108*	*58-129*			

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PCBs EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Aroclor 1016	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1221	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1232	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1242	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1248	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1254	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1260	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1262	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1268	**ND**	0.035	EPA 8082A	11-4-20	11-4-20	X
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*98*	*46-125*				
Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Aroclor 1016	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1221	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1232	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1242	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1248	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1254	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1260	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1262	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Aroclor 1268	**ND**	0.029	EPA 8082A	11-4-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*90*	*46-125*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1104S1					
Aroclor 1016	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1221	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1232	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1242	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1248	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1254	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1260	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1262	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1268	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*98*	*46-125*				
Laboratory ID:	MB1104S1					
Aroclor 1016	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1221	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1232	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1242	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1248	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1254	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1260	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1262	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Aroclor 1268	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	X
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*97*	*46-125*				

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.224**	**0.292**	0.250	0.250	ND	**89**	**117**	43-125	26	15	L, X
Surrogate:											
DCB						*102*	*102*	*46-125*			
SPIKE BLANKS											
Laboratory ID:	SB1104S1										
	SB	SBD	SB	SBD		SB	SBD				
Aroclor 1260	**0.280**	**0.260**	0.250	0.250	N/A	**112**	**104**	50-134	7	18	
Surrogate:											
DCB						*96*	*96*	*46-125*			
Laboratory ID:	SB1104S1										
	SB	SBD	SB	SBD		SB	SBD				
Aroclor 1260	**0.301**	**0.272**	0.250	0.250	N/A	**120**	**109**	50-134	10	18	X
Surrogate:											
DCB						*102*	*101*	*46-125*			

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**0.46**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	

Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**1.5**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1030TM1					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	
Laboratory ID:	MB1030T1					
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-279-02										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Barium	**0.462**	**0.462**	NA	NA		NA		NA	0	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-279-02										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**3.92**	**3.90**	4.00	4.00	ND	**98**	**98**	75-125	1	20	
Barium	**4.29**	**4.30**	4.00	4.00	0.462	**96**	**96**	75-125	0	20	
Cadmium	**1.82**	**1.81**	2.00	2.00	ND	**91**	**90**	75-125	1	20	
Chromium	**3.80**	**3.78**	4.00	4.00	ND	**95**	**95**	75-125	1	20	
Lead	**9.55**	**9.51**	10.0	10.0	ND	**96**	**95**	75-125	0	20	
Selenium	**4.05**	**4.01**	4.00	4.00	ND	**101**	**100**	75-125	1	20	
Silver	**0.960**	**0.968**	1.00	1.00	ND	**96**	**97**	75-125	1	20	
Laboratory ID:	10-279-02										
Mercury	**0.0488**	**0.0486**	0.0500	0.0500	ND	**98**	**97**	75-125	0	20	

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G

Matrix: Soil
Units: % Solids

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-9-0-0.5**					
Laboratory ID:	10-279-01					
Total Solids	**95**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-7-4.5-5**					
Laboratory ID:	10-279-02					
Total Solids	**72**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-4-0-0.5**					
Laboratory ID:	10-279-03					
Total Solids	**81**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-6-0-0.5**					
Laboratory ID:	10-279-05					
Total Solids	**88**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-16-5-5.5**					
Laboratory ID:	10-279-07					
Total Solids	**68**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-13-1.5-2**					
Laboratory ID:	10-279-08					
Total Solids	**79**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-17-1.5-2**					
Laboratory ID:	10-279-09					
Total Solids	**61**	0.50	SM 2540G	10-29-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G

Matrix: Soil
Units: % Solids

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TP-15-1-1.5**					
Laboratory ID:	10-279-10					
Total Solids	**83**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-14-1.5-2**					
Laboratory ID:	10-279-11					
Total Solids	**83**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-1-0.5-1.5**					
Laboratory ID:	10-279-12					
Total Solids	**77**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-2-1.5-2**					
Laboratory ID:	10-279-13					
Total Solids	**77**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**TP-3-1.5-2**					
Laboratory ID:	10-279-14					
Total Solids	**49**	0.50	SM 2540G	10-29-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 23, 2020
Laboratory Reference: 2010-279
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G
QUALITY CONTROL

Matrix: Soil
Units: % Solids

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-279-02								
	ORIG	DUP							
Total Solids	**72.1**	**70.8**	NA	NA	NA	NA	2	20	
Laboratory ID:	10-264-01								
	ORIG	DUP							
Total Solids	**89.3**	**91.7**	NA	NA	NA	NA	3	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

November 17, 2020

Vista Work Order No. 2002337

Mr. David Baumeister
OnSite Environmental Inc.
14648 NE 95th Street
Redmond, WA 98052

Dear Mr. Baumeister,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on October 28, 2020 under your Project Name '202005-0101'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 ph: 916-673-1520 fx: 916-673-0106 www.vista-analytical.com

Vista Work Order No. 2002337
Case Narrative

Sample Condition on Receipt:

One solid sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The sample was received in good condition and within the method temperature requirements. The sample was received in a clear glass jar.

Analytical Notes:

EPA Method 1613B

This sample was extracted and analyzed for tetra-through-octa chlorinated dioxins and furans by EPA Method 1613B using a ZB-DIOXIN GC column.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank. The OPR recoveries were within the method acceptance criteria.

Labeled standard recoveries for all QC and field samples were within method acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2002337-01	TP-6-0-0.5	21-Oct-20 12:13	28-Oct-20 09:49	Clear Glass Jar, 250mL

ANALYTICAL RESULTS

Sample ID: Method Blank	**EPA Method 1613B**

Client Data		**Laboratory Data**			
Name:	OnSite Environmental Inc.	Lab Sample:	B0K0041-BLK1		
Project:	202005-0101	QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Matrix:	Solid	Sample Size:	10.0 g	Column:	ZB-DIOXIN

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND	0.0263			13-Nov-20 10:55	1
1,2,3,7,8-PeCDD	ND	0.0497			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDD	ND	0.0568			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDD	ND	0.0574			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDD	ND	0.0721			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDD	ND	0.0573			13-Nov-20 10:55	1
OCDD	ND	0.116			13-Nov-20 10:55	1
2,3,7,8-TCDF	ND	0.0198			13-Nov-20 10:55	1
1,2,3,7,8-PeCDF	ND	0.0288			13-Nov-20 10:55	1
2,3,4,7,8-PeCDF	ND	0.0235			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDF	ND	0.0329			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDF	ND	0.0337			13-Nov-20 10:55	1
2,3,4,6,7,8-HxCDF	ND	0.0389			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDF	ND	0.0698			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDF	ND	0.0487			13-Nov-20 10:55	1
1,2,3,4,7,8,9-HpCDF	ND	0.0568			13-Nov-20 10:55	1
OCDF	ND	0.0915			13-Nov-20 10:55	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	0.00					
Totals						
Total TCDD	ND	0.0263				
Total PeCDD	ND	0.0497				
Total HxCDD	ND	0.0721				
Total HpCDD	ND	0.0573				
Total TCDF	ND	0.0198				
Total PeCDF	ND	0.0288				
Total HxCDF	ND	0.0698				
Total HpCDF	ND	0.0568				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	80.4	25 - 164		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDD	IS	81.8	25 - 181		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDD	IS	88.4	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDD	IS	89.3	28 - 130		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDD	IS	80.0	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDD	IS	80.0	23 - 140		13-Nov-20 10:55	1
13C-OCDD	IS	74.4	17 - 157		13-Nov-20 10:55	1
13C-2,3,7,8-TCDF	IS	83.2	24 - 169		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDF	IS	84.6	24 - 185		13-Nov-20 10:55	1
13C-2,3,4,7,8-PeCDF	IS	90.3	21 - 178		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDF	IS	82.0	26 - 152		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDF	IS	82.7	26 - 123		13-Nov-20 10:55	1
13C-2,3,4,6,7,8-HxCDF	IS	83.8	28 - 136		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDF	IS	71.1	29 - 147		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDF	IS	75.5	28 - 143		13-Nov-20 10:55	1
13C-1,2,3,4,7,8,9-HpCDF	IS	71.1	26 - 138		13-Nov-20 10:55	1
13C-OCDF	IS	71.5	17 - 157		13-Nov-20 10:55	1
37Cl-2,3,7,8-TCDD	CRS	95.5	35 - 197		13-Nov-20 10:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

Sample ID: OPR | **EPA Method 1613B**

Client Data	
Name:	OnSite Environmental Inc.
Project:	202005-0101
Matrix:	Solid

Laboratory Data			
Lab Sample:	B0K0041-BS1		
QC Batch:	B0K0041	Date Extracted:	05-Nov-20 06:05
Sample Size:	10.0 g	Column:	ZB-DIOXIN

Analyte	Amt Found (pg/g)	Spike Amt	% Recovery	Limits	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	21.0	20.0	105	67-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDD	106	100	106	70-142		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDD	101	100	101	70-164		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDD	104	100	104	76-134		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDD	103	100	103	64-162		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDD	102	100	102	70-140		13-Nov-20 09:25	1
OCDD	204	200	102	78-144		13-Nov-20 09:25	1
2,3,7,8-TCDF	19.4	20.0	96.8	75-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDF	102	100	102	80-134		13-Nov-20 09:25	1
2,3,4,7,8-PeCDF	102	100	102	68-160		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDF	103	100	103	72-134		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDF	101	100	101	84-130		13-Nov-20 09:25	1
2,3,4,6,7,8-HxCDF	100	100	100	70-156		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDF	98.9	100	98.9	78-130		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDF	103	100	103	82-122		13-Nov-20 09:25	1
1,2,3,4,7,8,9-HpCDF	100	100	100	78-138		13-Nov-20 09:25	1
OCDF	200	200	100	63-170		13-Nov-20 09:25	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	88.5	20-175		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDD	IS	89.5	21-227		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDD	IS	91.6	21-193		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDD	IS	91.8	25-163		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDD	IS	90.8	21-193		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDD	IS	87.0	26-166		13-Nov-20 09:25	1
13C-OCDD	IS	79.6	13-199		13-Nov-20 09:25	1
13C-2,3,7,8-TCDF	IS	88.7	22-152		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDF	IS	93.6	21-192		13-Nov-20 09:25	1
13C-2,3,4,7,8-PeCDF	IS	95.6	13-328		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDF	IS	84.0	19-202		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDF	IS	85.3	21-159		13-Nov-20 09:25	1
13C-2,3,4,6,7,8-HxCDF	IS	85.0	22-176		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDF	IS	87.1	17-205		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDF	IS	78.0	21-158		13-Nov-20 09:25	1
13C-1,2,3,4,7,8,9-HpCDF	IS	75.8	20-186		13-Nov-20 09:25	1
13C-OCDF	IS	77.7	13-199		13-Nov-20 09:25	1
37Cl-2,3,7,8-TCDD	CRS	106	31-191		13-Nov-20 09:25	1

Sample ID: TP-6-0-0.5	**EPA Method 1613B**

Client Data

Name:	OnSite Environmental Inc.
Project:	202005-0101
Matrix:	Solid
Date Collected:	21-Oct-20 12:13

Laboratory Data

Lab Sample:	2002337-01	Date Received:	28-Oct-20 09:49
QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Sample Size:	12.2 g	Column:	ZB-DIOXIN
% Solids:	82.4		

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND		0.0977		14-Nov-20 05:46	1
1,2,3,7,8-PeCDD	0.665			J	14-Nov-20 05:46	1
1,2,3,4,7,8-HxCDD	ND		0.812		14-Nov-20 05:46	1
1,2,3,6,7,8-HxCDD	12.6				14-Nov-20 05:46	1
1,2,3,7,8,9-HxCDD	5.14				14-Nov-20 05:46	1
1,2,3,4,6,7,8-HpCDD	187				14-Nov-20 05:46	1
OCDD	1720				14-Nov-20 05:46	1
2,3,7,8-TCDF	0.170			J	14-Nov-20 05:46	1
1,2,3,7,8-PeCDF	0.189			J	14-Nov-20 05:46	1
2,3,4,7,8-PeCDF	0.361			J	14-Nov-20 05:46	1
1,2,3,4,7,8-HxCDF	0.504			J	14-Nov-20 05:46	1
1,2,3,6,7,8-HxCDF	0.332			J	14-Nov-20 05:46	1
2,3,4,6,7,8-HxCDF	0.225			J	14-Nov-20 05:46	1
1,2,3,7,8,9-HxCDF	0.0933			J	14-Nov-20 05:46	1
1,2,3,4,6,7,8-HpCDF	10.2				14-Nov-20 05:46	1
1,2,3,4,7,8,9-HpCDF	0.509			J	14-Nov-20 05:46	1
OCDF	43.1				14-Nov-20 05:46	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	5.19					
Totals						
Total TCDD	1.82		1.96			
Total PeCDD	3.80		4.79			
Total HxCDD	89.3		90.1			
Total HpCDD	409					
Total TCDF	0.620		0.690			
Total PeCDF	3.74		4.32			
Total HxCDF	15.1					
Total HpCDF	41.1					

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	95.7	25 - 164		14-Nov-20 05:46	1
13C-1,2,3,7,8-PeCDD	IS	90.9	25 - 181		14-Nov-20 05:46	1
13C-1,2,3,4,7,8-HxCDD	IS	92.7	32 - 141		14-Nov-20 05:46	1
13C-1,2,3,6,7,8-HxCDD	IS	95.1	28 - 130		14-Nov-20 05:46	1
13C-1,2,3,7,8,9-HxCDD	IS	94.9	32 - 141		14-Nov-20 05:46	1
13C-1,2,3,4,6,7,8-HpCDD	IS	93.8	23 - 140		14-Nov-20 05:46	1
13C-OCDD	IS	89.4	17 - 157		14-Nov-20 05:46	1
13C-2,3,7,8-TCDF	IS	97.3	24 - 169		14-Nov-20 05:46	1
13C-1,2,3,7,8-PeCDF	IS	99.0	24 - 185		14-Nov-20 05:46	1
13C-2,3,4,7,8-PeCDF	IS	97.5	21 - 178		14-Nov-20 05:46	1
13C-1,2,3,4,7,8-HxCDF	IS	88.9	26 - 152		14-Nov-20 05:46	1
13C-1,2,3,6,7,8-HxCDF	IS	90.9	26 - 123		14-Nov-20 05:46	1
13C-2,3,4,6,7,8-HxCDF	IS	90.6	28 - 136		14-Nov-20 05:46	1
13C-1,2,3,7,8,9-HxCDF	IS	91.5	29 - 147		14-Nov-20 05:46	1
13C-1,2,3,4,6,7,8-HpCDF	IS	85.1	28 - 143		14-Nov-20 05:46	1
13C-1,2,3,4,7,8,9-HpCDF	IS	86.8	26 - 138		14-Nov-20 05:46	1
13C-OCDF	IS	83.4	17 - 157		14-Nov-20 05:46	1
37Cl-2,3,7,8-TCDD	CRS	106	35 - 197		14-Nov-20 05:46	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
K	EMPC (specific projects only)
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

2002337 2.3

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 · (425) 883-3881

Laboratory Reference #: 10-279

Laboratory: Vista Analytical Laboratory

Attention: Jennifer Miller

Address: 1104 Windfield Way, El Dorado Hills, CA 95762

Phone Number: (916) 673-1520

Turnaround Request

1 Day 2 Day 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 202005-0101

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analyses
	TP-6-0-0.5	10/21/20	12:13	S	1	Dioxin/Furans

Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:	OSE	10/27/20	1600	
Received by:	UPS			
Relinquished by:	UPS			
Received by:	VAL	10/28/20	09:49	
Relinquished by:				
Received by:				

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2002337 TAT Std

Samples Arrival:	**Date/Time** 10/28/20 09:49	**Initials:** [illegible]	**Location:** WR-2 **Shelf/Rack:** NA

Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice		Techni Ice	Dry Ice	None	

Temp °C: 2.3 **(uncorrected)**	**Probe used:** Y / N	**Thermometer ID:** IR-4
Temp °C: 2.3 **(corrected)**		

	YES	NO	NA
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			X
Airbill — Trk # 1Z684E1W0195332127	✓		
Shipping Documentation Present?	✓		
Shipping Container: Vista / Client / Retain / Return / Dispose			
Chain of Custody / Sample Documentation Present?	✓		
Chain of Custody / Sample Documentation Complete?	✓		
Holding Time Acceptable?	✓		

Logged In:	**Date/Time** 10/30/20 1107	**Initials:** [illegible]	**Location:** WR-2 **Shelf/Rack:** F2

	YES	NO	NA
COC Anomaly/Sample Acceptance Form completed?	✓		

Comments:

CoC/Label Reconciliation Report WO# 2002337

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2002337-01	A TP-6-0-0.5 ☑		21-Oct-20 12:13 ☑	Clear Glass Jar, 250mL (A)	Solid	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)		✓	
Preservation Documented: Na2S2O3 Trizma None Other			✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

Comments:
(A) Sample rec'd in clear glass jar.

Verifed by/Date: BSB 10/30/20

ANOMALY FORM

Vista Work Order 2002337

Initial/Date — The following checked issues were noted during sample receipt and login:

Initial/Date		
	☐	**1. The samples were received out of temperature at (WI-PHT):** ______ Was Ice present: Yes No Melted Blue Ice
	☐	2. The Chain-of-Custody (CoC) was not relinquished properly.
	☐	3. The CoC did not include collection time(s). 00:00 will be used unless notified otherwise.
	☐	4. The sample(s) did not include a sample collection time. All or Sample Name: ______
	☐	5. A sample ID discrepancy was found. See the Reconciliation report. The CoC Sample ID will be used unless notified otherwise.
	☐	6. A sample date and/or time discrepancy was found. See the Reconciliation report. The CoC Sample date/time will be used unless notified otherwise.
	☐	**7. The CoC did not include a sample matrix. The following sample matrix will be used:** ______
	☐	**8. Insufficent volume received for analysis. All or Sample Name:** ______
	☐	9. The backup bottle was received broken. Sample Name: ______
	☐	**10. CoC not received, illegible or destroyed.**
	☐	**11. The sample(s) were received out of holding time. All or Sample Name:** ______
	☐	**12. The CoC did not include an analysis. All or Sample Name:** ______
	☐	**13. Sample(s) received without collection date. All or Sample Name:** ______
	☐	**14. Sample(s) not received. All or Sample Name:** ______
	☐	**15. Sample(s) received broken. All or Sample Name:** ______
BDB 10/30/20	☑	**16. An incorrect container-type was used. All or Sample Name:** TP-6-0.0.5
	☐	17. Other:

Bolded items require sign-off

Client Contacted: Yes, via email

Date of Contact: 10/30/2020

Vista Client Manager: KJR

Resolution: Client informed of container type in acknowledgement letter email

10-279

Chain of Custody Record & Laboratory Analysis Request

ANCHOR QEA

Laboratory Name: OnSite
Date: 10/22/2020
Project Name: ABC Recycling Phase 2
Project Number: 202005-01.01
Project Manager: Derek Ormerod / Matt Woltman
Phone Number: 206-331-1738
Shipment Method: FedEx

Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Mercury / Metals (PP Metals)	~~Total Solids~~ / PAHs	Grain Size	Total Organic Carbon	Dioxin/Furans	Archive	TPHDx / ~~ETPH~~	GRO	MS/MSD	PCBs	TCLP Metals	HOLD			TOTAL SOLIDS 2540G				Comments/Preservation
1	TP-9-0-0.5	10/21/2020 0837	S	4	X	X			X	X	X	X							X				~~HOLD~~
2	TP-7-4.5-5	10/21/2020 1016	S	4	X	X			X	X	X	X	X	X	X				X				MS/MSD SAMPLE
3	TP-4-0-0.5	10/21/2020 1111	S	4	X	X			X	X	X	X							X				
4	TP-4-3.5-4	10/21/2020 1133	S	4	X	X			X	X	X	X				X							
5	TP-6-0-0.5	10/21/2020 1213	S	4	X	X			X	X	X	X		X					X				
6	TP-16-0-0.5	10/21/2020 1410	S	4	X	X			X	X	X	X				X							
7	TP-16-5-5.5	10/21/2020 1527	S	3	X	X			X		X	X							X				
8	TP-13-1.5-2	10/22/2020 0837	S	4	X	X			X	X	X	X							X				
9	TP-17-1.5-2	10/22/2020 0926	S	4	X	X			X	X	X	X			X				X				
10	TP-15-1-1.5	10/22/2020 1010	S	4	X	X			X	X	X	X							X				
11	TP-14-1.5-2	10/22/2020 1034	S	4	X	X			X	X	X	X							X				
12	TP-1-0.5-1.5	10/22/2020 1145	S	4	X	X			X	X	X	X							X				
13	TP-2-1.5-2	10/22/2020 1214	S	4	X	X			X	X	X	X							X				
14	TP-3-1.5-2	10/22/2020 1256	S	4	X	X			X	X	X	X							X				
15																							
16																							
17																							
18																							

Notes: Hold until further instruction provided
X Added 10/26/2020. DB (STA)

Relinquished By:	Company: Anchor QEA, LLC	Received By:	Company: OSE
Tanner Kamila	10/22/2020 1402	M. Voun	10/23/20 1115
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Relinquished By:	Company:	Received By:	Company:
Signature/Printed Name	Date/Time	Signature/Printed Name	Date/Time

Distribution: A copy will be made for the laboratory and client. The Project file will retain the original.

Sample/Cooler Receipt and Acceptance Checklist

Client: ANC

Client Project Name/Number: 202005-01.01

OnSite Project Number: 10-279

Initiated by: MV

Date Initiated: 10/23/20

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	Yes	No	N/A	1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	N/A	Temperature: 5.5
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A		
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No	1 2 3 4
2.2 Was the COC legible and written in permanent ink?	Yes	No	1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No	1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No	1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	Yes	No	1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	No	1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	Yes	No		1 2 3 4
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#	2	N/A	1 2 3 4

Explain any discrepancies:

2.4) #7) -6- an 1 jar

3.2) #8-14) MeOH vials horizontal

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

//SERVER\OSE\Administration\forms\cooler_checklist.xls

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 17, 2020

Derek Ormerod
Anchor QEA
1201 3rd Ave, Suite 2600
Seattle, WA 98101

Re: Analytical Data for Project 202005-01.01
Laboratory Reference No. 2010-327

Dear Derek:

Enclosed are the analytical results and associated quality control data for samples submitted on October 28, 2020.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

Case Narrative

Samples were collected on October 26 and 27, 2020 and received by the laboratory on October 28, 2020. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH-Gx (soil) Analysis

The surrogate percent recovery is outside control limits on the high end for sample GP-2-25-27 due to reduced methanol volumes in the provided field-extracted Method 5035A VOA vial. Because the sample is non-detect, no further action was taken.

PCBs EPA 8082A (soil) Analysis

The Sample 10-279-02 was used as the MS/MSD pair. The RPD between the MS/MSD (26%) was above quality control limit of 15%. The sample was re-extracted and rerun with similar results and attributed to matrix effect. All other QC was within their corresponding quality control limits. No further action was performed.

Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Sediment
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-8-9**					
Laboratory ID:	10-327-01					
Gasoline	**ND**	8.1	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*107*	*58-129*				
Client ID:	**GP-2-25-27**					
Laboratory ID:	10-327-03					
Gasoline	**ND**	20	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*163*	*58-129*				Q
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Gasoline	**ND**	7.0	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*58-129*				
Client ID:	**GP-1-20-22**					
Laboratory ID:	10-327-06					
Gasoline	**ND**	7.8	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*113*	*58-129*				
Client ID:	**GP-1-20-22-Dup**					
Laboratory ID:	10-327-07					
Gasoline	**ND**	7.6	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*111*	*58-129*				
Client ID:	**GP-5-6.9-7.5**					
Laboratory ID:	10-327-08					
Gasoline	**ND**	6.5	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*98*	*58-129*				
Client ID:	**GP-5-20-22**					
Laboratory ID:	10-327-10					
Gasoline	**ND**	6.4	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*106*	*58-129*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Sediment
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-10.8-15**					
Laboratory ID:	10-327-11					
Gasoline	**ND**	6.3	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*58-129*				
Client ID:	**GP-4-7.8-8.7**					
Laboratory ID:	10-327-13					
Gasoline	**ND**	11	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*90*	*58-129*				
Client ID:	**GP-4-15-18.7**					
Laboratory ID:	10-327-14					
Gasoline	**ND**	8.0	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*115*	*58-129*				
Client ID:	**GP-3-14.4-15.9**					
Laboratory ID:	10-327-16					
Gasoline	**ND**	6.6	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*58-129*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Solid
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029S1					
Gasoline	**ND**	5.0	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				
Laboratory ID:	MB1029S2					
Gasoline	**ND**	5.0	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*58-129*				

Analyte	Result		Spike Level	Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	10-327-10									
	ORIG	DUP								
Gasoline	**ND**	**ND**	NA	NA	NA		NA	NA	30	
Surrogate:										
Fluorobenzene					*106*	*108*	*58-129*			
Laboratory ID:	10-349-01									
	ORIG	DUP								
Gasoline	**ND**	**ND**	NA	NA	NA		NA	NA	30	
Surrogate:										
Fluorobenzene					*96*	*96*	*58-129*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-GW**					
Laboratory ID:	10-327-12					
Gasoline	**ND**	100	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*83*	*65-120*				
Client ID:	**GP-3-GW**					
Laboratory ID:	10-327-17					
Gasoline	**ND**	100	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*83*	*65-120*				
Client ID:	**GP-3-GW-Dup**					
Laboratory ID:	10-327-18					
Gasoline	**ND**	100	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*83*	*65-120*				
Client ID:	**TB-201026**					
Laboratory ID:	10-327-19					
Gasoline	**ND**	100	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*65-120*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029W1					
Gasoline	**ND**	100	NWTPH-Gx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*84*	*65-120*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-327-17										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*83*	*83*	*65-120*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-8-9**					
Laboratory ID:	10-327-01					
Diesel Range Organics	**ND**	33	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	67	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*85*	*50-150*				
Client ID:	**GP-2-25-27**					
Laboratory ID:	10-327-03					
Diesel Range Organics	**ND**	33	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	66	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*86*	*50-150*				
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Diesel Range Organics	**ND**	32	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	64	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*79*	*50-150*				
Client ID:	**GP-1-20-22**					
Laboratory ID:	10-327-06					
Diesel Range Organics	**ND**	34	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	69	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*75*	*50-150*				
Client ID:	**GP-1-20-22-Dup**					
Laboratory ID:	10-327-07					
Diesel Range Organics	**ND**	35	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	70	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*78*	*50-150*				
Client ID:	**GP-5-6.9-7.5**					
Laboratory ID:	10-327-08					
Diesel Range Organics	**ND**	32	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	63	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*84*	*50-150*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-5-20-22**					
Laboratory ID:	10-327-10					
Diesel Range Organics	**ND**	31	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	62	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*92*	*50-150*				
Client ID:	**GP-6-10.8-15**					
Laboratory ID:	10-327-11					
Diesel Range Organics	**ND**	31	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	63	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*87*	*50-150*				
Client ID:	**GP-4-7.8-8.7**					
Laboratory ID:	10-327-13					
Diesel Range Organics	**ND**	38	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	76	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*80*	*50-150*				
Client ID:	**GP-4-15-18.7**					
Laboratory ID:	10-327-14					
Diesel Range Organics	**ND**	35	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	69	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				
Client ID:	**GP-3-14.4-15.9**					
Laboratory ID:	10-327-16					
Diesel Range Organics	**ND**	30	NWTPH-Dx	11-6-20	11-6-20	
Lube Oil Range Organics	**ND**	60	NWTPH-Dx	11-6-20	11-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*105*	*50-150*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1102S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	11-2-20	11-2-20	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*92*	*50-150*				
Laboratory ID:	MB1106S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	11-6-20	11-6-20	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	11-6-20	11-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*106*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-327-10										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*92*	*74*	*50-150*			
Laboratory ID:	SB1102S1										
	ORIG	DUP									
Diesel Fuel #2	**100**	**94.0**	NA	NA		NA		NA	6	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*100*	*91*	*50-150*			
Laboratory ID:	SB1106S1										
	ORIG	DUP									
Diesel Fuel #2	**91.0**	**85.2**	NA	NA		NA		NA	7	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*102*	*98*	*50-150*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-GW**					
Laboratory ID:	10-327-12					
Diesel Range Organics	**ND**	0.10	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*86*	*50-150*				
Client ID:	**GP-3-GW**					
Laboratory ID:	10-327-17					
Diesel Range Organics	**0.12**	0.10	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**0.29**	0.20	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**GP-3-GW-Dup**					
Laboratory ID:	10-327-18					
Diesel Range Organics	**0.11**	0.10	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**0.27**	0.20	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1029W1					
Diesel Range Organics	**ND**	0.10	NWTPH-Dx	10-29-20	10-29-20	
Lube Oil Range Organics	**ND**	0.20	NWTPH-Dx	10-29-20	10-29-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*90*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-327-17										
	ORIG	DUP									
Diesel Range Organics	**0.120**	**0.0927**	NA	NA		NA		NA	26	NA	
Lube Oil Range Organics	**0.287**	**0.221**	NA	NA		NA		NA	26	NA	
Surrogate:											
o-Terphenyl						*97*	*81*	*50-150*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
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PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-8-9**					
Laboratory ID:	10-327-01					
Naphthalene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*48*	*46 - 113*				
Pyrene-d10	*52*	*45 - 114*				
Terphenyl-d14	*54*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
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Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-25-27**					
Laboratory ID:	10-327-03					
Naphthalene	**0.0078**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**0.013**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**0.0084**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**0.024**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**0.037**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**0.11**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**0.025**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**0.20**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**0.14**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**0.066**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**0.065**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**0.055**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**0.016**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**0.021**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**0.0058**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**0.0048**	0.0044	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*90*	*46 - 113*				
Pyrene-d10	*102*	*45 - 114*				
Terphenyl-d14	*101*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Naphthalene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0043	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*85*	*46 - 113*				
Pyrene-d10	*97*	*45 - 114*				
Terphenyl-d14	*100*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-20-22**					
Laboratory ID:	10-327-06					
Naphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*93*	*46 - 113*				
Pyrene-d10	*104*	*45 - 114*				
Terphenyl-d14	*106*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-20-22-Dup**					
Laboratory ID:	10-327-07					
Naphthalene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
2-Methylnaphthalene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
1-Methylnaphthalene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthylene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Fluorene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Phenanthrene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Anthracene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Fluoranthene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Pyrene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]anthracene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Chrysene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[b]fluoranthene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo(j,k)fluoranthene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]pyrene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Dibenz[a,h]anthracene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[g,h,i]perylene	**ND**	0.0047	EPA 8270E/SIM	11-3-20	11-3-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*53*	*46 - 113*				
Pyrene-d10	*60*	*45 - 114*				
Terphenyl-d14	*62*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-5-6.9-7.5**					
Laboratory ID:	10-327-08					
Naphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
2-Methylnaphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
1-Methylnaphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthylene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Fluorene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Phenanthrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Chrysene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[b]fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo(j,k)fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Dibenz[a,h]anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[g,h,i]perylene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-3-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*50*	*46 - 113*				
Pyrene-d10	*58*	*45 - 114*				
Terphenyl-d14	*60*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-5-20-22**					
Laboratory ID:	10-327-10					
Naphthalene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0041	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*92*	*46 - 113*				
Pyrene-d10	*101*	*45 - 114*				
Terphenyl-d14	*99*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-10.8-15**					
Laboratory ID:	10-327-11					
Naphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0042	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*54*	*46 - 113*				
Pyrene-d10	*56*	*45 - 114*				
Terphenyl-d14	*57*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-4-7.8-8.7**					
Laboratory ID:	10-327-13					
Naphthalene	**0.043**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**0.050**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**0.042**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**0.028**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**0.0053**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**0.010**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**0.0094**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**0.013**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**0.020**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**0.015**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**0.013**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**0.0077**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**0.0047**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**0.012**	0.0040	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*79*	*46 - 113*				
Pyrene-d10	*55*	*45 - 114*				
Terphenyl-d14	*75*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-4-15-18.7**					
Laboratory ID:	10-327-14					
Naphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
2-Methylnaphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
1-Methylnaphthalene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthylene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Acenaphthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Fluorene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Phenanthrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Chrysene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[b]fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo(j,k)fluoranthene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[a]pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Dibenz[a,h]anthracene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Benzo[g,h,i]perylene	**ND**	0.0046	EPA 8270E/SIM	11-3-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*50*	*46 - 113*				
Pyrene-d10	*50*	*45 - 114*				
Terphenyl-d14	*51*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-3-14.4-15.9**					
Laboratory ID:	10-327-16					
Naphthalene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
2-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
1-Methylnaphthalene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Acenaphthylene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Acenaphthene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Fluorene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Phenanthrene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Anthracene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Fluoranthene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Pyrene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[a]anthracene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Chrysene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[b]fluoranthene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo(j,k)fluoranthene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[a]pyrene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Dibenz[a,h]anthracene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[g,h,i]perylene	**ND**	0.0040	EPA 8270E/SIM	11-6-20	11-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*67*	*46 - 113*				
Pyrene-d10	*83*	*45 - 114*				
Terphenyl-d14	*86*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1103S1					
Naphthalene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
2-Methylnaphthalene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
1-Methylnaphthalene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthylene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Acenaphthene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Fluorene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Phenanthrene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Anthracene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Fluoranthene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Pyrene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]anthracene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Chrysene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[b]fluoranthene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo(j,k)fluoranthene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[a]pyrene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Dibenz[a,h]anthracene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Benzo[g,h,i]perylene	**ND**	0.0027	EPA 8270E/SIM	11-3-20	11-3-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*61*	*46 - 113*				
Pyrene-d10	*58*	*45 - 114*				
Terphenyl-d14	*56*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1106S1					
Naphthalene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
2-Methylnaphthalene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
1-Methylnaphthalene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Acenaphthylene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Acenaphthene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Fluorene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Phenanthrene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Anthracene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Fluoranthene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Pyrene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[a]anthracene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Chrysene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[b]fluoranthene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo(j,k)fluoranthene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[a]pyrene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Dibenz[a,h]anthracene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Benzo[g,h,i]perylene	**ND**	0.0033	EPA 8270E/SIM	11-6-20	11-6-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*84*	*46 - 113*				
Pyrene-d10	*106*	*45 - 114*				
Terphenyl-d14	*95*	*49 - 121*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-327-10										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.0710**	**0.0687**	0.0833	0.0833	ND	85	82	51 - 115	3	26	
Acenaphthylene	**0.0733**	**0.0704**	0.0833	0.0833	ND	88	85	53 - 121	4	24	
Acenaphthene	**0.0729**	**0.0707**	0.0833	0.0833	ND	88	85	52 - 121	3	25	
Fluorene	**0.0787**	**0.0800**	0.0833	0.0833	ND	94	96	58 - 127	2	23	
Phenanthrene	**0.0779**	**0.0754**	0.0833	0.0833	ND	94	91	46 - 129	3	28	
Anthracene	**0.0802**	**0.0781**	0.0833	0.0833	ND	96	94	57 - 124	3	21	
Fluoranthene	**0.0829**	**0.0843**	0.0833	0.0833	ND	100	101	46 - 136	2	29	
Pyrene	**0.0775**	**0.0823**	0.0833	0.0833	ND	93	99	41 - 136	6	32	
Benzo[a]anthracene	**0.0804**	**0.0845**	0.0833	0.0833	ND	97	101	56 - 136	5	25	
Chrysene	**0.0790**	**0.0777**	0.0833	0.0833	ND	95	93	49 - 130	2	22	
Benzo[b]fluoranthene	**0.0792**	**0.0869**	0.0833	0.0833	ND	95	104	51 - 135	9	26	
Benzo(j,k)fluoranthene	**0.0769**	**0.0730**	0.0833	0.0833	ND	92	88	56 - 124	5	23	
Benzo[a]pyrene	**0.0777**	**0.0798**	0.0833	0.0833	ND	93	96	54 - 133	3	26	
Indeno(1,2,3-c,d)pyrene	**0.0804**	**0.0821**	0.0833	0.0833	ND	97	99	52 - 134	2	20	
Dibenz[a,h]anthracene	**0.0788**	**0.0784**	0.0833	0.0833	ND	95	94	58 - 127	1	17	
Benzo[g,h,i]perylene	**0.0787**	**0.0784**	0.0833	0.0833	ND	94	94	54 - 129	0	21	
Surrogate:											
2-Fluorobiphenyl						*88*	*84*	*46 - 113*			
Pyrene-d10						*96*	*98*	*45 - 114*			
Terphenyl-d14						*95*	*102*	*49 - 121*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB1106S1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.0752**	**0.0705**	0.0833	0.0833	90	85	60 - 116	6	16	
Acenaphthylene	**0.0794**	**0.0800**	0.0833	0.0833	95	96	60 - 125	1	15	
Acenaphthene	**0.0789**	**0.0776**	0.0833	0.0833	95	93	60 - 121	2	15	
Fluorene	**0.0802**	**0.0803**	0.0833	0.0833	96	96	65 - 126	0	15	
Phenanthrene	**0.0806**	**0.0801**	0.0833	0.0833	97	96	65 - 120	1	15	
Anthracene	**0.0796**	**0.0811**	0.0833	0.0833	96	97	67 - 125	2	15	
Fluoranthene	**0.0854**	**0.0829**	0.0833	0.0833	103	100	66 - 125	3	15	
Pyrene	**0.0838**	**0.0820**	0.0833	0.0833	101	98	62 - 125	2	15	
Benzo[a]anthracene	**0.0884**	**0.0859**	0.0833	0.0833	106	103	72 - 129	3	15	
Chrysene	**0.0845**	**0.0835**	0.0833	0.0833	101	100	66 - 123	1	15	
Benzo[b]fluoranthene	**0.0867**	**0.0859**	0.0833	0.0833	104	103	68 - 128	1	15	
Benzo(j,k)fluoranthene	**0.0825**	**0.0784**	0.0833	0.0833	99	94	63 - 128	5	16	
Benzo[a]pyrene	**0.0829**	**0.0792**	0.0833	0.0833	100	95	66 - 130	5	15	
Indeno(1,2,3-c,d)pyrene	**0.0754**	**0.0807**	0.0833	0.0833	91	97	63 - 135	7	15	
Dibenz[a,h]anthracene	**0.0704**	**0.0760**	0.0833	0.0833	85	91	65 - 130	8	15	
Benzo[g,h,i]perylene	**0.0729**	**0.0775**	0.0833	0.0833	88	93	66 - 127	6	15	
Surrogate:										
2-Fluorobiphenyl					*98*	*90*	*46 - 113*			
Pyrene-d10					*95*	*94*	*45 - 114*			
Terphenyl-d14					*103*	*106*	*49 - 121*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-GW**					
Laboratory ID:	10-327-12					
Naphthalene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
2-Methylnaphthalene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
1-Methylnaphthalene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthylene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Fluorene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Phenanthrene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Anthracene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Fluoranthene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Pyrene	**ND**	0.060	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]anthracene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Chrysene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[b]fluoranthene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo(j,k)fluoranthene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]pyrene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Dibenz[a,h]anthracene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[g,h,i]perylene	**ND**	0.0060	EPA 8270E/SIM	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*52*	*20 - 106*				
Pyrene-d10	*65*	*26 - 104*				
Terphenyl-d14	*64*	*44 - 127*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-3-GW**					
Laboratory ID:	10-327-17					
Naphthalene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
2-Methylnaphthalene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
1-Methylnaphthalene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthylene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Fluorene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Phenanthrene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Anthracene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Fluoranthene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Pyrene	**ND**	0.056	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]anthracene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Chrysene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[b]fluoranthene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo(j,k)fluoranthene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]pyrene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Dibenz[a,h]anthracene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[g,h,i]perylene	**ND**	0.0056	EPA 8270E/SIM	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*47*	*20 - 106*				
Pyrene-d10	*61*	*26 - 104*				
Terphenyl-d14	*62*	*44 - 127*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-3-GW-Dup**					
Laboratory ID:	10-327-18					
Naphthalene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
2-Methylnaphthalene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
1-Methylnaphthalene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthylene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Fluorene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Phenanthrene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Anthracene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Fluoranthene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Pyrene	**ND**	0.051	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]anthracene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Chrysene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[b]fluoranthene	**0.0053**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo(j,k)fluoranthene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]pyrene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Dibenz[a,h]anthracene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[g,h,i]perylene	**ND**	0.0051	EPA 8270E/SIM	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*62*	*20 - 106*				
Pyrene-d10	*70*	*26 - 104*				
Terphenyl-d14	*72*	*44 - 127*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1102W1					
Naphthalene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
2-Methylnaphthalene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
1-Methylnaphthalene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthylene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Acenaphthene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Fluorene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Phenanthrene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Anthracene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Fluoranthene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Pyrene	**ND**	0.050	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]anthracene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Chrysene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[b]fluoranthene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo(j,k)fluoranthene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[a]pyrene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Dibenz[a,h]anthracene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Benzo[g,h,i]perylene	**ND**	0.0050	EPA 8270E/SIM	11-2-20	11-2-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*47*	*20 - 106*				
Pyrene-d10	*65*	*26 - 104*				
Terphenyl-d14	*63*	*44 - 127*				

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PAHs EPA 8270E/SIM
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-327-17										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.283**	**0.250**	0.552	0.521	ND	51	48	30 - 98	12	40	
Acenaphthylene	**0.326**	**0.295**	0.552	0.521	ND	59	57	39 - 106	10	28	
Acenaphthene	**0.348**	**0.313**	0.552	0.521	ND	63	60	36 - 114	11	35	
Fluorene	**0.361**	**0.339**	0.552	0.521	ND	65	65	45 - 112	6	29	
Phenanthrene	**0.401**	**0.373**	0.552	0.521	ND	73	72	51 - 109	7	23	
Anthracene	**0.348**	**0.324**	0.552	0.521	ND	63	62	49 - 109	7	22	
Fluoranthene	**0.378**	**0.349**	0.552	0.521	ND	68	67	53 - 115	8	20	
Pyrene	**0.376**	**0.346**	0.552	0.521	ND	68	66	49 - 129	8	27	
Benzo[a]anthracene	**0.513**	**0.462**	0.552	0.521	ND	93	89	61 - 123	10	20	
Chrysene	**0.427**	**0.382**	0.552	0.521	ND	77	73	59 - 114	11	22	
Benzo[b]fluoranthene	**0.427**	**0.404**	0.552	0.521	ND	77	78	60 - 125	6	24	
Benzo(j,k)fluoranthene	**0.436**	**0.354**	0.552	0.521	ND	79	68	58 - 121	21	23	
Benzo[a]pyrene	**0.393**	**0.350**	0.552	0.521	ND	71	67	58 - 118	12	23	
Indeno(1,2,3-c,d)pyrene	**0.450**	**0.407**	0.552	0.521	ND	82	78	59 - 124	10	23	
Dibenz[a,h]anthracene	**0.443**	**0.393**	0.552	0.521	ND	80	75	59 - 123	12	23	
Benzo[g,h,i]perylene	**0.431**	**0.383**	0.552	0.521	ND	78	74	58 - 120	12	23	
Surrogate:											
2-Fluorobiphenyl						*47*	*44*	*20 - 106*			
Pyrene-d10						*63*	*62*	*26 - 104*			
Terphenyl-d14						*64*	*61*	*44 - 127*			

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

PCBs EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Aroclor 1016	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1221	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1232	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1242	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1248	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1254	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1260	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1262	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Aroclor 1268	**ND**	0.032	EPA 8082A	11-4-20	11-5-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*76*	*46-125*				

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PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1104S1					
Aroclor 1016	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1221	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1232	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1242	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1248	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1254	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1260	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1262	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Aroclor 1268	**ND**	0.025	EPA 8082A	11-4-20	11-4-20	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*98*	*46-125*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.224**	**0.292**	0.250	0.250	ND	**89**	**117**	43-125	26	15	L, X
Surrogate:											
DCB						*102*	*102*	*46-125*			
SPIKE BLANKS											
Laboratory ID:	SB1104S1										
	SB	SBD	SB	SBD		SB	SBD				
Aroclor 1260	**0.280**	**0.260**	0.250	0.250	N/A	**112**	**104**	50-134	7	18	
Surrogate:											
DCB						*96*	*96*	*46-125*			

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Project: 202005-01.01

TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-8-9**					
Laboratory ID:	10-327-01					
Antimony	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Arsenic	**9.8**	3.3	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.43**	0.067	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.077**	0.067	EPA 6020B	11-4-20	11-5-20	
Chromium	**60**	0.67	EPA 6010D	11-2-20	11-2-20	
Copper	**49**	1.3	EPA 6010D	11-2-20	11-2-20	
Lead	**4.8**	0.67	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.085**	0.013	EPA 7471B	11-4-20	11-5-20	
Nickel	**58**	3.3	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.17	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Zinc	**72**	3.3	EPA 6010D	11-2-20	11-2-20	
Client ID:	**GP-2-25-27**					
Laboratory ID:	10-327-03					
Antimony	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Arsenic	**5.3**	3.3	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.15**	0.066	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.12**	0.066	EPA 6020B	11-4-20	11-5-20	
Chromium	**31**	0.66	EPA 6010D	11-2-20	11-2-20	
Copper	**21**	1.3	EPA 6010D	11-2-20	11-2-20	
Lead	**2.9**	0.66	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.038**	0.013	EPA 7471B	11-4-20	11-5-20	
Nickel	**29**	3.3	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.16	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.3	EPA 6010D	11-2-20	11-2-20	
Zinc	**42**	3.3	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Antimony	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Arsenic	**9.3**	3.2	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.33**	0.064	EPA 6020B	11-4-20	11-5-20	
Cadmium	**ND**	0.064	EPA 6020B	11-4-20	11-5-20	
Chromium	**55**	0.64	EPA 6010D	11-2-20	11-2-20	
Copper	**48**	1.3	EPA 6010D	11-2-20	11-2-20	
Lead	**3.2**	0.64	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.062**	0.013	EPA 7471B	11-4-20	11-5-20	
Nickel	**58**	3.2	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.16	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Zinc	**64**	3.2	EPA 6010D	11-2-20	11-2-20	

Client ID:	**GP-1-20-22**					
Laboratory ID:	10-327-06					
Antimony	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Arsenic	**6.0**	3.4	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.18**	0.068	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.13**	0.068	EPA 6020B	11-4-20	11-5-20	
Chromium	**42**	0.68	EPA 6010D	11-2-20	11-2-20	
Copper	**35**	1.4	EPA 6010D	11-2-20	11-2-20	
Lead	**2.0**	0.68	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.037**	0.014	EPA 7471B	11-4-20	11-5-20	
Nickel	**46**	3.4	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.17	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Zinc	**64**	3.4	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-20-22-Dup**					
Laboratory ID:	10-327-07					
Antimony	**ND**	3.5	EPA 6010D	11-2-20	11-2-20	
Arsenic	**6.3**	3.5	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.19**	0.070	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.11**	0.070	EPA 6020B	11-4-20	11-5-20	
Chromium	**44**	0.70	EPA 6010D	11-2-20	11-2-20	
Copper	**35**	1.4	EPA 6010D	11-2-20	11-2-20	
Lead	**2.0**	0.70	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.045**	0.014	EPA 7471B	11-4-20	11-5-20	
Nickel	**46**	3.5	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.5	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.18	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.5	EPA 6010D	11-2-20	11-2-20	
Zinc	**62**	3.5	EPA 6010D	11-2-20	11-2-20	

Client ID:	**GP-5-6.9-7.5**					
Laboratory ID:	10-327-08					
Antimony	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Arsenic	**7.5**	3.2	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.36**	0.063	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.093**	0.063	EPA 6020B	11-4-20	11-5-20	
Chromium	**43**	0.63	EPA 6010D	11-2-20	11-2-20	
Copper	**22**	1.3	EPA 6010D	11-2-20	11-2-20	
Lead	**4.7**	0.63	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.059**	0.013	EPA 7471B	11-4-20	11-5-20	
Nickel	**33**	3.2	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.16	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.2	EPA 6010D	11-2-20	11-2-20	
Zinc	**61**	3.2	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-5-20-22**					
Laboratory ID:	10-327-10					
Antimony	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Arsenic	**5.0**	3.1	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.16**	0.062	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.093**	0.062	EPA 6020B	11-4-20	11-5-20	
Chromium	**31**	0.62	EPA 6010D	11-2-20	11-2-20	
Copper	**19**	1.2	EPA 6010D	11-2-20	11-2-20	
Lead	**2.0**	0.62	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.024**	0.012	EPA 7471B	11-4-20	11-5-20	
Nickel	**28**	3.1	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.15	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Zinc	**36**	3.1	EPA 6010D	11-2-20	11-2-20	

Client ID:	**GP-6-10.8-15**					
Laboratory ID:	10-327-11					
Antimony	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Arsenic	**3.6**	3.1	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.13**	0.063	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.092**	0.063	EPA 6020B	11-4-20	11-5-20	
Chromium	**27**	0.63	EPA 6010D	11-2-20	11-2-20	
Copper	**15**	1.3	EPA 6010D	11-2-20	11-2-20	
Lead	**1.4**	0.63	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.022**	0.013	EPA 7471B	11-4-20	11-5-20	
Nickel	**28**	3.1	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.16	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.1	EPA 6010D	11-2-20	11-2-20	
Zinc	**29**	3.1	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-4-7.8-8.7**					
Laboratory ID:	10-327-13					
Antimony	**4.6**	3.8	EPA 6010D	11-2-20	11-2-20	
Arsenic	**14**	3.8	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.37**	0.076	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.90**	0.076	EPA 6020B	11-4-20	11-5-20	
Chromium	**37**	0.76	EPA 6010D	11-2-20	11-2-20	
Copper	**30**	1.5	EPA 6010D	11-2-20	11-2-20	
Lead	**44**	1.5	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.095**	0.015	EPA 7471B	11-4-20	11-5-20	
Nickel	**38**	3.8	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.8	EPA 6010D	11-2-20	11-2-20	
Silver	**0.22**	0.19	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.8	EPA 6010D	11-2-20	11-2-20	
Zinc	**120**	3.8	EPA 6010D	11-2-20	11-2-20	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-4-15-18.7**					
Laboratory ID:	10-327-14					
Antimony	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Arsenic	**6.0**	3.4	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.21**	0.068	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.13**	0.068	EPA 6020B	11-4-20	11-5-20	
Chromium	**41**	0.68	EPA 6010D	11-2-20	11-2-20	
Copper	**28**	1.4	EPA 6010D	11-2-20	11-2-20	
Lead	**2.4**	0.68	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.030**	0.014	EPA 7471B	11-4-20	11-5-20	
Nickel	**39**	3.4	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.17	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.4	EPA 6010D	11-2-20	11-2-20	
Zinc	**53**	3.4	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-3-14.4-15.9**					
Laboratory ID:	10-327-16					
Antimony	**ND**	3.0	EPA 6010D	11-2-20	11-2-20	
Arsenic	**3.9**	3.0	EPA 6010D	11-2-20	11-2-20	
Beryllium	**0.11**	0.060	EPA 6020B	11-4-20	11-5-20	
Cadmium	**0.078**	0.060	EPA 6020B	11-4-20	11-5-20	
Chromium	**28**	0.60	EPA 6010D	11-2-20	11-2-20	
Copper	**16**	1.2	EPA 6010D	11-2-20	11-2-20	
Lead	**1.3**	0.60	EPA 6020B	11-4-20	11-5-20	
Mercury	**0.016**	0.012	EPA 7471B	11-4-20	11-5-20	
Nickel	**24**	3.0	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	3.0	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.15	EPA 6020B	11-4-20	11-5-20	
Thallium	**ND**	3.0	EPA 6010D	11-2-20	11-2-20	
Zinc	**30**	3.0	EPA 6010D	11-2-20	11-2-20	

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TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1102SH1					
Antimony	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Arsenic	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.50	EPA 6010D	11-2-20	11-2-20	
Copper	**ND**	1.0	EPA 6010D	11-2-20	11-2-20	
Nickel	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Thallium	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Zinc	**ND**	2.5	EPA 6010D	11-2-20	11-2-20	
Laboratory ID:	MB1104SM1					
Beryllium	**ND**	0.050	EPA 6020B	11-4-20	11-5-20	
Cadmium	**ND**	0.050	EPA 6020B	11-4-20	11-5-20	
Lead	**ND**	0.50	EPA 6020B	11-4-20	11-5-20	
Silver	**ND**	0.13	EPA 6020B	11-4-20	11-5-20	
Laboratory ID:	MB1104S1					
Mercury	**ND**	0.010	EPA 7471B	11-4-20	11-5-20	

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TOTAL METALS
EPA 6010D/6020B/7471B
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-327-10										
	ORIG	DUP									
Antimony	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Arsenic	**4.07**	**4.38**	NA	NA		NA		NA	7	20	
Chromium	**25.2**	**26.1**	NA	NA		NA		NA	4	20	
Copper	**15.5**	**15.4**	NA	NA		NA		NA	1	20	
Nickel	**22.6**	**23.2**	NA	NA		NA		NA	3	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Thallium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Zinc	**29.0**	**29.8**	NA	NA		NA		NA	3	20	
Laboratory ID:	10-327-10										
Beryllium	**0.134**	**0.123**	NA	NA		NA		NA	9	20	
Cadmium	**0.0755**	**0.0695**	NA	NA		NA		NA	8	20	
Lead	**1.66**	**1.40**	NA	NA		NA		NA	17	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-327-10										
Mercury	**0.0197**	**0.0201**	NA	NA		NA		NA	2	20	
MATRIX SPIKES											
Laboratory ID:	10-327-10										
	MS	MSD	MS	MSD		MS	MSD				
Antimony	**88.5**	**88.5**	100	100	ND	**89**	**89**	75-125	0	20	
Arsenic	**99.5**	**101**	100	100	4.07	**95**	**96**	75-125	1	20	
Chromium	**121**	**122**	100	100	25.2	**96**	**97**	75-125	1	20	
Copper	**67.5**	**64.0**	50.0	50.0	15.5	**104**	**97**	75-125	5	20	
Nickel	**125**	**124**	100	100	22.6	**102**	**101**	75-125	1	20	
Selenium	**95.5**	**93.5**	100	100	ND	**96**	**94**	75-125	2	20	
Thallium	**48.2**	**51.0**	50.0	50.0	ND	**96**	**102**	75-125	6	20	
Zinc	**129**	**124**	100	100	29.0	**100**	**95**	75-125	4	20	
Laboratory ID:	10-327-10										
Beryllium	**48.9**	**47.7**	50.0	50.0	0.134	**97**	**95**	75-125	2	20	
Cadmium	**46.1**	**44.7**	50.0	50.0	0.0755	**92**	**89**	75-125	3	20	
Lead	**227**	**223**	250	250	1.66	**90**	**88**	75-125	2	20	
Silver	**20.7**	**19.9**	25.0	25.0	ND	**83**	**80**	75-125	4	20	
Laboratory ID:	10-327-10										
Mercury	**0.529**	**0.528**	0.500	0.500	0.0197	**102**	**102**	80-120	0	20	

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Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**0.47**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

TCLP METALS
EPA 1311/6010D/7470A
QUALITY CONTROL

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1030TM1					
Arsenic	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Barium	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Cadmium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Chromium	**ND**	0.020	EPA 6010D	11-2-20	11-2-20	
Lead	**ND**	0.20	EPA 6010D	11-2-20	11-2-20	
Selenium	**ND**	0.40	EPA 6010D	11-2-20	11-2-20	
Silver	**ND**	0.040	EPA 6010D	11-2-20	11-2-20	
Laboratory ID:	MB1030T1					
Mercury	**ND**	0.0050	EPA 7470A	10-30-20	10-30-20	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-279-02										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Barium	**0.462**	**0.462**	NA	NA		NA		NA	0	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	10-279-02										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	10-279-02										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**3.92**	**3.90**	4.00	4.00	ND	**98**	**98**	75-125	1	20	
Barium	**4.29**	**4.30**	4.00	4.00	0.462	**96**	**96**	75-125	0	20	
Cadmium	**1.82**	**1.81**	2.00	2.00	ND	**91**	**90**	75-125	1	20	
Chromium	**3.80**	**3.78**	4.00	4.00	ND	**95**	**95**	75-125	1	20	
Lead	**9.55**	**9.51**	10.0	10.0	ND	**96**	**95**	75-125	0	20	
Selenium	**4.05**	**4.01**	4.00	4.00	ND	**101**	**100**	75-125	1	20	
Silver	**0.960**	**0.968**	1.00	1.00	ND	**96**	**97**	75-125	1	20	
Laboratory ID:	10-279-02										
Mercury	**0.0488**	**0.0486**	0.0500	0.0500	ND	**98**	**97**	75-125	0	20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DISSOLVED METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-GW**					
Laboratory ID:	10-327-12					
Antimony	**ND**	1.0	EPA 200.8		11-5-20	
Arsenic	**0.76**	0.50	EPA 200.8		11-5-20	
Beryllium	**ND**	0.20	EPA 200.8		11-5-20	
Cadmium	**ND**	0.20	EPA 200.8		11-5-20	
Chromium	**ND**	1.0	EPA 200.8		11-5-20	
Copper	**ND**	1.0	EPA 200.8		11-5-20	
Lead	**ND**	0.50	EPA 200.8		11-5-20	
Mercury	**ND**	0.025	EPA 7470A		11-5-20	
Nickel	**17**	1.0	EPA 200.8		11-5-20	
Selenium	**5.6**	1.0	EPA 200.8		11-5-20	
Silver	**ND**	0.20	EPA 200.8		11-5-20	
Thallium	**ND**	0.20	EPA 200.8		11-5-20	
Zinc	**3.0**	2.5	EPA 200.8		11-5-20	

Client ID:	**GP-3-GW**					
Laboratory ID:	10-327-17					
Antimony	**ND**	1.0	EPA 200.8		11-5-20	
Arsenic	**0.68**	0.50	EPA 200.8		11-5-20	
Beryllium	**ND**	0.20	EPA 200.8		11-5-20	
Cadmium	**ND**	0.20	EPA 200.8		11-5-20	
Chromium	**ND**	1.0	EPA 200.8		11-5-20	
Copper	**ND**	1.0	EPA 200.8		11-5-20	
Lead	**ND**	0.50	EPA 200.8		11-5-20	
Mercury	**ND**	0.025	EPA 7470A		11-5-20	
Nickel	**13**	1.0	EPA 200.8		11-5-20	
Selenium	**1.4**	1.0	EPA 200.8		11-5-20	
Silver	**ND**	0.20	EPA 200.8		11-5-20	
Thallium	**ND**	0.20	EPA 200.8		11-5-20	
Zinc	**7.0**	2.5	EPA 200.8		11-5-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DISSOLVED METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-3-GW-Dup**					
Laboratory ID:	10-327-18					
Antimony	**ND**	1.0	EPA 200.8		11-5-20	
Arsenic	**0.56**	0.50	EPA 200.8		11-5-20	
Beryllium	**ND**	0.20	EPA 200.8		11-5-20	
Cadmium	**ND**	0.20	EPA 200.8		11-5-20	
Chromium	**ND**	1.0	EPA 200.8		11-5-20	
Copper	**ND**	1.0	EPA 200.8		11-5-20	
Lead	**ND**	0.50	EPA 200.8		11-5-20	
Mercury	**ND**	0.025	EPA 7470A		11-5-20	
Nickel	**15**	1.0	EPA 200.8		11-5-20	
Selenium	**1.4**	1.0	EPA 200.8		11-5-20	
Silver	**ND**	0.20	EPA 200.8		11-5-20	
Thallium	**ND**	0.20	EPA 200.8		11-5-20	
Zinc	**6.6**	2.5	EPA 200.8		11-5-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DISSOLVED METALS
EPA 200.8/7470A
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1105D1					
Antimony	**ND**	1.0	EPA 200.8		11-5-20	
Arsenic	**ND**	0.50	EPA 200.8		11-5-20	
Beryllium	**ND**	0.20	EPA 200.8		11-5-20	
Cadmium	**ND**	0.20	EPA 200.8		11-5-20	
Chromium	**ND**	1.0	EPA 200.8		11-5-20	
Copper	**ND**	1.0	EPA 200.8		11-5-20	
Lead	**ND**	0.50	EPA 200.8		11-5-20	
Nickel	**ND**	0.50	EPA 200.8		11-5-20	
Selenium	**ND**	1.0	EPA 200.8		11-5-20	
Silver	**ND**	0.20	EPA 200.8		11-5-20	
Thallium	**ND**	0.20	EPA 200.8		11-5-20	
Zinc	**ND**	2.5	EPA 200.8		11-5-20	
Laboratory ID:	MB1105D1					
Mercury	**ND**	0.025	EPA 7470A		11-5-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

DISSOLVED METALS
EPA 200.8/7470A
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	10-327-17										
	ORIG	DUP									
Antimony	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Arsenic	**0.680**	**0.702**	NA	NA		NA		NA	3	20	
Beryllium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Copper	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Nickel	**12.8**	**13.3**	NA	NA		NA		NA	4	20	
Selenium	**1.37**	**1.34**	NA	NA		NA		NA	2	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Thallium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Zinc	**7.02**	**6.84**	NA	NA		NA		NA	3	20	
Laboratory ID:	10-327-17										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	10-327-17										
	MS	MSD	MS	MSD		MS	MSD				
Antimony	**84.0**	**84.8**	80.0	80.0	ND	**105**	**106**	75-125	1	20	
Arsenic	**86.0**	**84.4**	80.0	80.0	0.680	**107**	**105**	75-125	2	20	
Beryllium	**77.2**	**77.6**	80.0	80.0	ND	**97**	**97**	75-125	1	20	
Cadmium	**77.0**	**78.0**	80.0	80.0	ND	**96**	**98**	75-125	1	20	
Chromium	**76.6**	**75.4**	80.0	80.0	ND	**96**	**94**	75-125	2	20	
Copper	**71.6**	**72.0**	80.0	80.0	ND	**90**	**90**	75-125	1	20	
Lead	**74.8**	**75.2**	80.0	80.0	ND	**94**	**94**	75-125	1	20	
Nickel	**87.0**	**86.6**	80.0	80.0	12.8	**93**	**92**	75-125	0	20	
Selenium	**96.4**	**94.8**	80.0	80.0	1.37	**119**	**117**	75-125	2	20	
Silver	**69.4**	**68.0**	80.0	80.0	ND	**87**	**85**	75-125	2	20	
Thallium	**74.4**	**75.8**	80.0	80.0	ND	**93**	**95**	75-125	2	20	
Zinc	**83.2**	**81.0**	80.0	80.0	7.02	**95**	**93**	75-125	3	20	
Laboratory ID:	10-327-17										
Mercury	**5.78**	**5.78**	6.25	6.25	ND	**92**	**92**	75-125	0	20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G

Matrix: Soil
Units: % Solids

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-2-8-9**					
Laboratory ID:	10-327-01					
Total Solids	**75**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-2-25-27**					
Laboratory ID:	10-327-03					
Total Solids	**76**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-1-5.7-9.7**					
Laboratory ID:	10-327-04					
Total Solids	**78**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-1-20-22**					
Laboratory ID:	10-327-06					
Total Solids	**73**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-1-20-22-Dup**					
Laboratory ID:	10-327-07					
Total Solids	**71**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-5-6.9-7.5**					
Laboratory ID:	10-327-08					
Total Solids	**79**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-5-20-22**					
Laboratory ID:	10-327-10					
Total Solids	**81**	0.50	SM 2540G	10-29-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G

Matrix: Soil
Units: % Solids

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**GP-6-10.8-15**					
Laboratory ID:	10-327-11					
Total Solids	**80**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-4-7.8-8.7**					
Laboratory ID:	10-327-13					
Total Solids	**66**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-4-15-18.7**					
Laboratory ID:	10-327-14					
Total Solids	**73**	0.50	SM 2540G	10-29-20	10-30-20	
Client ID:	**GP-3-14.4-15.9**					
Laboratory ID:	10-327-16					
Total Solids	**83**	0.50	SM 2540G	10-29-20	10-30-20	

Date of Report: November 17, 2020
Samples Submitted: October 28, 2020
Laboratory Reference: 2010-327
Project: 202005-01.01

TOTAL SOLIDS
SM 2540G
QUALITY CONTROL

Matrix: Soil
Units: % Solids

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-264-01								
	ORIG	DUP							
Total Solids	**89.3**	**91.7**	NA	NA	NA	NA	3	20	
Laboratory ID:	10-327-10								
	ORIG	DUP							
Total Solids	**81.1**	**81.2**	NA	NA	NA	NA	0	20	

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

November 17, 2020

Vista Work Order No. 2002347

Mr. David Baumeister
OnSite Environmental Inc.
14648 NE 95th Street
Redmond, WA 98052

Dear Mr. Baumeister,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on October 30, 2020 under your Project Name '202005-01.01'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2002347
Case Narrative

Sample Condition on Receipt:

One solid sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology. The sample was received in good condition and within the method temperature requirements. The sample was received in a clear glass jar.

Analytical Notes:

EPA Method 1613B

This sample was extracted and analyzed for tetra-through-octa chlorinated dioxins and furans by EPA Method 1613B using a ZB-DIOXIN GC column.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank. The OPR recoveries were within the method acceptance criteria.

Labeled standard recoveries for all QC and field samples were within method acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2002347-01	GP-1-5.7-9.7	26-Oct-20 13:15	30-Oct-20 07:49	Clear Glass Jar, 250mL

ANALYTICAL RESULTS

Sample ID: Method Blank — EPA Method 1613B

Client Data		Laboratory Data			
Name:	OnSite Environmental Inc.	Lab Sample:	B0K0041-BLK1		
Project:	202005-01.01	QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Matrix:	Solid	Sample Size:	10.0 g	Column:	ZB-DIOXIN

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND	0.0263			13-Nov-20 10:55	1
1,2,3,7,8-PeCDD	ND	0.0497			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDD	ND	0.0568			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDD	ND	0.0574			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDD	ND	0.0721			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDD	ND	0.0573			13-Nov-20 10:55	1
OCDD	ND	0.116			13-Nov-20 10:55	1
2,3,7,8-TCDF	ND	0.0198			13-Nov-20 10:55	1
1,2,3,7,8-PeCDF	ND	0.0288			13-Nov-20 10:55	1
2,3,4,7,8-PeCDF	ND	0.0235			13-Nov-20 10:55	1
1,2,3,4,7,8-HxCDF	ND	0.0329			13-Nov-20 10:55	1
1,2,3,6,7,8-HxCDF	ND	0.0337			13-Nov-20 10:55	1
2,3,4,6,7,8-HxCDF	ND	0.0389			13-Nov-20 10:55	1
1,2,3,7,8,9-HxCDF	ND	0.0698			13-Nov-20 10:55	1
1,2,3,4,6,7,8-HpCDF	ND	0.0487			13-Nov-20 10:55	1
1,2,3,4,7,8,9-HpCDF	ND	0.0568			13-Nov-20 10:55	1
OCDF	ND	0.0915			13-Nov-20 10:55	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	0.00					
Totals						
Total TCDD	ND	0.0263				
Total PeCDD	ND	0.0497				
Total HxCDD	ND	0.0721				
Total HpCDD	ND	0.0573				
Total TCDF	ND	0.0198				
Total PeCDF	ND	0.0288				
Total HxCDF	ND	0.0698				
Total HpCDF	ND	0.0568				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	80.4	25 - 164		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDD	IS	81.8	25 - 181		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDD	IS	88.4	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDD	IS	89.3	28 - 130		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDD	IS	80.0	32 - 141		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDD	IS	80.0	23 - 140		13-Nov-20 10:55	1
13C-OCDD	IS	74.4	17 - 157		13-Nov-20 10:55	1
13C-2,3,7,8-TCDF	IS	83.2	24 - 169		13-Nov-20 10:55	1
13C-1,2,3,7,8-PeCDF	IS	84.6	24 - 185		13-Nov-20 10:55	1
13C-2,3,4,7,8-PeCDF	IS	90.3	21 - 178		13-Nov-20 10:55	1
13C-1,2,3,4,7,8-HxCDF	IS	82.0	26 - 152		13-Nov-20 10:55	1
13C-1,2,3,6,7,8-HxCDF	IS	82.7	26 - 123		13-Nov-20 10:55	1
13C-2,3,4,6,7,8-HxCDF	IS	83.8	28 - 136		13-Nov-20 10:55	1
13C-1,2,3,7,8,9-HxCDF	IS	71.1	29 - 147		13-Nov-20 10:55	1
13C-1,2,3,4,6,7,8-HpCDF	IS	75.5	28 - 143		13-Nov-20 10:55	1
13C-1,2,3,4,7,8,9-HpCDF	IS	71.1	26 - 138		13-Nov-20 10:55	1
13C-OCDF	IS	71.5	17 - 157		13-Nov-20 10:55	1
37Cl-2,3,7,8-TCDD	CRS	95.5	35 - 197		13-Nov-20 10:55	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

Sample ID: OPR

EPA Method 1613B

Client Data

Name: OnSite Environmental Inc.
Project: 202005-01.01
Matrix: Solid

Laboratory Data

Lab Sample: B0K0041-BS1
QC Batch: B0K0041
Sample Size: 10.0 g
Date Extracted: 05-Nov-20 06:05
Column: ZB-DIOXIN

Analyte	Amt Found (pg/g)	Spike Amt	% Recovery	Limits	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	21.0	20.0	105	67-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDD	106	100	106	70-142		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDD	101	100	101	70-164		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDD	104	100	104	76-134		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDD	103	100	103	64-162		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDD	102	100	102	70-140		13-Nov-20 09:25	1
OCDD	204	200	102	78-144		13-Nov-20 09:25	1
2,3,7,8-TCDF	19.4	20.0	96.8	75-158		13-Nov-20 09:25	1
1,2,3,7,8-PeCDF	102	100	102	80-134		13-Nov-20 09:25	1
2,3,4,7,8-PeCDF	102	100	102	68-160		13-Nov-20 09:25	1
1,2,3,4,7,8-HxCDF	103	100	103	72-134		13-Nov-20 09:25	1
1,2,3,6,7,8-HxCDF	101	100	101	84-130		13-Nov-20 09:25	1
2,3,4,6,7,8-HxCDF	100	100	100	70-156		13-Nov-20 09:25	1
1,2,3,7,8,9-HxCDF	98.9	100	98.9	78-130		13-Nov-20 09:25	1
1,2,3,4,6,7,8-HpCDF	103	100	103	82-122		13-Nov-20 09:25	1
1,2,3,4,7,8,9-HpCDF	100	100	100	78-138		13-Nov-20 09:25	1
OCDF	200	200	100	63-170		13-Nov-20 09:25	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	88.5	20-175		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDD	IS	89.5	21-227		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDD	IS	91.6	21-193		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDD	IS	91.8	25-163		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDD	IS	90.8	21-193		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDD	IS	87.0	26-166		13-Nov-20 09:25	1
13C-OCDD	IS	79.6	13-199		13-Nov-20 09:25	1
13C-2,3,7,8-TCDF	IS	88.7	22-152		13-Nov-20 09:25	1
13C-1,2,3,7,8-PeCDF	IS	93.6	21-192		13-Nov-20 09:25	1
13C-2,3,4,7,8-PeCDF	IS	95.6	13-328		13-Nov-20 09:25	1
13C-1,2,3,4,7,8-HxCDF	IS	84.0	19-202		13-Nov-20 09:25	1
13C-1,2,3,6,7,8-HxCDF	IS	85.3	21-159		13-Nov-20 09:25	1
13C-2,3,4,6,7,8-HxCDF	IS	85.0	22-176		13-Nov-20 09:25	1
13C-1,2,3,7,8,9-HxCDF	IS	87.1	17-205		13-Nov-20 09:25	1
13C-1,2,3,4,6,7,8-HpCDF	IS	78.0	21-158		13-Nov-20 09:25	1
13C-1,2,3,4,7,8,9-HpCDF	IS	75.8	20-186		13-Nov-20 09:25	1
13C-OCDF	IS	77.7	13-199		13-Nov-20 09:25	1
37Cl-2,3,7,8-TCDD	CRS	106	31-191		13-Nov-20 09:25	1

Sample ID: GP-1-5.7-9.7	**EPA Method 1613B**

Client Data		**Laboratory Data**			
Name:	OnSite Environmental Inc.	Lab Sample:	2002347-01	Date Received:	30-Oct-20 07:49
Project:	202005-01.01	QC Batch:	B0K0041	Date Extracted:	05-Nov-20
Matrix:	Solid	Sample Size:	12.9 g	Column:	ZB-DIOXIN
Date Collected:	26-Oct-20 13:15	% Solids:	77.8		

Analyte	Conc. (pg/g)	EDL	EMPC	Qualifiers	Analyzed	Dilution
2,3,7,8-TCDD	ND	0.0323			14-Nov-20 06:31	1
1,2,3,7,8-PeCDD	ND	0.0816			14-Nov-20 06:31	1
1,2,3,4,7,8-HxCDD	ND	0.140			14-Nov-20 06:31	1
1,2,3,6,7,8-HxCDD	ND	0.147			14-Nov-20 06:31	1
1,2,3,7,8,9-HxCDD	ND	0.165			14-Nov-20 06:31	1
1,2,3,4,6,7,8-HpCDD	2.60				14-Nov-20 06:31	1
OCDD	34.6				14-Nov-20 06:31	1
2,3,7,8-TCDF	ND	0.0247			14-Nov-20 06:31	1
1,2,3,7,8-PeCDF	ND	0.0301			14-Nov-20 06:31	1
2,3,4,7,8-PeCDF	ND	0.0256			14-Nov-20 06:31	1
1,2,3,4,7,8-HxCDF	ND	0.0403			14-Nov-20 06:31	1
1,2,3,6,7,8-HxCDF	ND	0.0387			14-Nov-20 06:31	1
2,3,4,6,7,8-HxCDF	ND	0.0418			14-Nov-20 06:31	1
1,2,3,7,8,9-HxCDF	ND	0.0675			14-Nov-20 06:31	1
1,2,3,4,6,7,8-HpCDF	ND	0.0849			14-Nov-20 06:31	1
1,2,3,4,7,8,9-HpCDF	ND	0.0805			14-Nov-20 06:31	1
OCDF	ND	0.101			14-Nov-20 06:31	1
Toxic Equivalent						
TEQMinWHO2005Dioxin	0.0364					
Totals						
Total TCDD	0.134					
Total PeCDD	0.194					
Total HxCDD	0.947		1.38			
Total HpCDD	6.48					
Total TCDF	0.0999					
Total PeCDF	ND	0.0301				
Total HxCDF	ND	0.0675				
Total HpCDF	ND	0.0849				

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Analyzed	Dilution
13C-2,3,7,8-TCDD	IS	94.5	25 - 164		14-Nov-20 06:31	1
13C-1,2,3,7,8-PeCDD	IS	94.1	25 - 181		14-Nov-20 06:31	1
13C-1,2,3,4,7,8-HxCDD	IS	93.6	32 - 141		14-Nov-20 06:31	1
13C-1,2,3,6,7,8-HxCDD	IS	94.5	28 - 130		14-Nov-20 06:31	1
13C-1,2,3,7,8,9-HxCDD	IS	95.3	32 - 141		14-Nov-20 06:31	1
13C-1,2,3,4,6,7,8-HpCDD	IS	91.5	23 - 140		14-Nov-20 06:31	1
13C-OCDD	IS	88.0	17 - 157		14-Nov-20 06:31	1
13C-2,3,7,8-TCDF	IS	97.2	24 - 169		14-Nov-20 06:31	1
13C-1,2,3,7,8-PeCDF	IS	99.6	24 - 185		14-Nov-20 06:31	1
13C-2,3,4,7,8-PeCDF	IS	100	21 - 178		14-Nov-20 06:31	1
13C-1,2,3,4,7,8-HxCDF	IS	89.4	26 - 152		14-Nov-20 06:31	1
13C-1,2,3,6,7,8-HxCDF	IS	91.2	26 - 123		14-Nov-20 06:31	1
13C-2,3,4,6,7,8-HxCDF	IS	93.5	28 - 136		14-Nov-20 06:31	1
13C-1,2,3,7,8,9-HxCDF	IS	93.2	29 - 147		14-Nov-20 06:31	1
13C-1,2,3,4,6,7,8-HpCDF	IS	86.8	28 - 143		14-Nov-20 06:31	1
13C-1,2,3,4,7,8,9-HpCDF	IS	89.8	26 - 138		14-Nov-20 06:31	1
13C-OCDF	IS	86.3	17 - 157		14-Nov-20 06:31	1
37Cl-2,3,7,8-TCDD	CRS	105	35 - 197		14-Nov-20 06:31	1

EDL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration

The results are reported in dry weight.
The sample size is reported in wet weight.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
K	EMPC (specific projects only)
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

2002347

2.3°C

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 · (425) 883-3881

Laboratory Reference #: 10-327

Laboratory: Vista Analytical Laboratory

Attention: Jennifer Miller

Address: 1104 Windfield Way, El Dorado Hills, CA 95762

Phone Number: (916) 673-1520

Turnaround Request

1 Day ~~2 Day~~ 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 202005-01.01

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analyses
	GP-1-5.7-9.7	10/26/20	13:15	S	1	Dioxins/Furans

Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by: [signature]	OSE	10/29/20	1600	EDDs
Received by: William Wright	VAL	10/30/20	07:49	
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2002347 TAT Std

Samples Arrival:	**Date/Time** 10/30/20 7:49	**Initials:** URW	**Location:** WR-2 **Shelf/Rack:** NA

Delivered By:	FedEx	UPS	On Trac	GLS	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice		Techni Ice	Dry Ice	None	

Temp °C: 2.3 **(uncorrected)**	**Probe used:** Y / N	**Thermometer ID:** IR-4	
Temp °C: 2.3 **(corrected)**			

						YES	NO	NA
Shipping Container(s) Intact?						✓		
Shipping Custody Seals Intact?								X
Airbill —	Trk # 1Z684E1W1595788339					✓		
Shipping Documentation Present?						✓		
Shipping Container	Vista	Client	Retain	Return	Dispose			
Chain of Custody / Sample Documentation Present?						✓		
Chain of Custody / Sample Documentation Complete?						✓		
Holding Time Acceptable?						✓		

Logged In:	**Date/Time** 11/02/20 0909	**Initials:** KS	**Location:** WR-2 **Shelf/Rack:** F-3

	YES	NO	NA
COC Anomaly/Sample Acceptance Form completed?	✓		

Comments:

CoC/Label Reconciliation Report WO# 2002347

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2002347-01	A GP-1-5.7-9.7 *		26-Oct-20 13:15	Clear Glass Jar, 250mL	Solid	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Adequate Sample Volume?	✓		
Container Type Appropriate for Analysis(es)		✓	
Preservation Documented: Na2S2O3 Trizma None Other		✓	✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

Comments:
* Reconciled with container lid

Verifed by/Date: KS 11/02/20

Vista Analytical Laboratory

ANOMALY FORM

Vista Work Order 2002347

Initial/Date The following checked issues were noted during sample receipt and login:

Initial/Date		
	☐	**1. The samples were received out of temperature at (WI-PHT):** ______ Was Ice present: Yes No Melted Blue Ice
	☐	2. The Chain-of-Custody (CoC) was not relinquished properly.
	☐	3. The CoC did not include collection time(s). 00:00 will be used unless notified otherwise.
	☐	4. The sample(s) did not include a sample collection time. All or Sample Name: ______
	☐	5. A sample ID discrepancy was found. See the Reconciliation report. The CoC Sample ID will be used unless notified otherwise.
	☐	6. A sample date and/or time discrepancy was found. See the Reconciliation report. The CoC Sample date/time will be used unless notified otherwise.
	☐	**7. The CoC did not include a sample matrix. The following sample matrix will be used:** ______
	☐	**8. Insufficent volume received for analysis. All or Sample Name:** ______
	☐	9. The backup bottle was received broken. Sample Name: ______
	☐	**10. CoC not received, illegible or destroyed.**
	☐	**11. The sample(s) were received out of holding time. All or Sample Name:** ______
	☐	**12. The CoC did not include an analysis. All or Sample Name:** ______
	☐	**13. Sample(s) received without collection date. All or Sample Name:** ______
	☐	**14. Sample(s) not received. All or Sample Name:** ______
	☐	**15. Sample(s) received broken. All or Sample Name:** ______
KS 11/02/20	☑	**16. An incorrect container-type was used. All or Sample Name:** All
	☐	17. Other:

Bolded items require sign-off

Client Contacted: Yes, via email

Date of Contact: 11/02/2020

Vista Client Manager: KJR

Resolution: Client contacted in body of acknowledgement letter.

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 10-327

Company: Anchor QEA
Project Number: 202005-01.01
Project Name: ABC Recycling
Project Manager: Derek Ormerod
Sampled by: MH / DP

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total ~~MTCA~~ Metals PP Metals (6010C/7471A)	TCLP Metals	HEM (oil and grease) 1664A	Dioxin/furans	MS/MSD		HOLD	~~% Moisture~~ 2540G TOTAL SOLIDS
1	GP-2-8-9	10.26.20	1030	Soil	3			X	X					X	X					X			X				X
2	GP-2-14-20		1045		3			X	X					X	X					X			X			X	X
3	GP-2-25-27		1050		3			X	X					X	X					X			X				X
4	GP-1-~~10-12.3~~ 5.7-9.7		1315		3			X	X					X	X					X	X		X				X
5	GP-1-10-12.3		1320		3			X	X					X	X					X			X			X	X
6	GP-1-20-22		1330		3			X	X					X	X					X			X				X
7	GP-1-20-22-Dup		1331		3			X	X					X	X					X			X				X
8	GP-5-6.9-7.5		1515		3			X	X					X	X					X			X				X
9	GP-5-10-11		1525		3			X	X					X	X					X			X			X	X
10	GP-5-20-22	↓	1530	↓	3			X	X					X	X					X			X	X			X

	Signature	Company	Date	Time
Relinquished	[signature]	Anchor QEA	10/28/20	0820
Received	[signature]	Speedy	10-28-20	0820
Relinquished	[signature]	Speedy	10-28-20	0855
Received	[signature]	OSE	10/28/20	0855
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn
X-HOLD
~~Hold all samples pending further instructions.~~
(X) Added 10/28/2020. DB

Data Package: Standard ☐ Level III ☐ Level IV ☐
Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

OnSite Environmental Inc.

Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Company: Anchor QEA
Project Number: 202005-01.01
Project Name: ABC Recycling
Project Manager: Derek Ormerod
Sampled by: MH / DP

Turnaround Request (in working days) (Check One)

- ☐ Same Day ☐ 1 Day
- ☐ 2 Days ☐ 3 Days
- ☒ Standard (7 Days)
- ☐ ______ (other)

Laboratory Number: 10-327

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total ~~MTCA~~ Metals (6010C/7471A) PP Metals	TCLP Metals	HEM (oil and grease) 1664A	Dioxin/Furans	Diss. Metals (6010C/7470A) (PP Metals)	MS/MSD	HOLD	~~% Moisture~~ 2540G TOTAL SOLIDS
11	GP-6-10.8-15	10.26.20	1650	Soil	3			X	X					X	X					X			X				X
12	GP-6-GW	↓	1750	GW	11			X	X					X	X								X	X			
13	GP-4-7.8-8.7	10.27.20	1020	Soil	3			X	X					X	X					X			X				X
14	GP-4-15-18.7		1030		3			X	X					X	X					X			X				X
15	GP-3-12.7-13.4		1205		3			X	X					X	X					X			X			X	X
16	GP-3-14.4-15.9		1215	↓	3			X	X					X	X					X			X				X
17	GP-3-GW		1315	GW	23			X	X					X	X					~~X~~			X	X	X		
18	GP-3-GW-Dup	↓	1320	↓	11			X	X					X	X					~~X~~			X	X			
19	TB-201026	10.26.20	1015	W	2			X																			

	Signature	Company	Date	Time
Relinquished	[signature]	Anchor QEA	10/28/20	0820
Received	[signature]	Speedy	10-28-20	0820
Relinquished	[signature]	Speedy	10-28-20	0855
Received	[signature]	OSE	10/28/20	0855
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

Sample/Cooler Receipt and Acceptance Checklist

Client: ANC

Client Project Name/Number: 202005-01.01

OnSite Project Number: 10-327

Initiated by: [illegible]

Date Initiated: 10/28/20

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	No	N/A	1 2 3 4
1.2 Were the custody seals intact?	Yes	No	N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	Yes	No	N/A	1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	No	N/A	Temperature: 2,3,3,4
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	N/A		
1.7 How were the samples delivered?	Client	Courier	UPS/FedEx	OSE Pickup / Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	Yes	No	1 2 3 4
2.2 Was the COC legible and written in permanent ink?	Yes	No	1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	Yes	No	1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	Yes	No	1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	Yes	No	1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	Yes	No	1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	No		1 2 3 4
3.2 Were any sample labels missing or illegible?	Yes	No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	Yes	No		1 2 3 4
3.4 Have the samples been correctly preserved?	Yes	No	N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	Yes	No	N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	Yes	No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	No		1 2 3 4
3.8 Was method 5035A used?	Yes	No	N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#	2	N/A	1 2 3 4

Explain any discrepancies:

3.4) 1/2L ambers unpreserved

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed

//SERVER\OSE\Administration\forms\cooler_checklist.xls

The maintenance standards in this appendix section are intended to be used by the property owners for determining inspection and maintenance actions. They are not standards of the facility's required condition between inspections. It is understood that conditions are variable with weather and vegetative debris and conditions between inspections and/or maintenance do not constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance schedules shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance.

Inspector: ___________________________

Date: ___________________________

Location: 741 Marine Dr, Bellingham, WA

Date of Last Inspection: ___________________________

Amount of Rainfall Since Last Inspection: ___________________________

Facilities to Inspect: Stormwater Detention Pond, Catch Basin

Abbreviated Checklist. See following tables for additional information and maintenance procedures
Circle one

Stormwater Detention Pond and Structure

- Trash or oil sheen present on surface? YES NO
- Dead or dying trees? YES NO
- Beaver dams? YES NO
- Erosion of side slopes? YES NO
- Structural damage to control structure? YES NO
- Rodent Evidence? YES NO
- Do reedy marsh plants (cattails) compose more than 10% of the stormwater treatment wetland cover? YES NO

  If so, schedule for removal _____________

Catch Basin

- Sediment present in Catch Basin? YES NO Depth of Sediment? ________________

Table V-A.1: Maintenance Standards - Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 1 cubic feet per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance and inspection access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g.,rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.

Table V-A.1: Maintenance Standards - Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Liner (if Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Ponds Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation If settlement is apparent, measure berm to determine amount of settlement Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Emergency Overflow/Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See "Side Slopes of Pond"	

Table V-A.11: Maintenance Standards - Wetponds

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Water level	First cell is empty, doesn't hold water.	Line the first cell to maintain at least 4 feet of water. Although the second cell may drain, the first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.
	Trash and Debris	Accumulation that exceeds 1 CF per 1000-SF of pond area.	Trash and debris removed from pond.
	Inlet/Outlet Pipe	Inlet/Outlet pipe clogged with sediment and/or debris material.	No clogging or blockage in the inlet and outlet piping.
	Sediment Accumulation in Pond Bottom	Sediment accumulations in pond bottom that exceeds the depth of sediment zone plus 6-inches, usually in the first cell.	Sediment removed from pond bottom.
	Oil Sheen on Water	Prevalent and visible oil sheen.	Oil removed from water using oil-absorbent pads or vactor truck. Source of oil located and corrected. If chronic low levels of oil persist, plant wetland plants such as Juncus effusus (soft rush) which can uptake small concentrations of oil.
	Erosion	Erosion of the pond's side slopes and/or scouring of the pond bottom, that exceeds 6-inches, or where continued erosion is prevalent.	Slopes stabilized using proper erosion control measures and repair methods.
	Settlement of Pond Dike/Berm	Any part of these components that has settled 4-inches or lower than the design elevation, or inspector determines dike/berm is unsound.	Dike/berm is repaired to specifications.

	Internal Berm	Berm dividing cells should be level.	Berm surface is leveled so that water flows evenly over entire length of berm.
	Overflow Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks replaced to specifications.

Table V-A.4: Maintenance Standards - Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)
Catch Basin	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.

WAVEIONICS™

BY

WATERTECTONICS

WT-XXXXX ABC Recycling – Bellingham Shredder 100 GPM Stormwater Treatment System

Operation and Maintenance Manual

Document # XXXXX

Rev	Description	Date
0	SAMPLE DRAFT	10/3/2023

Table of Contents

1. Safety Information

Read this entire manual before operating this equipment. Pay attention to all danger, warning, and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure that the safety and protection mechanisms designed into this equipment are not impaired, do not use or install this equipment in any manner other than that specified in this manual.

NOTE: The following general safety instructions are not all-inclusive. This manual cannot cover every conceivable situation. WaterTectonics recommends that the system owner develop a comprehensive set of safety protocols tailored specifically to the owner's situation.

1.1 Operational Safeguards

This system uses voltages that are high enough to seriously harm a human being. **Disconnect power before servicing any electrical components.** The system is equipped with an external power disconnect to provide a single point for power management.

Exercise caution at all times while working on the system. **Do NOT disconnect or reconnect pipes, hoses, components, or cables while the system is operating.**

This system operates under pressure. **Improper use, such as dead-heading pumps, can produce even higher pressures that could compromise operator safety and damage equipment.**

At any point, the process water, that is, water moving through the system and being treated by the system, may contain chemical substances that are hazardous to human and animal health. **Do NOT regard process water as clean or safe.**

- Catch all water from sample, drain, and vent valves and return it to the Source Tank or dispose of as hazardous waste.
- Walk the system regularly and look for broken or leaking pipes, components, and tanks. Repair immediately.
- Always wear personal protective equipment when removing components from the system for cleaning, calibration, servicing, or replacement. This means at least chemical-resistant eye and face protection, gloves, and apron.

1.2 Safety Notations and Symbols

The following notations and symbols emphasize important safety information in this manual:

- **DANGER:** Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
- **WARNING:** Indicates a potentially hazardous situation that may result in minor or moderate injury.
- **NOTE:** Information that requires special attention.

2. Chemicals

Four different chemicals are required for effective use of the Allied Recycling Water Treatment System.

TABLE 1: REQUIRED CHEMICALS

Chemical	Where Used	Used For	Pump Tag	Pump Name
NaOH (Sodium Hydroxide)	Caustic Drum (T-Caus)	pH raising, necessary for precipitating dissolved metals.	P-Caus	Caustic Pump
Polymer	Polymer Drum (T-Poly)	Coagulation, brings the suspended particles together into larger, heavier masses of solids called floc.	P-Poly	Polymer Pump
NaCl (Sodium Chloride)	Brine Tank (T-Brine)	Increases downstream conductivity.	P-Brine	Brine Pump
CO_2	CO_2 Dewar Tank	Used as a pH reduction agent.	N/A	N/A

DANGER: Many of these chemicals can have an adverse effect on health and/or the environment. Read the chemical manufacturers' safety data sheets for safe handling, emergency, and spill cleanup instructions. **Always wear personal protective equipment, such as chemical-resistant eye and face coverings, apron, and gloves, when handling these chemicals.**

3. Terminology

The following table explains the terminology used in this document.

Term	Definition
AAC	Amperage alternating current (AC)
ADC	Amperage direct current (DC)
Air-locking	Occurs when there is more air than water on the suction side of a pump. May cause damage to the pump if not corrected.
Cavitation	Occurs when the pressure at the suction side of a pump is low enough for air bubbles to form. Can lead to air-locking of the pump if not corrected.
Coagulation	During the coagulation process, a chemical coagulant is added to water and its chemical charge neutralizes the chemical charge of suspended contaminants. This causes suspended particles to bind together into aggregations that are more easily removed from the water.
CO2	Carbon dioxide, a weak acid used for pH adjustment.
Dead-heading	Occurs when flow is obstructed or restricted on the discharge side of the pump. May cause damage to the pump if not corrected.
EC	Electrocoagulation
Flocculation	Flocculation continues the process of removing suspended particles begun by coagulation. A chemical flocculant is added, and a mixer causes movement, both of which result in suspended particles binding together into aggregations called floc that are large enough to settle out of the water.
gpm	Gallons per Minute
HMI	Human Machine Interface, the system touchscreen
hp	Horsepower, a measurement of power.
H2S	Hydrogen sulfide
NTU	Nephelometric turbidity units, a measure of water clarity.
MF	Media filter
PID	Proportional-integral-derivative controller, a control loop mechanism.
pH	Potential Hydrogen - pH is a logarithmic scale based on the concentration of hydrogen ions in a water-based solution. It is used to specify how acidic or basic the solution is. Solutions with a pH of less than 7 are acidic. Solutions with a pH of greater than 7 are basic or alkaline. Neutral solutions have a pH of 7.
PLC	Programmable Logic Controller
psi	Pounds per Square Inch

PSV	Pressure sustaining valve
VAC	Volts Alternating Current
VDC	Volts Direct Current
VFD	Variable frequency drive
Volts	Used in context, usually means VDC.
µS	Microsiemens, a measure of conductivity.

4. Introduction

This manual contains instructions for the operation and maintenance of the Water Treatment System. The intended audience for this document includes trained operators, technicians, and WaterTectonics personnel.

4.1 System Description

Much of system operation is automated. The Programmable Logic Controller (PLC), located in the Main Control Panel (MCP), controls the operation of pumps, electrically actuated valves and other equipment. Readings transmitted from instruments such as chemical sensors and water level, pressure, and flow transmitters provide feedback to the PLC. The PLC compares the instrument readings to setpoints and controls the action of interlocked components according to its programming. The PLC will generate an alarm when a fault or other situation requires operator attention. Setpoints can be changed at the Human Machine Interface (HMI), located on the MCP door. All components are labelled for ease of location and identification. Tag numbers are noted in the text.

4.2 Treatment Train

4.2.1 Electrocoagulation Treatment Flow and System Triggers

The system is designed to manage multiple EC subsystems with expansion capacity for additional subsystems. Each subsystem consists of three EC cells. Supply pumps move raw water through the EC cells into a solids separation stage. The charged contaminants in the water combine with the cations entering the solution from the sacrificial anodes and begin the coagulation process.

The EC stage is activated by a level transmitter located in the source tank. This transmitter measures the water depth by measuring the water pressure in the source tank. The transmitter sends a signal to the control system, which converts the signal to a level in inches. The control system activates the EC stage when the source tank level is greater than the ON setpoint programmed into the control software. The control system puts the EC stage in standby when the source tank level transmitter signal falls below the OFF setpoint.

When the source tank level transmitter signal activates the EC stage, the automated control system completes several actions including:

- Reading the number of EC cell subsystems to utilize at the programmed ON setpoint.
- Activating the EC supply pump.
- Matching the supply pump flow to the subsystem flow capacity.

The control system software has a number of features that allow the operator to monitor system performance and water quality while keeping operator involvement in the treatment process to a minimum. Refer to Section 8 Using the HMI Pages on page 31 for more information.

Warning: Use caution when programming the ON and OFF setpoints on the HMI. Always ensure all pumps are operating with an adequate supply of water. Incorrectly programming the setpoints may cause the pumps to run dry, resulting in serious damage to the pumps.

The clearwell tank is the final tank in the settling and separation stage. The clearwell tank serves as the water source for the media filter stage. When the clearwell tank level transmitter signal activates the media filter stage, the automated control system completes several actions including:

- Calling the media filter supply pump.
- Activating the air compressor.
- Supplying power to the automatic filter controller.

The control system puts the media filter supply pump in standby when the clearwell tank level transmitter signal falls below the OFF setpoint.

The system also features protections such as a high high alarm that will put the EC supply pump in standby if the clearwell tank level rises above a programmed setpoint. The programmable high high alarm prevents the clearwell tank from overflowing.

Both the EC and media filter stages have dedicated flowmeters. The operator can read the system flow rates on the flowmeter displays or on the HMI.

4.2.2 Media Filter

The media filter pump is used to push water through the media filter. The media filter contains four pods and a control panel. Media filter size is determined by influent flow rates and pressure according to media filter specifications. Each pod holds a media bed consisting of inert, uniform crushed glass filter media above a layer of crushed rock. Media size and quantities are determined by media filter size and site-specific influent water conditions.

Figure 1: Example Media Filter

The media filter requires periodic backflushing (reversing the flow in each of the pods individually) to remove filtered sediment and debris from the media bed. Backflushing can be manual, timed, or automatic. The automatic backflush feature is based on the pressure differential between the influent and effluent sides of the media filter.

The operator can initiate a manual backflush and configure certain settings, such as backflush timing, using the automatic filter controller mounted to the media filter.

Note: Periodic backflushing is essential for system performance and maintaining treatment flows. For detailed filter operating instructions, refer to the media filter manufacturer’s manual.

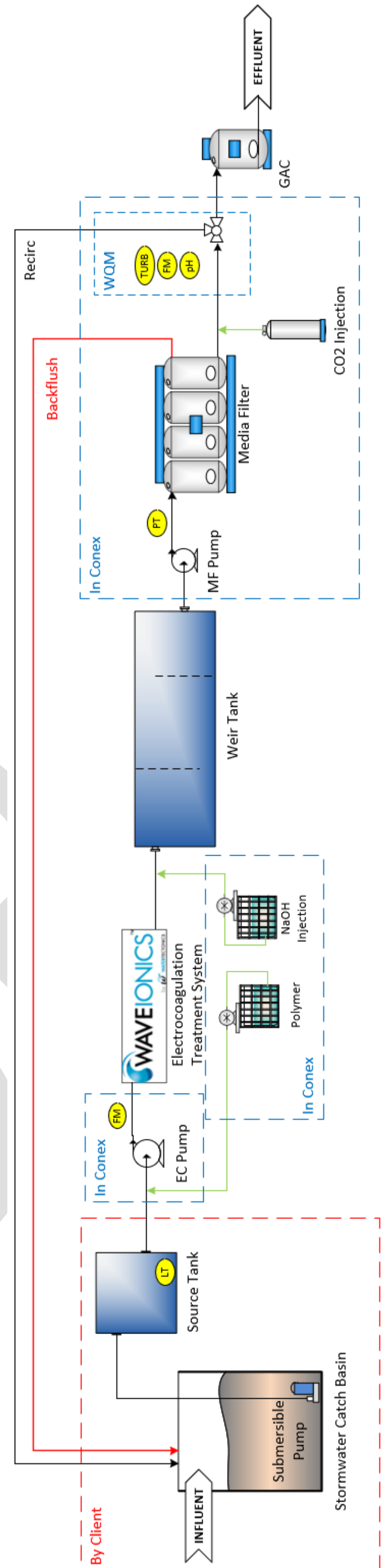
4.2.3 Coagulated Substance Management

The settling stage consists of multiple settling tanks. Coagulated solids will join together and increase in size until they either float to the top or fall to the bottom of the tank. After a period of operation the settling tanks need to be drained and cleaned. The sludge is then disposed of in the nearest licensed waste disposal facility.

4.2.4 Water Quality

The Allied Recycling system uses a series of in-line water quality probes to measure influent and effluent water quality characteristics in real time. Monitored water characteristics include pH, conductivity, and turbidity. The system actively manages chemical injection into the treatment train to maintain conductivity and pH within programmable limits. Water that does not meet the discharge quality criteria is recirculated back within the system.

4.3 System Diagram



5. System Power

The Allied Recycling system requires a 480 VAC, 3-phase, 200 Amp service at the treatment site.

6. System Components

This section describes components of the WaterTectonics Water Treatment System.

6.1 Source Pump

The source pump moves water from the source vault to the EC Cells. A level transmitter sends a signal to the system to start the source pump once the water level reaches a certain height.

The source pump controls are integrated into the PLC/HMI software. A disconnect for the source pump is provided on the outside of the conex.

Figure 2: Source Pump Disconnect

6.2 EC Supply Pump

A 480 V 3-phase flooded suction centrifugal pump moves water through the EC stage. The pump is controlled by the EC PUMP switch on the control cabinet door. The operator can select from HAND (Manual), OFF, and AUTO operation.

Figure 3: EC Supply Pump

6.3 Electrocoagulation System

Electrocoagulation consists of channeling contaminated water between closely spaced metal plates with a direct current applied across them. The electric current changes the surface charge of particles in the water, which allows suspended contaminants to form agglomerations that are more easily removed by later stages of the water treatment process.

6.3.1 EC Cells

The system's six EC Treatment Cells are each comprised of a cell housing, a stack of consumable metal plates, a Flow Valve, two Isolation Valves, a Temperature Switch, a Vent Valve, and a Drain Valve.

The EC Treatment Cells are divided into three subsystems, each with its own power supply in the Main Control Panel.

When an EC Treatment Cell is supplied with electricity, the metal plates become charged, metal ions are released into the water and react with contaminants suspended in the water, making it much easier for them to coagulate and precipitate out during the clarification phase of the water treatment process.

Figure 4: EC Treatment Cell

Charging the metal plates produces heat that can damage other parts of the system. The purpose of the Temperature Switches is to alert the PLC to when water temperature in an EC Treatment Cell reaches the pre-programmed high setpoint. In that event, the PLC will close the EC Flow Valves to both the EC Treatment Cells in the subsystem that includes the affected EC Treatment Cell, and cut power to that EC subsystem. Overheating is typically caused by low flow of water through the EC Treatment Cell. The cause of the low flow must be corrected before that EC subsystem can be restarted.

Over time, the metal plates in the EC Treatment Cells are consumed by the electrocoagulation process. This reduces the effectiveness of the EC Treatment Cells to the point where replacement of the metal plate assembly is recommended. Contact WaterTectonics to order replacements.

For information on inspecting and cleaning EC Treatment Cells, and replacing the metal plate assembly, refer to *Section 13.3 Inspecting, Cleaning and Replacing EC Cells on Page 67* for instructions.

WARNING: To avoid releasing pressurized water into the Conex, do NOT disconnect any vent line unless the EC is shut down and the EC Treatment Cell has been isolated by closing both the cell Isolation Valves.

6.3.2 EC Treatment Cell Influent Isolation Valves

Each EC Treatment Cell has two Influent Isolation Valves. During operation, these hand-operated, 2-inch ball valves should remain open to allow water into the EC Treatment Cell. They also act as backups for the electrically actuated EC Flow Valves. Closing both the Influent and Effluent Isolation Valves isolates the individual EC Treatment Cell from the water stream when servicing or replacement of the metal plate assembly is necessary.

Figure 5: EC Treatment Cell Influent Isolation Valves

6.3.3 EC Treatment Cell Flow Valves

The EC Treatment Cell Flow Valves are 2-inch, 2-port, electrically actuated Jandy 4716 valves. When the EC Treatment Cell Flow Valves are open, water enters the EC Treatment Cell. If an EC subsystem is OFF, the associated cells' valves also close to prevent untreated water from flowing through that subsystem. These valves also prevent water from siphoning through the EC stage of the system when no EC subsystems are operating.

If an EC cell overheats, that entire EC subsystem is turned off because all the cells in a subsystem are electrically connected in series. The same is true hydraulically; all the Jandy valves in a subsystem are wired together.

Figure 6: EC Treatment Cell Flow Valve

6.3.4 EC Vent Valves

When the metal plates in the EC Treatment Cells become charged, hydrogen gas are released from the water. Each EC Treatment Cell has an air vent that allows hydrogen gas and air to escape, and the cell to fill with water following replacement of the metal plate assembly.

Figure 7: EC Vent Valve

6.3.5 EC Temperature Switches

All the EC Treatment Cells are equipped with Temperature Switches. Temperature Switch readings are monitored by the PLC. If a Temperature Switch returns a reading above 140° F for a pre-programmed length of time (typically 30 seconds), the PLC will turn off that EC subsystem. If only one EC subsystem was running, the PLC will also stop the EC pump to protect the piping and pump from an over-temperature/over-pressure situation.

Figure 8: EC Temperature Switch

6.3.6 EC Drain Valves

Each EC Treatment Cell has a Drain Valve. The EC Drain valves are 1/2-inch ball valves that are used to drain the EC treatment cells for maintenance or replacement of the metal plate assemblies.

Figure 9: EC Drain Valve

6.3.7 EC Effluent Valves

Each EC Treatment Cell has an Effluent Valve. These 2-inch ball valves allow water to exit the EC Treatment Cell and continue on to the Clarification Section of the water treatment system.

Figure 10: EC Effluent Valve

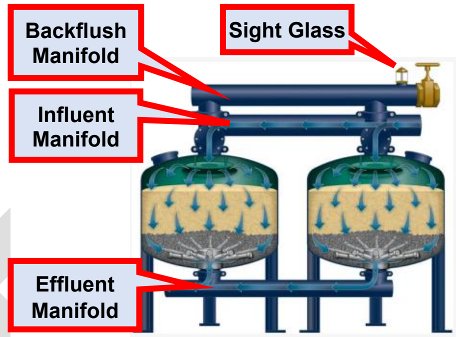
6.4 Media Filter Supply Pump

A 480 V 3-phase flooded suction centrifugal pump pushes water from the clearwell tank through the media filter. The clearwell tank is the final settling tank. The control for the media filter supply pump is located on the control cabinet door.

Figure 11: Media Filter Supply Pump

6.5 Media Filter (MF) and Components

Water is pumped by the MF Pump into the Media Filter (MF) from the Clearwell Tank. The media filter includes four filter vessels. Each filter vessel holds a filtration media bed consisting of a layer of crushed rock and a layer of silica sand.



Water typically flows into each filter vessel from the influent manifold (located above the row of filter vessels), through each filter vessel's three-way valve, and down through the filtration media. Contaminants adhere to the filtration media and the filtered water exits the filter vessels to an effluent manifold, which is located below the row of filter vessels. At the end of the effluent manifold, a pressure sustaining valve (PSV) maintains a constant operating pressure (typically 35-40 psi) inside the filter vessels during backflushing.

When the filter vessels are first filled with water, such as during startup or after the filtration media has been replaced, air vent valves are opened to allow the incoming water to displace as much air as possible. The air vent valves are then closed once the filter vessels are filled and operation begins.

Periodic backflushing to remove filtered sediment and debris from the filtration media is essential for system performance and maintaining treatment flows. The backflush process is managed by the media filter's control panel using user-configurable settings.

Filter vessels are backflushed one at a time in sequence for a specific length of time. Backflushing can be manual, timed, or automatic. The automatic backflush feature is based on the pressure differential between the influent and effluent sides of the filter. Typically, the controller is set to initiate an automatic backflush when the pressure differential reaches 10 psid. If manual backflushing is required, refer to *Section 13.4.1 Performing a Manual Backflush on Page 68* for instructions.

During backflushing, the solenoid valve for the backflushing filter vessel is opened by the controller to allow pressurized air from the air compressor to move a plunger inside that filter vessel's three-way valve. The three-way valve is designed and positioned so that the plunger shuts off inflow from the influent manifold to only the backflushing filter vessel, and opens outflow to the backflush manifold for only the backflushing filter vessel. The backflush manifold is also located above the row of filter vessels.

Water flowing into the effluent manifold from the other filter vessels that are not being backflushed then seeks the path of least resistance, which is the lower pressure in the backflushing filter vessel. The water moves up through the backflushing filter vessel, lifting contaminants from the filtration media and passes out through the outlet port of the three-way valve and into the backflush manifold. If filtration media accumulates in the sight glass at the end of the backflush manifold, this indicates backflush pressure is too high. Backflush pressure can be lowered by opening the backflush valve slightly.

The filtration media is a consumable and must be replaced periodically. When backflushing no longer lowers the differential pressure sufficiently, does so only for a short period, or when water turbidity remains high.

6.5.1 MF Filter Control Panel

The Media Filter Control Panel is used to configure pressure settings, backflush timing, and to initiate manual backflushes.

NOTE: Any configuration changes must be saved either to local memory or to a USB drive or they will be lost if there is a power outage, or the control panel is reset.

Figure 12: Media Filter Control Panel

6.5.2 MF Filter Pressure Gauges

The MF is equipped with two Pressure Gauges. The MF Influent Pressure Gauge (PI-201) shows the pressure of water flow as it goes into the MF and the MF Effluent Pressure Gauge (PI-202) shows the pressure of the water flow as it exits the MF. The difference between the influent and the effluent pressure is shown by the pressure differential indicator.

Figure 13: Media Filter Pressure Gauges

6.5.3 MF Pressure Differential Indicator

Located underneath the MF Control Panel, the Pressure Differential Indicator (PD-201) shows the difference between the pressure of the water going into the MF and the pressure of the water as it exits the MF. When the Pressure Differential Indicator shows a 10 psid pressure drop between these two pressures, a backflush cycle is initiated if the backflush cycle is set to Pressure Differential AUTO.

Figure 14: Media Filter Pressure Differential Indicator

6.5.4 MF Backflush Solenoid Valves

Located on the sides of the MF Control Panel, the four Backflush Solenoid Valves provide air to the Three-Way Valve actuator to change the direction of water flow for backflushing. The Backflush Solenoid Valves are closed during the MF filtration cycle. When a backflush is initiated, the Backflush Solenoid Valve for the filter vessel being backflushed opens and fills the Three-Way Valve actuator cavity with air. The increased pressure forces a plunger to seal off the inlet port of the Three-Way Valve, preventing water from entering the filter vessel from the MF inlet manifold. At the same time, the Three-Way Valve outlet port is opened, which allows water to exit the filter vessel into the backflush manifold. The Backflush Solenoid Valves can also be opened manually to perform a manual backflush. Manual backflushing is NOT recommended unless there is a serious and immediate problem. This is because doing so can disrupt the pre-programmed backflushing sequence.

Figure 15: Media Filter Solenoid Valves

6.5.5 MF Three-Way Valves

Each of the MF filter vessels is fitted with a Three-Way Valve. During normal operation, water flows from the inlet manifold down into each filter vessel through the inlet port of its Three-Way Valve. During a backflush cycle, the inlet port is closed, and the outlet port opens when air fills the actuator, and the increased pressure changes the position of a plunger inside the Three-Way Valve.

Figure 16: Three-Way Valve

6.5.6 MF Vent Valves

The Media Filter Vent Valves are used to vent air from the MF filter vessels during initial startup or after the filtration media has been changed.

Figure 17: Media Filter Vent Valve

6.5.7 MF Sight Glass

When the backflush flowrate is being set, if sand accumulates in the Sight Glass (SG-231), the backflush flowrate should be lowered using the Backflush Restrictor Valve. Any accumulated sand should clear out of the Sight Glass once water is flowing at the correct flowrate. If regular flow does not clear the Sight Glass and a large amount of sand has accumulated, stop the system, unscrew the bolt, remove the Sight Glass, empty the sand, and replace the Sight Glass.

Figure 18: Media Filter Sight Glass

6.5.8 MF Backflush Restrictor Valve

The Backflush Restrictor Valve on the end of the MF backflush manifold regulates the flowrate of backflush water into the backflush hose. The Backflush Restrictor Valve is a gate valve encased in a padlocked cover. During commissioning, the amount the Backflush Restrictor Valve is open is adjusted so that the backflush flowrate is not so great that it removes sand from the filter vessels.

Figure 19: Media Filter Backflush Restrictor Valve

6.5.9 MF Pressure Sustaining Valve

Located below the filter vessel at the effluent end of the MF, the 4-inch, Nelson 800 series Pressure Sustaining Valve is a hydraulic, sleeve-type valve with a pressure controller. When the set knob on top of the Nelson valve is set to AUTO, the pressure controller will automatically sustain the upstream pressure on the valve to maintain the correct operating pressure in the MF. The valve is closed at 35-40 psi, the typical MF operating pressure, and opens at pressures above 35-40 psi to release enough water to maintain operating pressure.

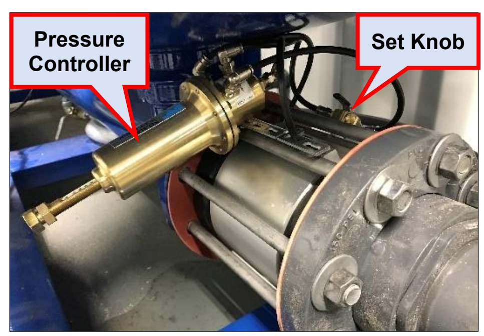


Figure 20: Media Filter Pressure Sustaining Valve

The pressure can be changed by turning the set bolt on the end of the pressure controller until the desired pressure marked on the set bolt's calibration scale is flush against the bottom of the pressure controller housing.

The Pressure Sustaining Valve is mostly closed during an MF backflush cycle to allow most of the water to flow out the Backflush Restrictor Valve and into the backflush hose.

6.5.10 Media Filter Air Compressor

The Air Compressor runs the Media Filter's air-actuated Three-Way Valves.

Adjust the pressure to the Three-Way Valves' operating pressure, which is typically 70 psi, by turning the Air Compressor's pressure regulator knob clockwise to increase the pressure and counterclockwise to decrease the pressure. Use the Air Compressor's built-in pressure gauge to see when the correct pressure is reached.

Figure 21: Air Compressor

6.6 GAC Filter

The GAC (granular activated carbon) filtration contains a GAC vessel for COD (Chemical Oxygen Demand) removal.

The GAC Filter has its own air vent, drain valve, sample port, pressure indicators and pressure transmitters. These components will be detailed below.

6.6.1 GAC Filter

The GAC Filter vessel is used for COD (Chemical Oxygen Demand) removal.

6.6.2 Air Vent

The GAC filter vessel has its own air vent that is used to vent trapped air from the filter.

6.6.3 Drain

The GAC Filter Vessel has a manually operated ball valve drain port for draining water from the filter and for maintenance purposes.

6.6.4 Sample Port

The GAC Filter Vessel has a manually operated ball valve sample port that is used to sample water after it exits the filter.

6.6.5 Pressure Indicators

The GAC Filter Vessel has a pressure indicator that allows for viewing of the line pressure as water passes through the filter.

Figure 22: GAC Pressure Indicator

6.6.6 Pressure Transmitters

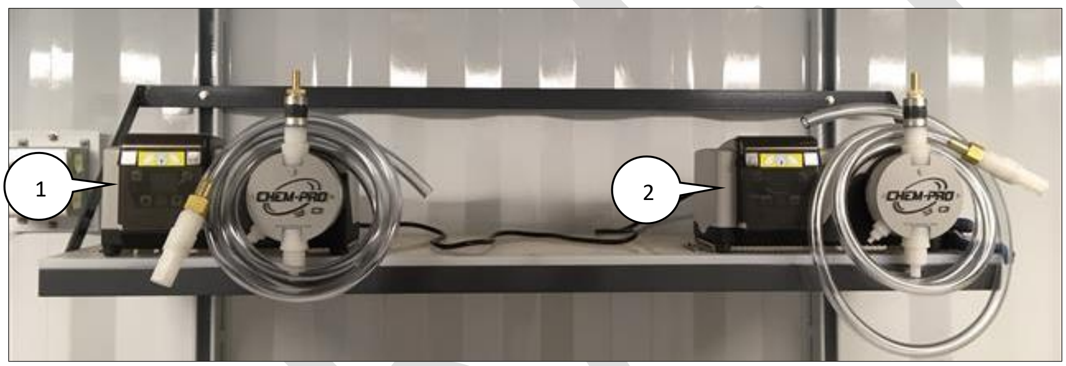
The GAC Filter Pressure Transmitters measure the pressure before and after the vessel. The differential pressure across the GAC vessel is defined as the pressure reading from PT-104 minus the pressure reading from PT-301, measured in PSI. The GAC filter pressure differential tag will be PD-301.

High pressure differential in the GAC indicates the vessel is loaded up and needs maintenance. A high-pressure differential triggers a warning and a high-high triggers an error, causing the Media Filter Pump to shutoff.

Figure 23: GACl Pressure Transmitter

6.7 Caustic Injection Pump

The caustic injection pump (P-CAUS) uses a diaphragm pump to inject caustic soda into the treatment water. The pump is controlled by the CAUSTIC Pump switch on the control cabinet door. Set the switch to the AUTO position to enable the caustic pump. Automatic operation is controlled by feedback from a programmable pH setpoint in the sc1000.



1 – Brine Injection Pump	**2 – Caustic Injection Pump**

Figure 24: Example Chemical Injection Pumps

6.8 Brine Injection Pump

The brine injection pump (P-BRINE) uses a diaphragm pump to inject brine into the treatment water. The pump is controlled by the BRINE Pump switch on the control cabinet door. Set the switch to the AUTO position to enable the brine pump. Automatic operation is controlled by feedback from a programmable conductivity setpoint in the sc1000. The brine injection pump is the same model as the caustic injection pump shown in Figure 22.

6.9 Polymer Injection Pump

The Polymer injection pump (P-POLY) uses a diaphragm pump to inject polymer into the treatment water. The pump is controlled by the Polymer Pump switch on the control cabinet door. Set the switch to the AUTO position to enable the polymer pump. Automatic operation is controlled by feedback from a programmable conductivity setpoint in the sc1000. The polymer injection pump is the same model as the caustic and brine injection pumps shown in Figure 22.

6.10 Caustic Drum

Caustic (sodium hydroxide) is stored in a 55-gallon chemical drum. There are no level sensors in the drums so the operator must monitor the level of caustic chemical. A PVC hose supplies the Caustic Injection Pump (P-CAUS) with chemical to pump to the Caustic Injection Quills for injection into the water flow.

Figure 25: Caustic Drum

6.11 Polymer Drum

Polymer is stored in a 55-gallon chemical drum. There are no level sensors in the drums so the operator must monitor the level of polymer chemical. A PVC hose supplies the Polymer Chemical Pump (P-Poly) with chemical to pump to the Polymer Injection Quills for injection into the water flow.

Figure 26: Polymer Drum

6.12 Brine Tank

Brine is stored in a 250-gallon Chemical Tote (T-Brine). It's made by adding salt to process water that flows back into the tote using a manual valve.

Figure 27: Brine Tank

6.13 Conductivity Probe

This probe measures the influent water conductivity. The sc1000 monitors the probe output using a proprietary digital bus and displays the conductivity of the water. The sc1000 uses the conductivity probe reading to turn the outlet for the pump on or off. Water conductivity can also serve as a useful piece of information for system troubleshooting.

Warning: Do not store the conductivity probe at temperatures below 15 °F.

Note: Refer to the *GLI 3700sc Digital Inductive Conductivity Sensor User Manual* for maintenance, cleaning, and calibration schedules and procedures.

Figure 28: Conductivity Probe

6.14 EC Power Supplies

Three power supplies, located in the control cabinet, provide power to the EC cells. More power supplies can be added for system expansion.

DANGER: Do not attempt to service, configure, or repair any power-related equipment in the system. Only qualified WaterTectonics personnel should service any equipment in the electrical control cabinet.

Figure 29: Hach sc1000 Controller

Hach sc1000 Controller

The Hach sc1000 is a multiparameter controller that contains a display module and probe connections. The controller monitors the water pH level, conductivity, and turbidity in real time and provides decisive switching between effluent recirculation and discharge. The controller also manages the introduction of all chemicals into the process streams.

Water quality data is digitally read on the sc1000. The operator can configure the sc1000 display using the touch screen controls to show multiple combinations of desired parameters.

Figure 31: Hach sc1000 Controller

6.15 Human Machine Interface (HMI)

Located on the system control panel door, the Human Machine Interface (HMI) is the main system control interface.

Figure 32: HMI Touchscreen

6.16 Programmable Logic Controller (PLC)

The Siemens PLC is the primary system controller. The device monitors electrical feedback circuits and provides system control signals.

Figure 33: PLC

Electrical inputs include control panel switches, level transmitters, valve position, flowmeter readings, pump status, EC stage power supply amperage, EC stage power supply voltage, cell over-temperature status, and other inputs. Control signals include pump call, EC stage power supply amperage, and other control signals.

6.17 Uninterruptable Power Supply

There is an Uninterruptable Power Supply (UPS) located inside the control cabinet. In the event of a power failure, it is used to close the EC isolation valve (V-EC). Closing the valve prevents siphoning through the systems. The UPS is controlled by the PLC, which powers up the UPS when power is restored to the system.

Figure 34: Uninterruptable Power Supply

6.18 Variable Frequency Drive (VFD)

The system features two VFDs located in the control cabinet that drive the EC and MF supply pumps. The VFDs provide a soft start function that reduces the current and torque peaks experienced by the pumps during startup. The VFD functions reduce water hammer, reduce overall pressure in the system, and reduce overall power consumption.

Figure 35: VFD

The EC supply pump VFD regulates the flow rate and dynamically adjusts the rate based on the number of EC subsystems in operation. The VFD uses a closed-loop proportional-integral-derivative controller (PID) loop. The flow rate per subsystem information is available in the following table.

Number of EC Subsystems	Flow Rate
1	100 gpm
2	200 gpm
3	300 gpm

6.19 Flowmeters

The flowmeters monitor both the influent and effluent flow rate and communicate the information to the HMI. They also feature digital displays showing real-time flow rate information. The operator can use flowmeter readings to gauge system performance, alert them to a system problem, and record discharge totals for regulatory purposes.

For additional information about the flowmeters, settings, display options, and calibration procedures, refer to the manufacturer's documentation.

Figure 36: Flowmeter

6.20 pH Probe

There are two pH probes for water quality monitoring in the following locations:

- The first pH probe located in the Clearwell Tank measures the water pH in the pre-treatment system. The sc1000 sends control signals that control the caustic injection rate based on this pH reading.
- The second pH probe measures the water pH after the media filter. The sc1000 sends control signals that control the CO2 injection solenoid based on this pH probe reading. The CO2 injection rate is controlled by adjusting the pressure regulator on the CO2 tank.

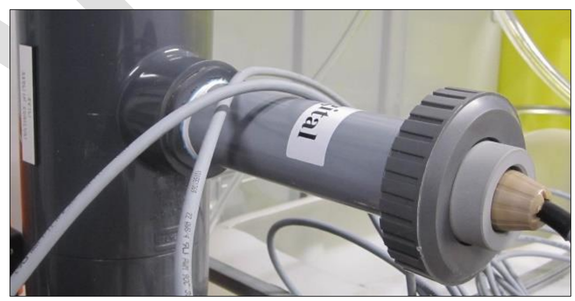


Figure 37: pH Probe

The probe output is monitored by the sc1000 using a proprietary digital bus. The sc1000 sends control signals that open or close valves to direct water to discharge or recirculate the water through the treatment train based on the second pH probe reading.

Warning: Do not store the pH probes at temperatures below 40 °F.

6.21 Turbidity Probe

A turbidity probe is used to measure the clarity of the water exiting the media filter. The probe output is monitored by the sc1000 using a proprietary digital bus. The sc1000 sends control signals that open or close valves to direct water to discharge or recirculate the water through the treatment train based on the turbidity probe reading.

Figure 38: Turbidity Probe

6.22 Emergency Stop

When activated, the fail-safe emergency stop (E-Stop) turns off power to all rotating devices, all motor loads, the EC treatment equipment, and closes the motorized cell isolation valves. Other items such as lighting and the HMI remain powered. There is an internal E-Stop button on the control cabinet door.

To reset the E-Stop, first rotate the button clockwise. Then press the E-STOP RESET button.

Figure 39: Emergency Stop

6.23 System Disconnect

The system power disconnect is a lever on the right side of a power box on the conex exterior. To disconnect all power to the system, pull the lever downward to the locked position. Follow all company lockout/tagout procedures prior to performing any electrical service or maintenance.

Figure 40: System Disconnect

6.24 Wireless Modem

The wireless modem and Tosibox Lock 200 provide a connection to the Internet for remote monitoring and maintenance.

Figure 41: Wireless Modem

Figure 42: Tosibox Lock 200

6.25 Unmanaged Ethernet Switch

The Ethernet switch facilitates communication between the HMI, PLC, sc1000, and wireless modem.

Figure 43: Unmanaged Ethernet Switch

7. External Components

This section describes components outside the Conex, that work with and are integral parts of the treatment train.

7.1 Source Tank

The Client Supplied source pump moves water from the stormwater catch basin to the Source Tank. The EC Pump pulls water from the Source Tank to the system.

7.2 Clarification Tank

The purpose of the Clarification Tank is to allow time for flocculation of coagulated solids into larger aggregations. Heavier solids sink to the bottom while lighter contaminants float to the surface and become trapped against the weir tank under wall. Water is pumped into three 21,000-gallon steel Clarification Tanks in parallel. The Clarification Tanks have two weirs (under and over) which help to remove solids before filtration. A level switch high-high in the Clarification Tank will generate an error and put the clarification pump in fault state when triggered. The level transmitter in the Clarification Tank provides the water level that the PLC compares again the start/stop setpoints that controls the Media Filter pump and also is a setpoint to stop the Source Pump from overfilling the clarification tank. A low level will issue a warning alarm. A low-low level will shut off the MF pump and issue an error alarm. Solids should be vacuumed out of the tank periodically.

8. Using the HMI Pages

The HMI touchscreen allows the operator to control and monitor the Allied Recycling Center Water Treatment System and to make changes to user-configurable system parameters.

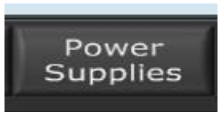
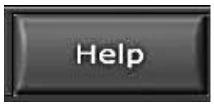
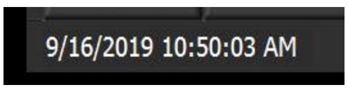
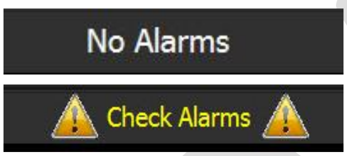
8.1 Navigation Bar

A Navigation Bar is provided at the bottom of each page. Navigate to other pages by pressing the labeled buttons on the Navigation Bar. Use the green arrows to scroll to pages that do not have buttons on the Navigation Bar.

Figure 44: HMI Navigation Bar

TABLE 2: NAVIGATION BAR BUTTONS

Icon	Function
	Displays the current page name (Not a button).
	Press this button to go to the System or Home Page.

Icon	Function
	Press this button to view graphs of treatment and pH, and turbidity readings over time, as well as media filter flow.
	Press this button to go to the Power Supplies Page to change the Target Current for the EC Power Supplies.
	Press this button to go to the Help Page to log in as an an administrator and access system setup and technician screens.
	Press to scroll left or right to other pages.
	Displays current date and time (Not a button).
	The Alarms Button has two states, one for when the system is in alarm and one for when it is not. Press this button to go to the Alarms Page to view current and past alarms.

8.2 System Page

Figure 39 shows the System Page during normal operation. The System Page is the main control panel for the system. The System Page allows the operator to determine overall system function and performance by displaying the following information:

- Source tank and clear well water levels.
- Pump status.
- Flowmeter readings.
- Electrically-actuated valve positions (open or closed).
- EC treatment system status.
- Power Supply Status
- Discharging or recirculating water status.

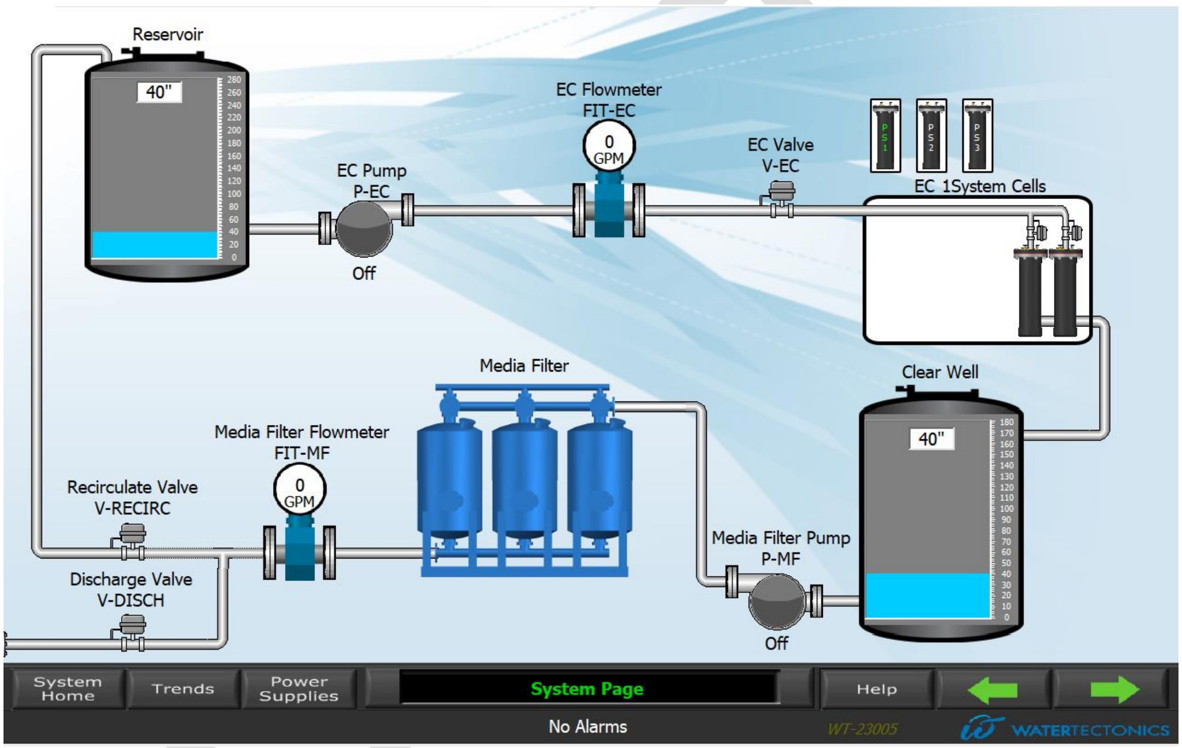


Figure 45: System Page

The colors of certain components on the System Page indicate the component status or the path of water flow. The following table describes how the valve and hydraulic pipe components change during operation.

8.2.1 System Page Icons

Icon appearance changes to reflect component status during operation. Refer to the following four tables for an explanation of icon appearance changes.

TABLE 3: PIPING ICON STATES

Component	Icon First State	Icon Second State
Hydraulic Piping	 No Water is Flowing	 Water is Flowing *

***** **NOTE:** Although the flow path is open, water may or may not be flowing, depending on pump conditions or water supply.

TABLE 4: PUMP ICON STATES

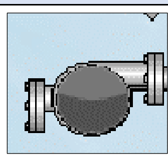
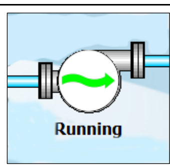
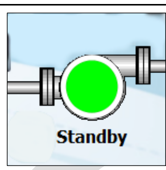
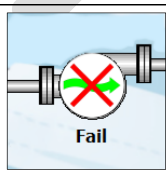
Icon	Meaning
	Pump off
	Pump running
	Pump in standby mode
	Pump failed

TABLE 5: VALVE ICON STATES

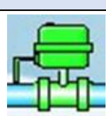
Icon	Meaning
	Valve open
	Valve closed

TABLE 6: FLOW METER AND FLOW SWITCH ICON STATES

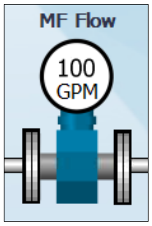
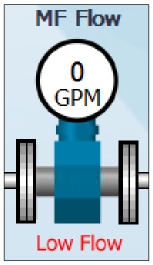
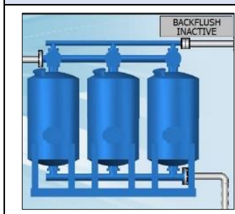
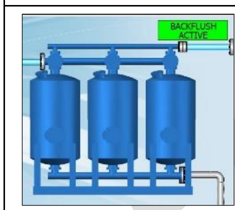
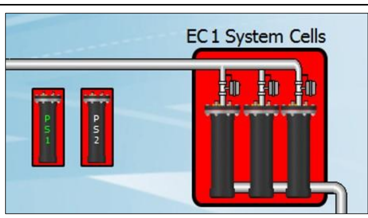
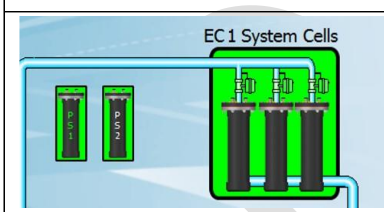
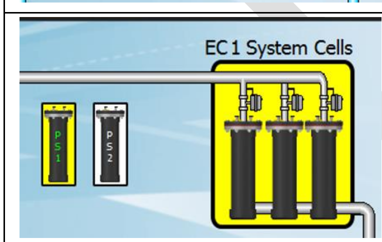
Icon	Meaning
	Flow meter registering a flow of 100 gpm
	Flow meter Low Flow Alarm

TABLE 7: MEDIA FILTER ICON STATES

Icon	Meaning
	Filtering
	Backflushing

The EC Cell icon on the System Page displays the status of the electrocoagulation cells. The EC Cell icon has the following states:

Table 8: EC System Icon States

• Icon	• Meaning
	• An EC Power Supply Icon with green lettering indicates that Power Supply is running.
	• An EC Power Supply Icon with red housing indicates that Power Supply has an over-temperature error.
	• An EC Power Supply Icon with white lettering indicates that Power Supply (and the EC Subsystem it feeds) is off.
	• A red background behind the EC Treatment Cells Icon and the associated EC Power Supply Icon indicates that EC Subsystem has faulted.
	• A green background behind the EC Treatment Cells Icon and the associated EC Power Supply Icon indicates that EC Subsystem is running.
	• A yellow background behind the EC Treatment Cells Icon and the associated EC Power Supply Icon indicates that EC Subsystem is in standby.

Above the EC Cell icon on the System Page is a Power Supply icon, shown in *Figure 46*. The system comes factory-equipped with three power supplies and three EC cells per power supply in each EC subsystem. The system can also be expanded. The number of EC cells and potential subsystems makes it impractical to display all EC cells simultaneously on the System Page. The Power Supply icon allows the operator to quickly determine which subsystems are operational.

Figure 46: Power Supply Icon

If an error occurs in an individual subsystem, that subsystem's Power Supply icon will change state. For example, in *Figure 47*, there is an error associated with an EC cell in EC subsystem two. The specific cell is identified on the associated EC Systems page (*Section 8.5 on page 42*) For more information about an EC subsystem or to investigate an error condition, press the associated Power Supply icon to open the EC Systems Page and refer to the Alarms page (*Section 8.9 on page 47*).

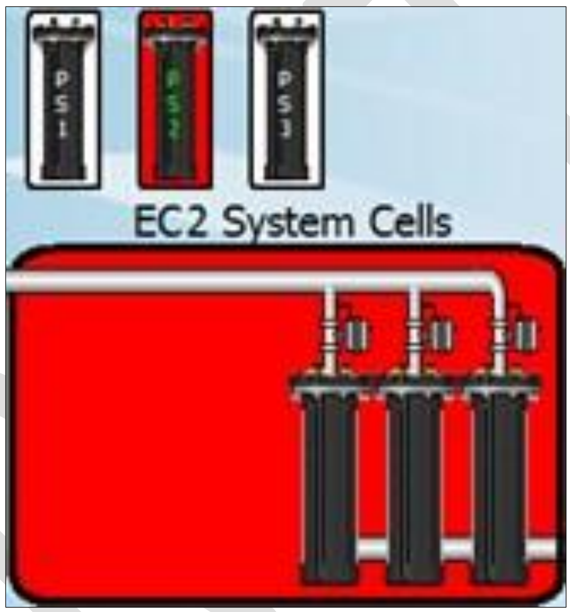


Figure 47: Power Supply Icon Error Indication

The System Page indicates the status of all water treatment stages. If there is an error anywhere in the system, the System Page will display the Check Alarms text at the bottom of the screen. The operator can investigate the error by tapping the corresponding icon or Check Alarms text.

8.3 Pumps Page

Press a pump icon on the System Page or press the Pumps Button on the Navigation Bar to access the Pumps Page. Use the Pumps Page to do the following:

Figure 42 shows the Pumps Page with all components off. The Pumps Page displays the following information:

- EC and Media Filter supply pump status.
- EC and Media Filter supply pump run times.
- Flowmeter readings.
- Flowmeter totals.

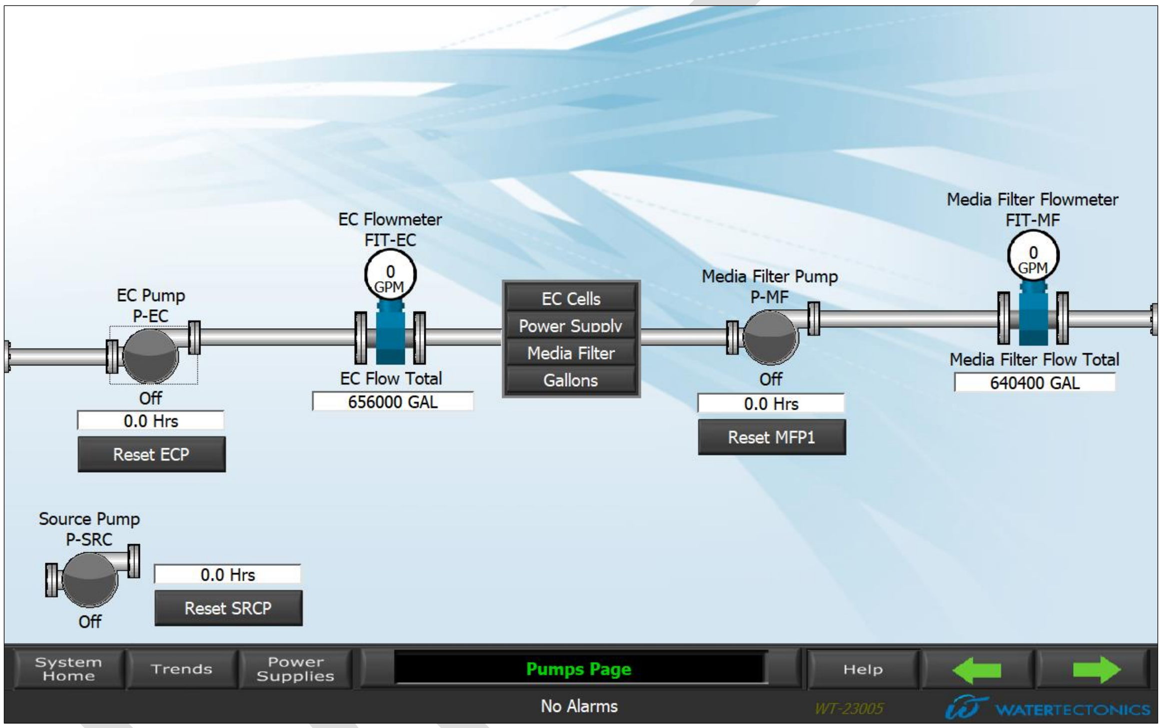


Figure 48: Pumps Page

The labeled buttons in the center of the screen link directly to the corresponding interface pages. For example, the Media Filter button opens the Media Filter Page, allowing the operator to access more detail about a possible media filter issue affecting system flow. Tapping the Gallons button allows the operator to change the unit of measurement.

8.4 Power Supplies Page

Figure 46 shows the Power Supplies Page during normal operation. The Power Supplies Page displays the real time status of the EC treatment subsystem power supplies, polarity change indicator, target current setpoint, and cell resistance.

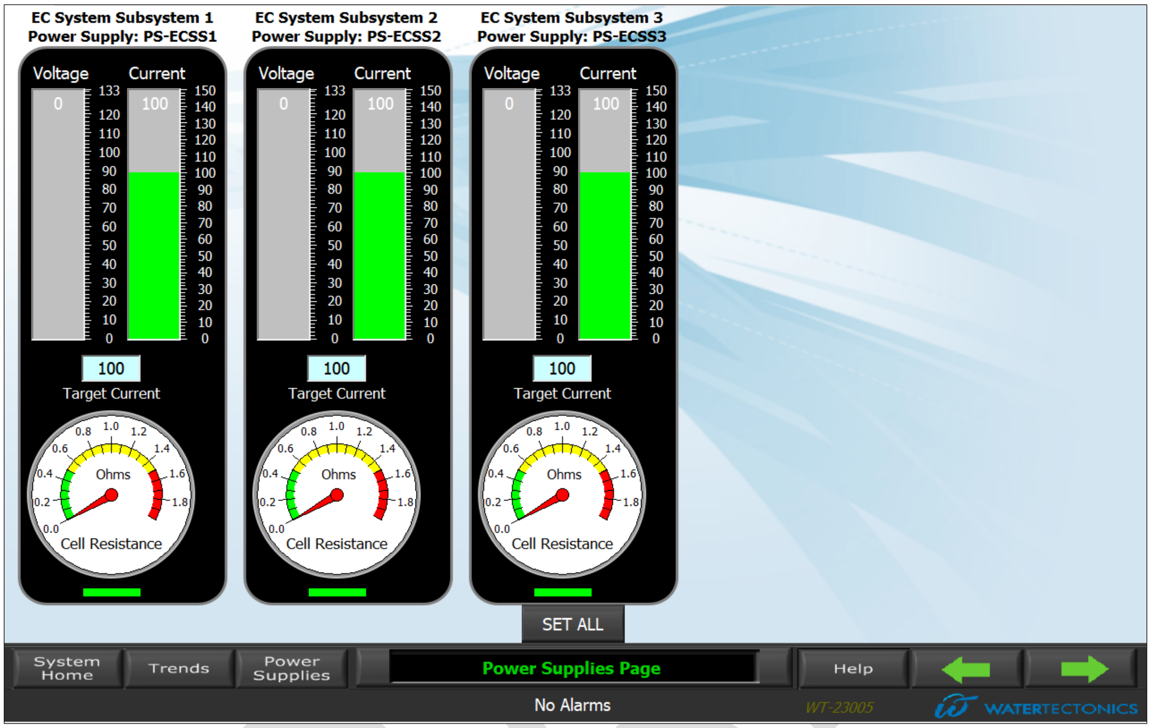


Figure 49: Power Supplies Page

Press the numeric indicator to set the target treatment current. The system will automatically adjust the voltage to achieve the target current setting. The Voltage indicator bar displays the DC voltage supplied to EC cell treatment. The voltage value is measured at the power supply output in DC volts (VDC). The Current indicator bar displays the DC current passing through the EC cells. The current value is measured at the power supply output in DC amperes (ADC).

The Cell Resistance indicator displays the EC cell subsystem resistance in ohms. Cell resistance varies due to variations in cell configuration, cell conditions such as fouling or plate consumption, and water conductivity. Cell resistance measurements in conjunction with water conductivity readings are used for estimating cell wear and troubleshooting various issues.

Cell resistance is calculated using Ohm’s law:

$$R = \frac{V}{I}$$

Where:

- *R* is the resistance of the conductor in units of ohms.
- *V* is the potential difference measured across the conductor in units of volts.
- *I* is the current through the conductor in units of amperes.

Figure 47 shows the Power Supplies Page with a current deviation error. A current deviation error occurs when a subsystem cannot meet the target EC treatment current for more than 30 seconds. A current deviation error can be a sign of cell wear, cell fouling, consumed plates, low water conductivity, or other electrical issue.

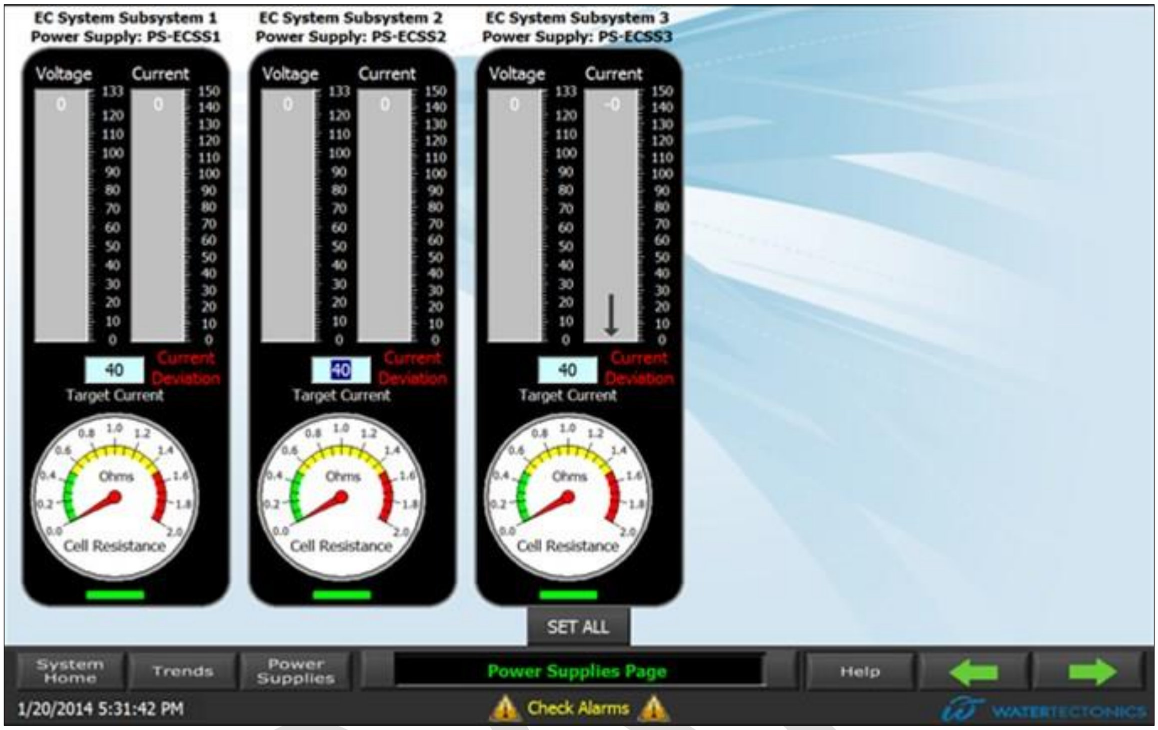


Figure 50: Current Deviation Error

Figure 48 shows the Power Supplies Page with an over-temperature error. An over-temperature error occurs when the internal power supply temperature exceeds a set limit for more than 30 seconds. The power supply will resume operation when the internal temperature returns to operational limits. If an over-temperature error occurs, check the environmental conditions inside the unit and electrical cabinet. Ensure all fan filters are clear and all fans are operating properly.

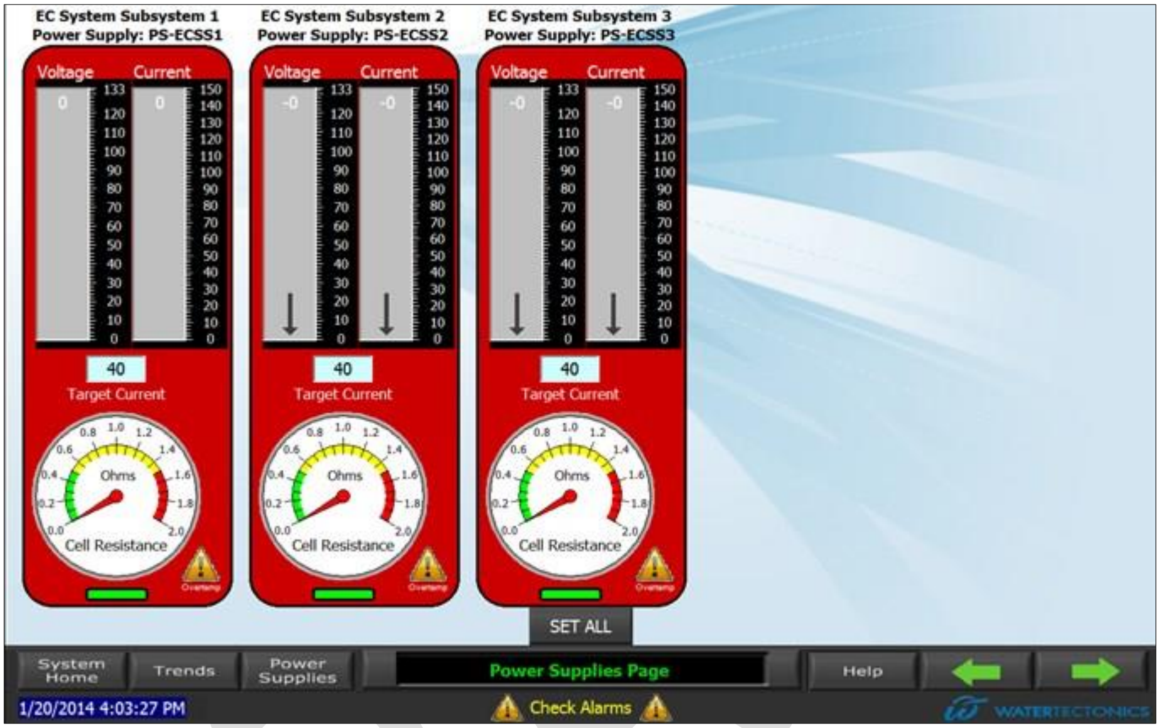


Figure 51: Over-Temperature Error

8.5 EC Systems Page

Figure 49 shows the EC Systems Page during normal operation. (See Section 7.21, Table 7 for an explanation of the colors used with the icons on this page) The EC Systems Page displays EC cell information. The operator can use this page to identify cells with over-temperature errors, monitor cell run times, and check the EC valve position. To reset cell run time, tap the Reset Cell Times button.

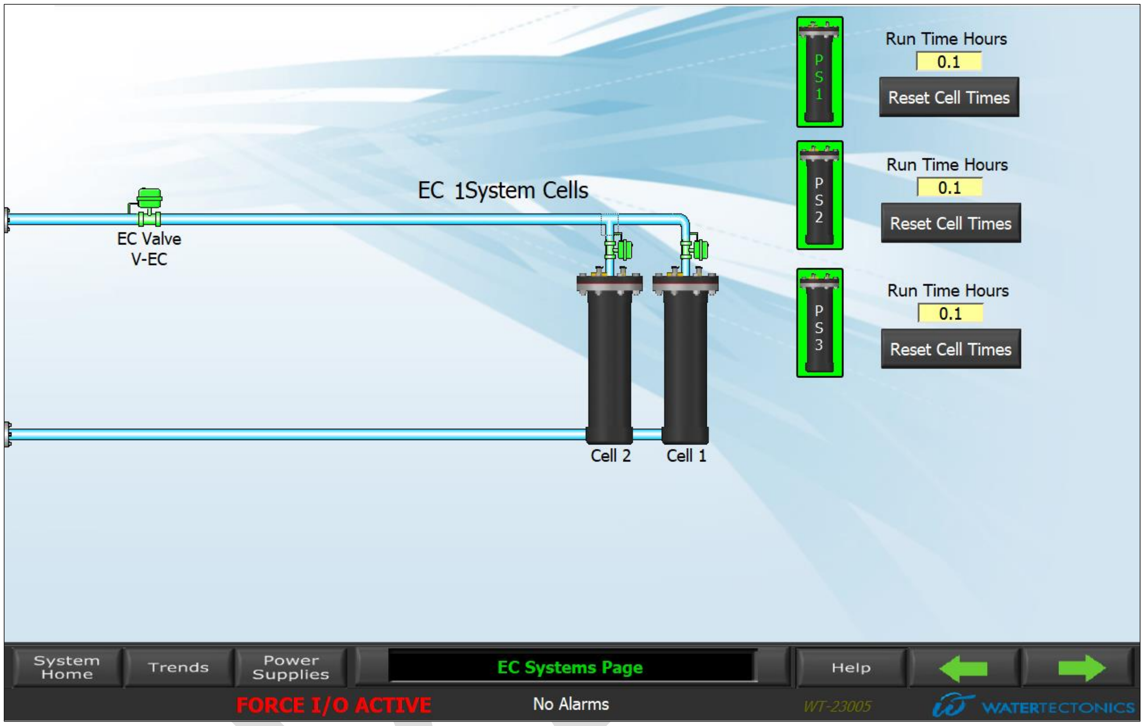


Figure 52: EC Systems Page

If an over-temperature error occurs, the Power Supply icon for the associated subsystem will turn red. Press the Power Supply icon to view information about the associated subsystem.

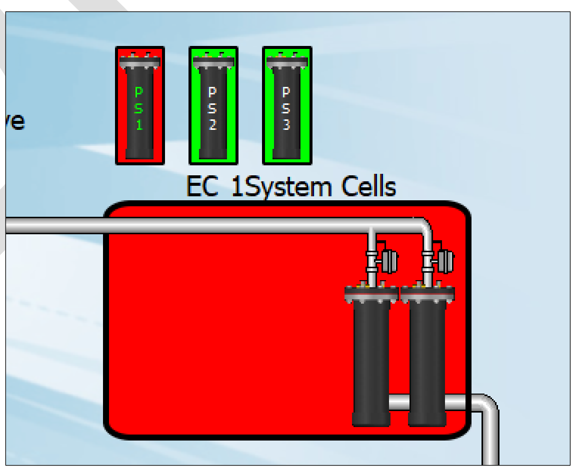


Figure 53: EC Systems Page with over temperature error

8.6 Reservoir Page

The Reservoir Tank Page displays the source tank level, source pump status, EC pump status and current setpoints.

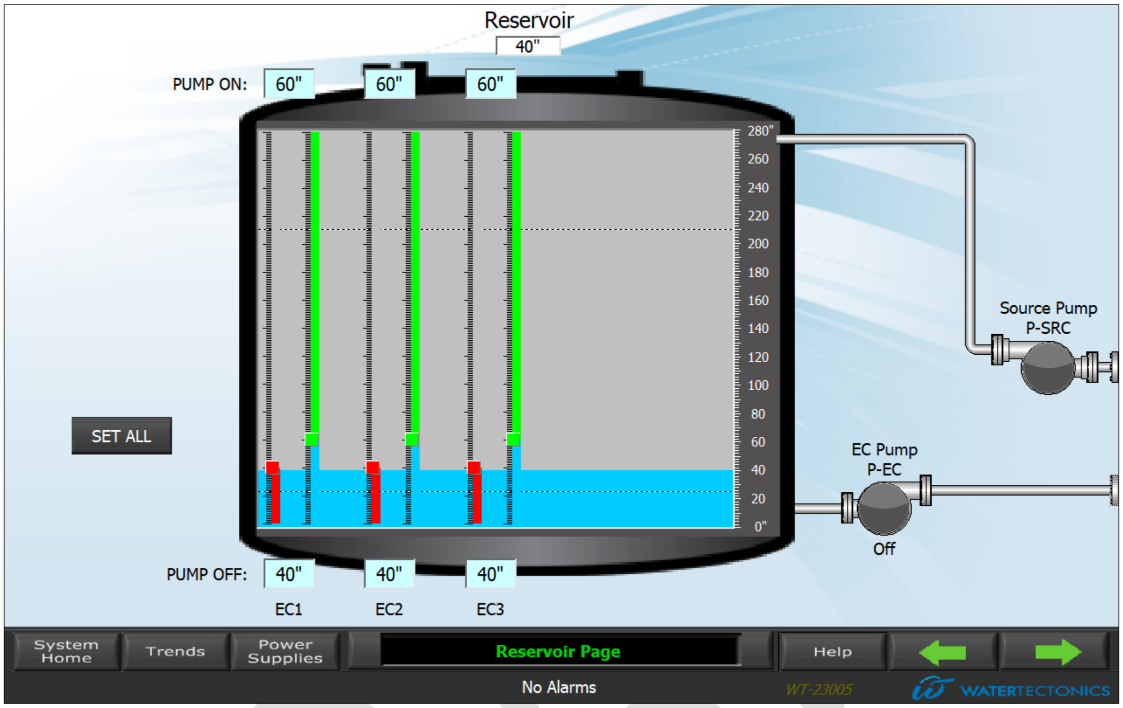


Figure 54: Source Tank Page

To define the level setpoints for the source tank, complete the following steps:

1. Drag the green square to set the level where the source pump is called.
2. Drag the red square to set the level where the source pump is deactivated.

The operator can also press the Set All button and type in the setpoints on the keypad that appears. The minimum and maximum allowed values will appear above the indicator.

8.7 Media Filter Page

Figure 55 shows the Media Filter Page during normal operation. The Media Filter Page allows the operator to monitor the clearwell and media filter system by displaying the following information:

- Clearwell level and setpoints.
- Media filter pump status.
- Media filter flowmeter reading.
- Flow totals.
- Electrically-actuated valve positions.
- Backflush status.
- Recirculation, and discharge status.
- Recirculation and discharge totals.

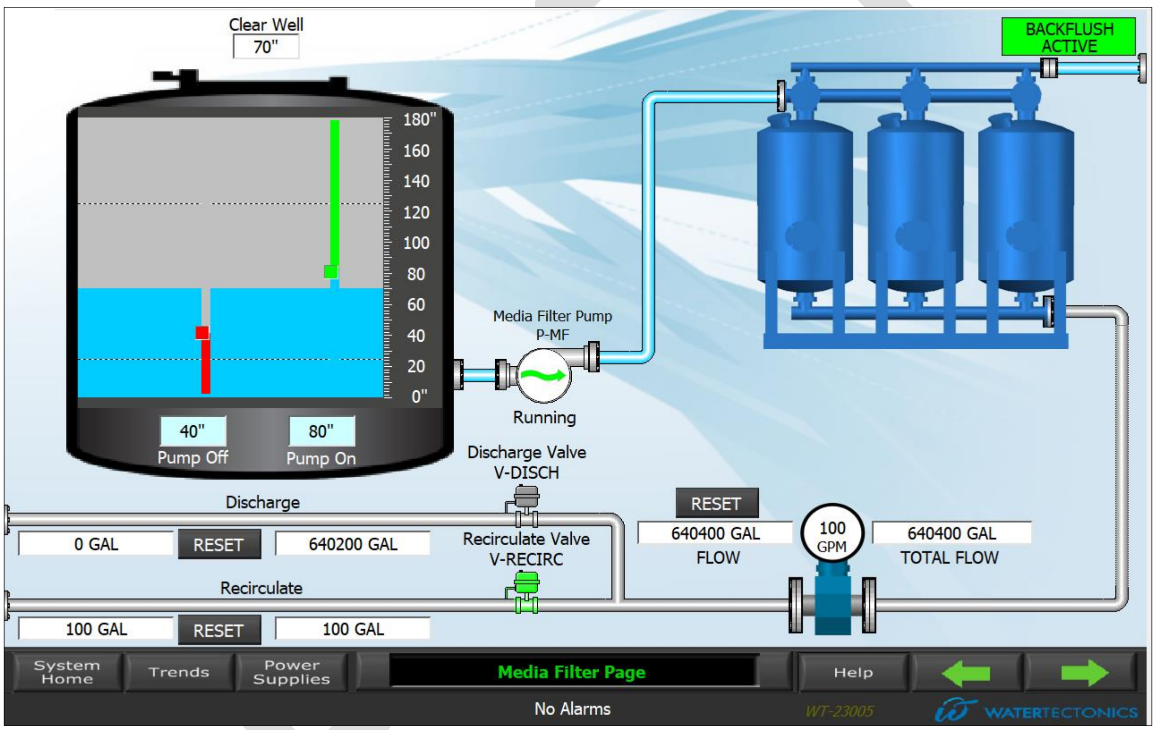


Figure 55: Media Filter Page

To define the level setpoints for the clear well, complete the following steps:

1. Drag the green square to set the level where the pump is called.
2. Drag the red square to set the level where the pump is deactivated.

The operator can also press the Pump Off and Pump On indicators and type the setpoints on the keypad that appears. The minimum and maximum allowed values will appear above the indicator.

8.8 Trends Page

Figure 53 shows the Trends Page. The Trends Page shows key electrical parameters such as EC treatment voltage and current, as well as hydraulic parameters such as flow rates. Tracking electrical and hydraulic parameters over time can aid operators and technicians with system tuning and troubleshooting.

Figure 54 gives a detailed description of the different parts of the trend page.

Figure 56: Trends Page

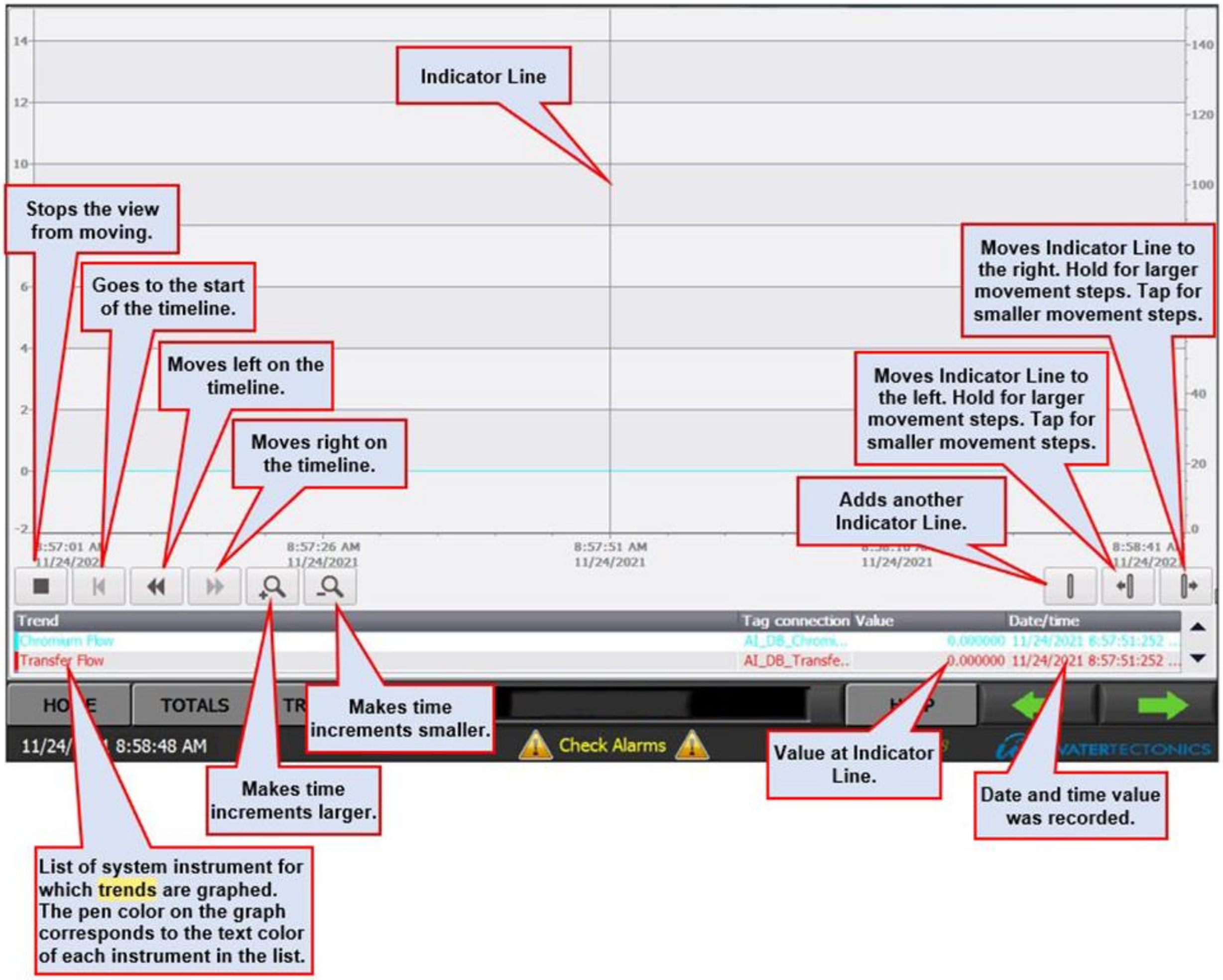


Figure 57: Descriptions of various parts of the Trend page

8.9 Alarms Page

Press the Check Alarms Button (may say "No Alarms" if there are no active alarms) at the bottom center of the Navigation Bar to access the Alarms Page. The Alarms Page displays the following:

- The date
- The time
- A description of the alarm condition – (the operator must acknowledge and/or clear alarms)

NOTE: all errors will send an alarm via email when they happen.

NOTE: Basic service of 2GB of data per month for e-mails and reporting is included in the service agreement for one year. After one year the data, e-mails and cloud storage will need to be renewed on an annual basis.

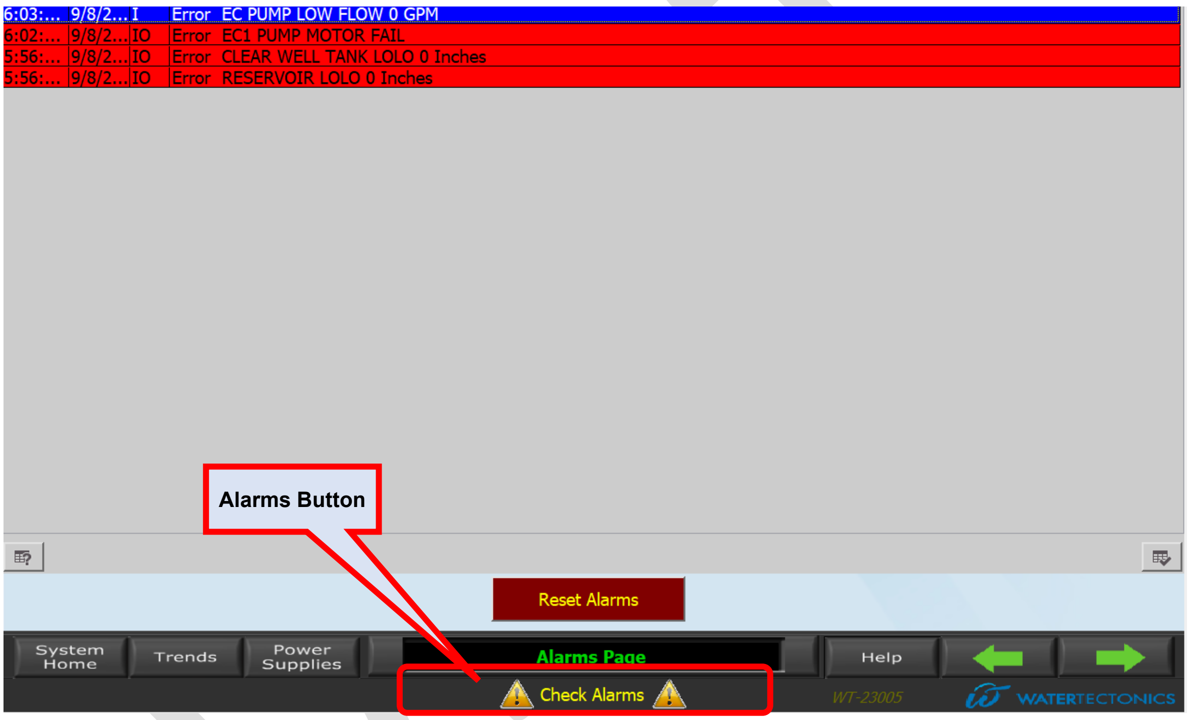


Figure 58: Example Alarms Page

8.9.1 Alarms Page Stat Column Legend

The following symbols in the Stat Column indicate what has happened since the alarm condition occurred:

I – The alarm has not been cleared, acknowledged, or reset. The alarm condition can be continuously occurring or input once.

IO – The alarm condition has been cleared.

IA – The alarm condition did not clear, but the operator acknowledged the alarm.

IOA-The alarm condition has been cleared and the operator acknowledged the

Table 9: ALARMS PAGE BUTTONS

Button	Function
	Press this button to acknowledge the selected alarm. If the alarm condition has been cleared, the alarm will be removed from the list when this button is pressed.
	Press this button to view more information about the selected alarm.
	Press this button to reset all alarms.

8.10 Help Page

Press the Help Button on the Navigation Bar to navigate to the Help Page.

The Help Page provides access to the setup pages and technician-only pages. After logging in as an administrator, press the buttons in the Technician Screens Box to access the technician-only pages.

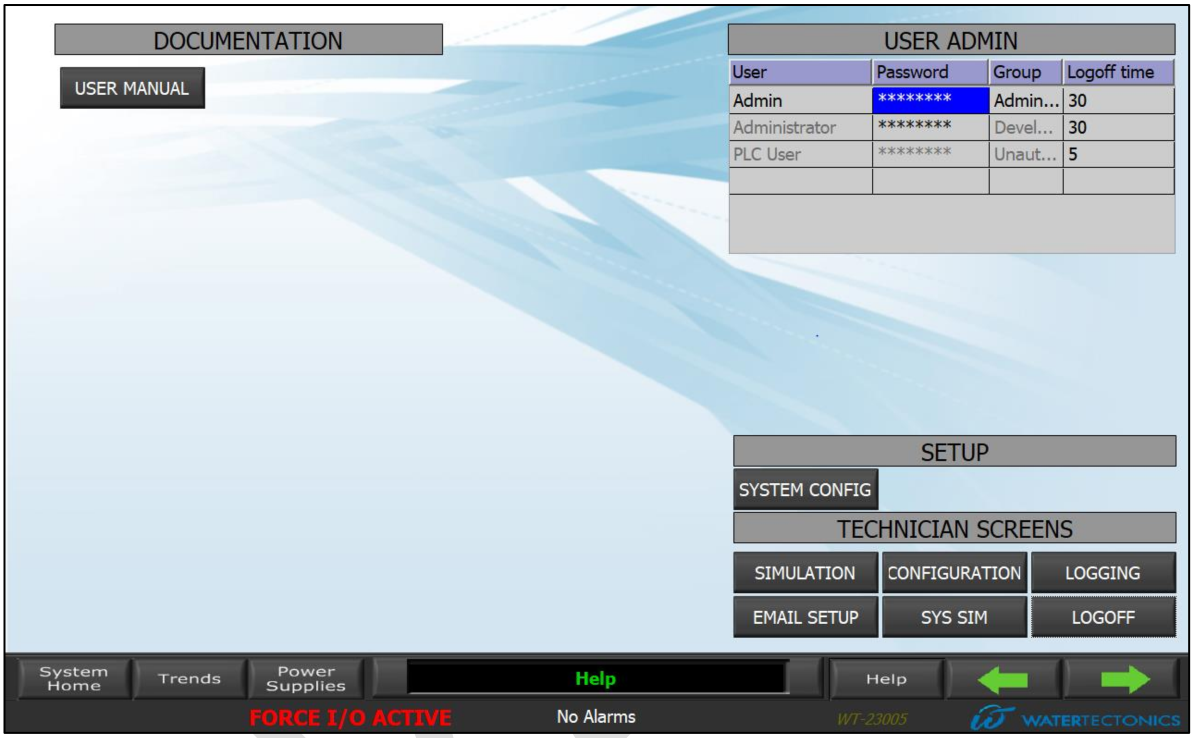


Figure 59: Help Page

8.11 User Manual

This button is not in use at this time.

8.12 System Config

The System Config screen is used in the commissioning process and is a technician only page that should only be accessed by or under the direction of Water Tectonics personnel.

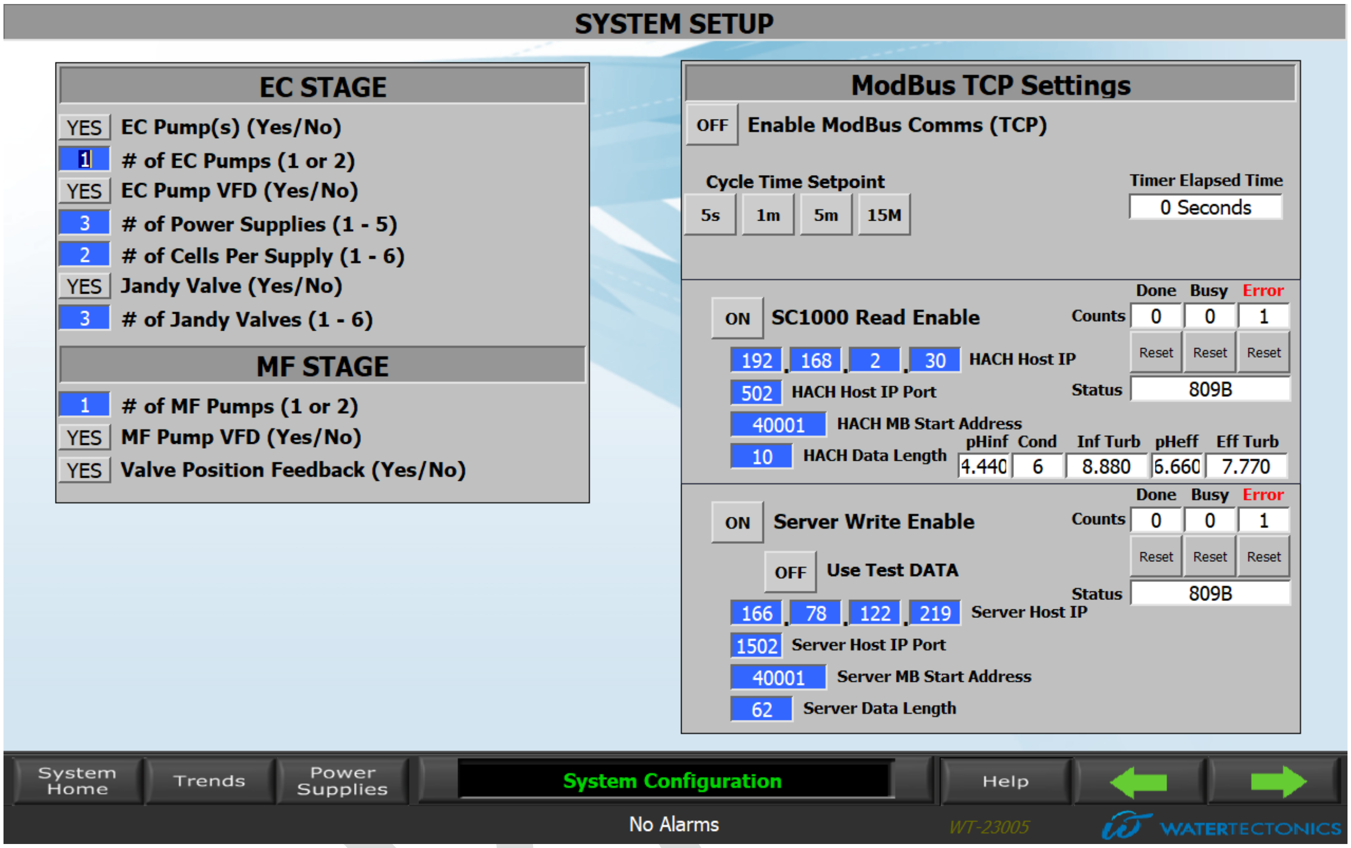


Figure 60: System Config Screen

8.13 Configuration Page 1

Access Configuration Page 1 from the Help Page by pressing the Config Button in the Technician Screens Box. Configuration Page 1 can only be accessed when the user is logged in as an administrator and should be used ONLY by, or under the direction of, WaterTectonics personnel.

Figure 61: Configuration Page 1

8.14 Configuration Page 2

Access Configuration Page 2 by pressing the right-hand green arrow on the Navigation Bar or the NEXT Button while on Configuration Page 1. Configuration Page 2 can only be accessed when the user is logged in as an administrator and should be used ONLY by, or under the direction of, WaterTectonics personnel.

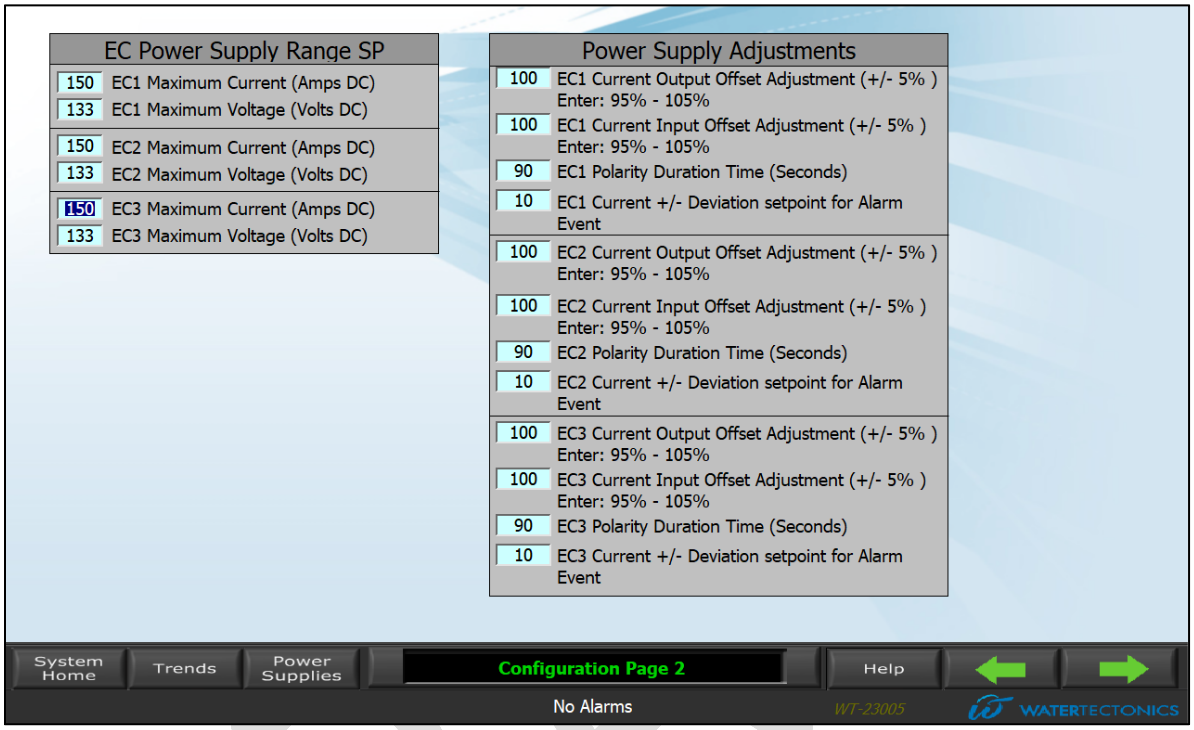


Figure 62: Configuration Page 2

8.15 Logging

The Logging page is a technician only page that should only be accessed by or under the direction of Water Tectonics personnel.

8.16 Email Page

Access the Email Page from the Help Page by pressing the Email Setup Button in the Technician Screens Box. Use the Email Page to resend the previous day's totals to selected email recipients. This page can only be accessed when the user is logged in as an administrator.

NOTE: Basic service of 2GB of data per month for e-mails and reporting is included in the service agreement for one year. After one year the data, e-mails and cloud storage will need to be renewed on an annual basis.

WARNING: Only select a single email at a time. Selecting more than one email will disable all emails.

Figure 63: Email Page

8.17 System Sim

The System Sim (Short for Simulation) page is a technician only page that should only be accessed by or under the direction of Water Tectonics personnel.

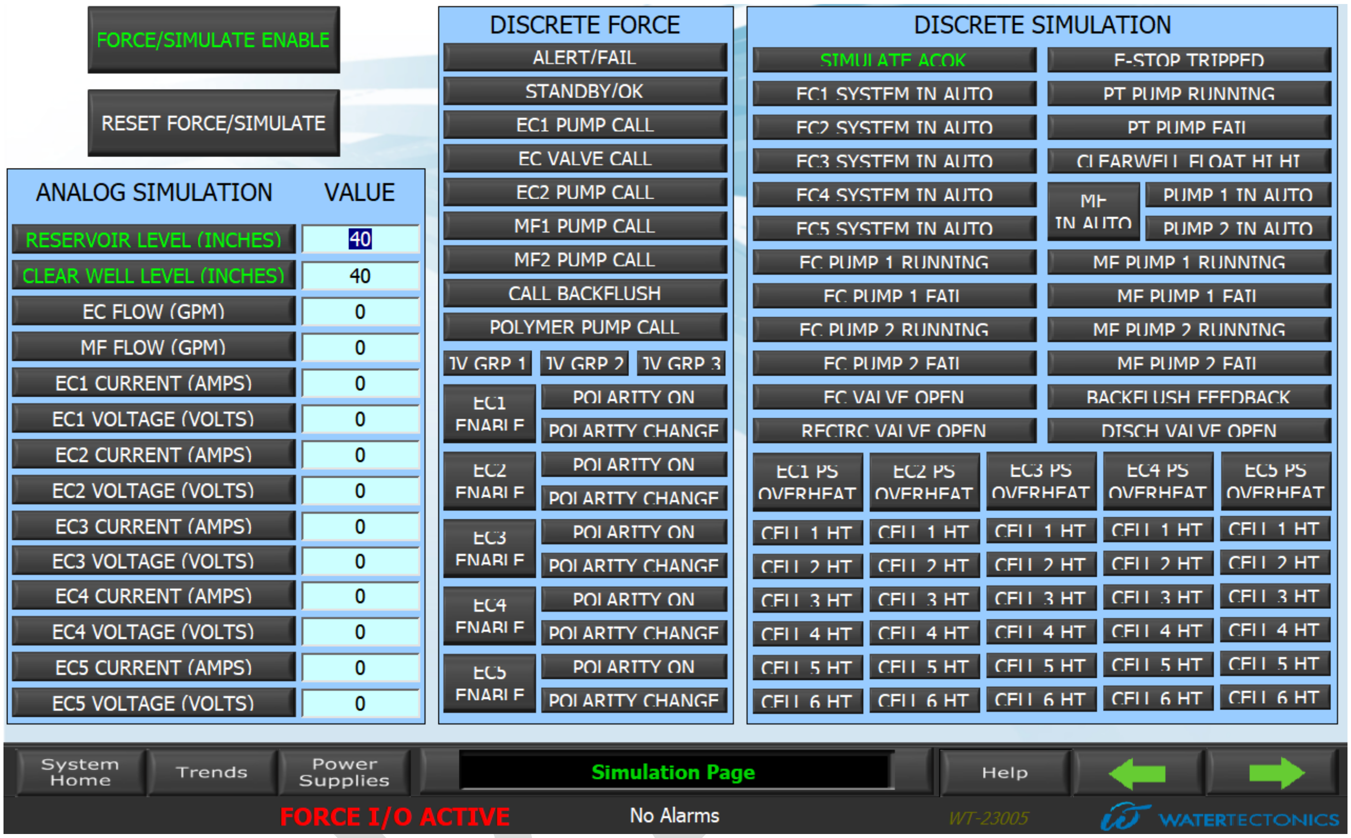


Figure 64: System Sim Page

8.18 Logoff

The Logoff screen logs off the current user (operator or administrator). The view goes from a logged in user to no user logged in.

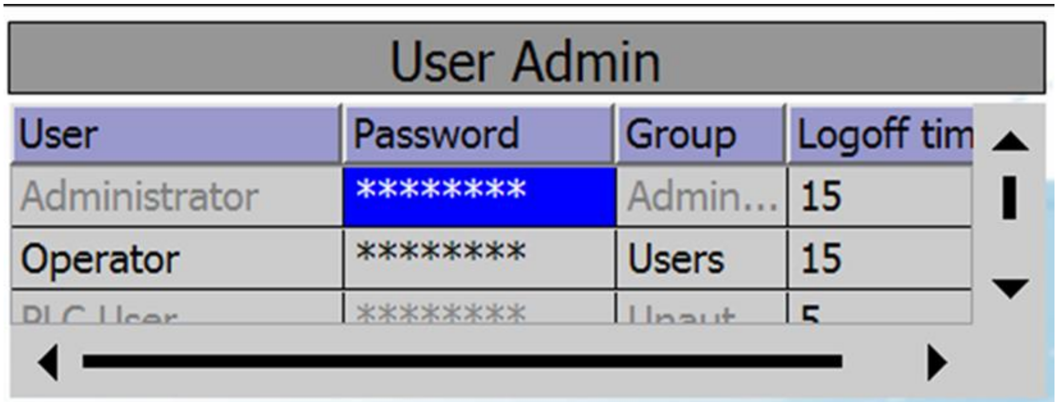


Figure 65: Admin User Logged On

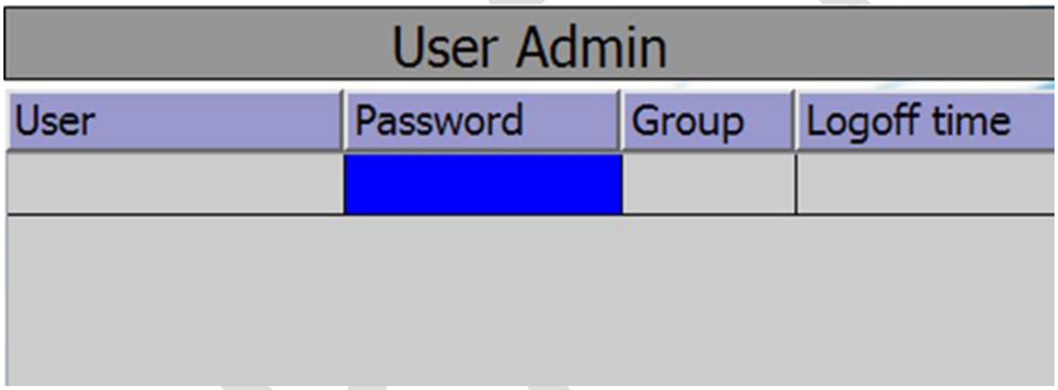


Figure 66: Admin User Logged Off

9. Operation

9.1 Sample Testing

Sample valves are provided throughout the system for testing. Testing can be done with either a handheld device that has been properly calibrated according to the manufacturer's instructions, or sent to an outside laboratory. Influent water characteristics may change, so test water samples regularly to determine whether adjustments to chemical dosage may be necessary.

9.2 Media Filter Operations

The following section describes media filter operation and components.

1. Water flows in through the top of the filter and down through the media bed. The media captures the suspended solids.
2. A media filter with new or clean media will operate at similar influent and effluent pressures. These pressures are indicated by gauges on the top and bottom of the media filter.
3. **Differential Pressure**: As sediment loading occurs in the media bed, the influent pressure will increase. The influent pressure is visible on the influent (inlet) manifold pressure gauge. The effluent pressure is visible on the effluent header pressure gauge. Calculate the differential pressure by comparing the influent and effluent pressure gauges.
4. **Differential Pressure Setting**: Located just below the control box is the pressure differential (PD) switch. This switch setting determines when the difference between the influent and effluent pressures will trigger an automatic backflush. When the differential pressure meets or exceeds the PD switch setpoint, the self-cleaning backflush cycle begins. A typical setpoint is 12 psi.
5. **Pressure sustaining valve (PSV)**: On the effluent side of the media filter is a PSV. This valve maintains a constant back pressure on the media filter to enable proper backflushing. The set screw for the PSV should be set to maintain approximately 35 psi.

Figure 67: Pressure Sustaining Valve

6. **Backwash line**: The backwash line is located at the top of the filtration unit. The backwash water contains concentrated solids and contaminants flushed from within the media bed. The backwash line discharges to a settling tank that decants the water to the source tank.
7. **Backwash valve**: The backwash valve is mounted to the backwash line manifold at the top of the filtration unit. The backwash valve is a critical component to proper backflush operations. If the valve is open too far the media can exit the media filter during backflushing. If the valve is overly restrictive the filter cannot discharge the sediment deposited on the media bed. The PSV and the backwash valve are directly related to each other and set for optimum backflush performance. Only qualified operators or WaterTectonics personnel should attempt to adjust the backwash valve.
8. During a backflush cycle, each filter pod will clean in series. Water filters down as normal through all the pods not backflushing. Air pressure actuates the PSV, which redirects the water flow. The water flow is routed up through the currently backflushing media filter pod. An automated sequence controls the rate at which each pod cycles through the backflush based on automatic filter controller settings.
9. Automatic filter controller: This controls media filter and backflush settings and is located on the front of the media filter. Refer to the manufacturer's documentation for information on the controls, switches, and indicators on the automatic filter controller.

The following typical timed backflush settings are provided for reference purposes:

- Periodic Flush (Hours): 2
- Flush Duration (Minutes): 4 (Base this number on current media solids loading level and backflush effectiveness.)
- Delay (Seconds): 0

Figure 68: Automatic Filter Controller

10. Startup Procedures

The following section describes the startup steps and procedure for the Allied Recycling system.

10.1 Treatment Train Startup

1. Make sure all E-Stop buttons are pulled out and reset.
2. Press the E-Stop reset button on the control cabinet.
3. Review the settings on the HMI and verify that water level, voltage, and current settings and setpoints are correct.
4. Verify all source tank, discharge, settling tank, and other hydraulic path valves are open.
5. Verify all manual isolation valves to the EC cells are open.
6. Open all manual system isolation valves.
7. Set the EC VALVE switch to the AUTO position.
8. Set the EC SYSTEM 1–3 switches to the AUTO position.
9. Set the MEDIA FILTER SYSTEM switch to the AUTO position.
10. Set the MEDIA FILTER CONTROLLER switch to the AUTO position.
11. Set the SOURCE PUMP switch to the AUTO position.
12. Set the EC PUMP switch to the AUTO position.
13. Set the MEDIA FILTER PUMP switch to the AUTO position.
14. Verify the green SYSTEM STANDBY/OK light is illuminated
15. Verify water flow. Prime pumps or purge air from the system if necessary to achieve optimal pump performance.
16. Set the CAUSTIC, BRINE, POLYMER and CO_2 switches to the AUTO position.
17. Review the current and voltage display on the HMI. Verify that the preset amperage is being met and the voltage in each EC subsystem is not in error.
18. Inspect the sc1000 controller to ensure that water quality parameters are within acceptable ranges.
19. When necessary, such as after initial startup, after a period of inactivity, and during regular maintenance intervals, take a grab sample from before the discharge point.
20. Verify the media filter backflush intervals and pressure settings. *refer to the Synergy Instruction Manual and for setup refer to The Yardney Media Filter Controller Configuration and Verification Setup Sheet included with this manual.*
21. Record initial pH and turbidity readings on a daily log. *See Section 16 Appendix A – Operations Log on page 122* for an example log.
22. Take grab samples and use field instruments calibrated to manufacturer's specifications to cross-check system pH and turbidity probe readings. Make note of variations outside of specified limits and do not discharge until acceptable limits are achieved.

10.2 Emergency Procedures

Warning: After an emergency, inspect the system carefully before restarting to ensure that the necessary repairs are complete and will not cause further equipment or human harm.

Warning: WaterTectonics personnel or an authorized electrician must perform all electrical repairs. Any repairs necessary must be made in accordance with design specifications.

In the event of an emergency with the system, complete the following steps:

1. Press the E-Stop button.
2. Turn off the power source. The main disconnect box is located on the exterior of the unit. Pull the disconnect lever down to the OFF position.
3. Wear all required personal protective equipment (PPE) when dealing with potentially hazardous materials or energized equipment.
4. Remove all hazards, including flammable materials.

10.3 Restart after Alarm, Servicing, or Filtration Media Changeout

The instructions in this section assume the system is full or partially full of water when shutdown occurred. During pump servicing or filtration media changeout, isolation valves for components taken out of service will have been closed and nearby drain valves opened to empty the piping for just that part of the system.

10.3.1 After an Alarm

Use the instructions in this section after the PLC has stopped the system due to an alarm condition.

1. Solve the condition that caused the alarm.

   Refer to Section 15.7 HMI Warnings and Alarms on Page 113 of this manual for tips on where to begin troubleshooting specific alarm conditions. If the failure of a specific component has caused the alarm condition, refer also to the troubleshooting section of the appropriate manufacturer's manual for the specific component.

   NOTE: If pump failure was the cause of the alarm, and servicing was necessary, prime the pump before putting back into service.

2. Once troubleshooting has been successfully completed, go to the Alarms Page on the HMI, and press the ACKNOWLEDGE Button and then the RESET ALARMS Button.

3. Also on the HMI, go to the System Page and press the ALL AUTO Button.

   If there are no other alarm conditions, the system will restart.

10.3.2 After Pump Servicing

NOTE: To avoid damage to the pump, do NOT start any pump without filling it with water or chemical first. Follow these steps for each pump when restarting after pump servicing.

EC, MF, Source Pump

1. After the pump has been serviced and reconnected to the system piping, close any open drain valves, including those on the pump itself, and open the pump discharge and suction side isolation valves.
2. Open the vent plug on the side of the volute casing to release air while pump fills with water.
   NOTE: The pump is full of water when a steady stream issues out of the vent plug.
3. Close the vent plug.
4. Press the Pump icon on the HMI System Page and set the virtual selector switch on its popup to the HAND position.
5. Also on the Pump popup screen, set the pump speed to 15-20% and then OFF again quickly ('bump' the pump), while observing the direction of motor rotation. The motor should rotate in the direction indicated on the volute casing.
   NOTE: If the motor rotates in the wrong direction, turn off the power supply and interchange any two wires. Switch power on again and turn the pump ON and OFF again briefly to verify that motor rotation is correct.
6. Turn the Pump virtual Selector Switch (on its popup screen) to the AUTO position.

ChemPro Chemical Pumps ONLY:

1. If the pump has been removed from the system, refer to the ***Chem-Pro C3V242XVA Chemical Metering Pump IOM*** for instructions on how to reconnect the hoses and set up the pump dosing controls.
2. When the Chemical Pump is properly connected and the controls are set up, set the chemical pump's virtual Selector Switch (on its popup screen) to AUTO.

11. System Standby

The system will transition from run to standby if the source tank level is at or below the OFF setpoint. The system will remain in standby until the source tank level rises above the ON setpoint.

At least one EC SYSTEM switch and the MEDIA FILTER SYSTEM switch must be in the AUTO position for the system to be in standby mode. Too much or too little water at critical points, such as in the clear well or source tank, will cause the system to wait until water levels reach programmed limits. Once water levels are within normal parameters and with all control switches set to AUTO, the system will resume operation automatically. If all conditions are normal and the system does not resume operation automatically, set the EC SYSTEM switches to OFF and back to AUTO to exit standby.

Note: If one part of the system causes a standby condition, other parts such as individual pumps or subsystems may also be in an error state. Verify no alarms are present if an unexpected standby condition occurs.

The system displays the following indications when in standby mode:

- The green SYSTEM STANDBY/OK indicator flashes.
- The EC pump and/or the MF pump is not operating. Both the EC and media filter stages have independent standby conditions that can stop either pump.
- There is no influent flow.
- The power supplies are idle.
- The flow control valves are closed.
- The red SYSTEM ALERT/FAIL indicator may be illuminated if the system had an error before entering standby (for example, one of the EC subsystems registered an error condition). If there are no errors, the indicator will not be illuminated.
- There may or may not be water in the clear well.
- There may or may not be effluent flow, meaning the media filter can continue to operate even if the rest of the system is in standby mode until the water level in the clear well drops below the OFF setpoint.

Possible causes of the standby condition include:

- Too much or too little water at critical points in the system, such as in the source tank or clear well tank.

11.1 Error Reset

To reset an error turn the EC SYSTEM and MEDIA FILTER SYSTEM switches to OFF, wait three seconds, and then turn the switches back to AUTO. Additionally, the alarm must be cleared in the HMI also (refer to Section 8.9 for instructions on how to clear alarms in the HMI).

12. Shutdown Procedures

12.1 Automatic Shutdown

An automatic shutdown occurs when the system detects a failure or out of tolerance condition.

The EC stage will automatically shut down if the EC supply pump flow rate drops below 20 gpm for 30 seconds. This prevents the pump from running dry and causing equipment damage.

- One or more EC subsystems will automatically shut down if one of the following conditions is true:
- The power supply current exceeds the target current by more than 10 A for 30 seconds.
- An EC subsystem or individual cell exceeds a temperature limit for 30 seconds.
- A subsystem exceeds maximum voltage or current limits for 30 seconds.
- The actual cell current is 10 or more amperes below the target for 30 seconds.

- A motor start protector (MSP) or similar pump or system protection circuit trips.
- A VFD is in an error state.

The system displays the following indications when all three EC subsystems automatically shut down:

- The red SYSTEM ALERT/FAIL indicator illuminates.
- The pumps do not operate.
- There is no influent flow.
- The power supplies are idle or possibly in an error state.
- The flow control valves are closed.
- There is no current flowing through the EC cells.
- There may or may not be water in the clear well.

12.2 System Shutdown

A normal shutdown, such as for maintenance purposes, transitions the EC and media filter stages from standby or run mode to off. To shut down the system, turn the following switches to the OFF position:

- EC SYSTEM 1–3
- MEDIA FILTER SYSTEM
- MEDIA FILTER CONTROLLER

For normal shutdowns, leave the pump control switches in the AUTO position.

13. Maintenance

13.1 General

Inspect all system components regularly to ensure they are operating properly and maintain a consistent data log to monitor their performance. Over time, the data will indicate when certain items need cleaning and/or replacement.

- Basic maintenance includes the following actions:
- Examine the system components for any signs of damage or malfunction.
- Inspect and clean the media filter pods. Replace media when necessary.
- Check the salt level in the brine tote. Add salt when the salt level is depleted.
- Verify caustic and CO_2 levels are sufficient for pH adjustment.
- Review all system logs available on the HMI.
- Verify that the preset amperage control is functioning properly by monitoring the amperage display meter on the HMI and verifying the target current is achieved.
- Record all pertinent data in the treatment log.

13.2 Conductivity Probe Calibration

The Conductivity Probe should be calibrated per the schedule mandated by your regulatory agency while the system is in operation. Calibration with a reference solution is the preferred method, but calibration with process solution can be done if no reference solution is available.

NOTE: When a damaged or malfunctioning Conductivity Probe has been replaced, complete the Zero Calibration procedure (as outlined on Page 17 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* that accompanies this manual) for the new Conductivity Probe before calibrating with one of the following methods.

13.2.1 Calibration with a Reference Solution

This calibration method adjusts the Conductivity Probe reading to match the value of a reference solution. Use a reference solution that is at the same value or higher than the expected measurement readings.

1. Thoroughly rinse the cleaned Conductivity Probe in deionized water.
2. Put the Conductivity Probe in the reference solution. Support the Conductivity Probe so that it does not touch the container. **Ensure that there is at least 2 inches of space between the Conductivity Probe and the sides of the container**. Stir the Conductivity Probe in the solution to remove bubbles.

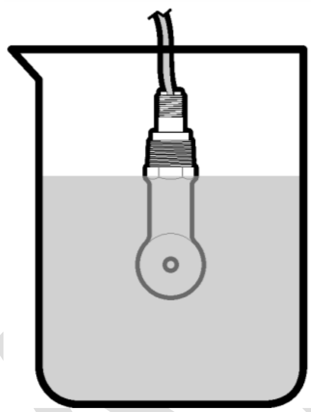


Figure 69: Conductivity Probe in Reference Solution

3. Wait for the Conductivity Probe and solution temperature to equalize. This can take 30 minutes or more if the temperature difference between the process and reference solution is significant.
4. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**.
5. Select **Sample Cal** and push **ENTER**.
6. Select the calibration for the specified parameter, which is **COND**, and push **ENTER**.

NOTE: Refer to the sensor configuration menu if the necessary option is not shown.

7. If the passcode is enabled in the security menu for the controller, enter the passcode.
8. Select the option for the output signal during calibration:

Table 10: Output Signal Options for Calibration

Option	Description
Active	The instrument sends the current measured output value during the calibration procedure.
Hold	The probe output value is held at the current measured value during the calibration procedure.
Transfer	A preset output value is sent during calibration. Refer to the controller user manual to change the preset value.

9. With the Conductivity Probe in the reference solution, push **ENTER**.
10. Enter the reference temperature of the reference solution and push **ENTER**.
11. Enter the slope of the reference solution and push **ENTER**.
12. Wait for the value to stabilize and push **ENTER**. **NOTE:** The screen may advance to the next step automatically.
13. Enter the value of the reference solution and push **ENTER**.
14. Review the calibration result:
    - Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown.
    - Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information.
15. If the calibration passed, push **ENTER** to continue.
16. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*.
17. On the New Sensor screen, select whether the Conductivity Probe is new:

Table 11: Conductivity Probe Options for Calibration

Option	Description
Yes	The Conductivity Probe was not previously calibrated with this controller. The days of operation and previous calibration curves for the Conductivity Probe are reset.
No	The Conductivity Probe was calibrated previously with this controller.

18. Return the Conductivity Probe to the treatment train and push **ENTER**.

The output signal returns to the active state, and the measured sample value is shown on the measure screen.

NOTE: If the output mode was set to HOLD or TRANSFER, select the delay time until the outputs return to the active state.

13.2.2 Calibration with the Process Sample

For this type of calibration, the Conductivity Probe can remain in the process sample, or a portion of the process sample can be removed for calibration. The reference value must be determined with a secondary verification instrument.

1. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**.
2. Select **Sample Cal** and push **ENTER**.
3. Select the type of calibration, which is **COND**, and push **ENTER**.

NOTE: Refer to the sensor configuration menu if the necessary option is not shown.

4. If the passcode is enabled in the security menu for the controller, enter the passcode.
5. Select the option for the output signal during calibration:

Table 12: Output Signal Options for Calibration

Option	Description
Active	The instrument sends the current measured output value during the calibration procedure.
Hold	The probe output value is held at the current measured value during the calibration procedure.
Transfer	A preset output value is sent during calibration. Refer to the controller user manual to change the preset value.

6. With the Conductivity Probe in the process sample, push **ENTER**. The measured value is shown.
7. Wait for the value to stabilize and push **ENTER**.
8. Measure the TDS value with a secondary verification instrument. Use the arrow keys to enter the measured value and push **ENTER**.
9. Review the calibration result:
   - Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown.
   - Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to the Troubleshooting section on Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information.
10. If the calibration passed, push **ENTER** to continue.
11. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*.
12. On the New Sensor screen, select whether the probe is new:

Table 13: Calibration Options for New Sensor

Option	Description
Yes	The Conductivity Probe was not calibrated previously with this controller. The days of operation and previous calibration curves for the Conductivity Probe are reset.
No	The Conductivity Probe was calibrated previously with this controller.

13. Return the Conductivity Probe to the treatment train and push **ENTER**.

The output signal returns to the active state, and the measured sample value is shown on the measure screen.

NOTE: If the output mode is set to HOLD or TRANSFER, select the delay time until the outputs return to the active state.

13.3 Inspecting, Cleaning, and Replacing EC Cells

To remove an EC cell for inspection, cleaning, or replacement, complete the following steps:

1. Check the EC cells and surrounding area for indications of problems such as leaks or loose interconnect power cables.
2. Power off the EC subsystem using the appropriate EC SYSTEM SUBSYSTEM 1–3 switch on the control cabinet.
3. Close the EC cell isolation valves and open the cell housing drain valve near the floor.
4. Loosen and remove the flange bolts.

DANGER: Do not disconnect or reconnect any cell leads while the EC system is operating. Do not operate the system without the cell leads connected and the cells filled with water.

1. Remove the power cables from the top of the cell. Turn the cable until it removes easily.
2. Remove the pressure relief valve at the top of the cell. Grasp the slide ring and pull downwards while gently pulling upwards on the vent.
3. Remove the EC cell. Residual water may spill from the cell plates. Use caution when removing the cell to avoid plumbing damage.
4. Inspect the cell plates for sediment build up and thickness. If the cell looks dirty but the plates are substantial, clean the cell with a pressure washer. Replace the cell by completing the remaining steps. If the cell appears consumed it must be replaced.
5. Place the old cell in a waterproof container to avoid spillage.
6. Save the rubber flange gasket and put the gasket back in place to receive the new or cleaned EC cell.
7. Install the new or cleaned EC cell by placing a new cell in the old cell location or returning a cleaned cell to the EC cell subsystem.
8. Reattach the cell power cables. Ensure the cables are secure by pushing down and turning until the connection is tight.
9. Install the flange bolts with the following precautions:
   - Tighten the bolts in the following order: 1 and 5, 4 and 8, 2 and 6, 3 and 7.
   - Use no more than 30 lb-ft of torque on each bolt.
10. Reattach the pressure relief valve.
11. Close cell housing drains.
12. Open EC cell isolation valves.

13.4 Media Filter Maintenance

The filtration media must be periodically removed with a vacuum truck and replaced with an equal amount and proportion of new media. For example, if the media bed is 8 inches of crushed rock below 24 inches of crushed glass, the same approximate proportions must be preserved when replacing the media. An exception is if site water conditions change, and authorized personnel determine a new media filtration configuration.

13.4.1 Performing a Manual Backflush

To perform a manual backflush, complete the following steps:

1. Press the Start button on the automatic filter controller and hold the button for three seconds.
2. The operator can also perform a manual backflush by opening each backflush solenoid located on the sides of the automatic filter controller. Open and close only one solenoid at a time.

Note: Performing a manual backflush by opening the backflush solenoid is not recommended. Manually open the backflush solenoids only when a backflush is immediately required.

13.5 pH Probe Calibration

To ensure proper operation, the pH probes should be calibrated monthly, or more often as mandated by your regulatory agency. Keep records of the calibrations of each probe on a copy of the *sample pH Probe Calibration Record form or similar found in Section 13.5.1 on Page 69.*

The Hach sc200 controllers are capable of four different calibration types. WaterTectonics recommends performing the 2 Point Manual Calibration.

To calibrate the pH probes, complete the following steps. Refer also to the Hach DPD1P1 probe documentation.

1. For this calibration, obtain two different pH buffer solutions (a buffer solution with a pH of 4.0 and a second buffer solution with a pH of 7.0 are recommended).
2. Before performing the calibration, isolate the pH probe from the water stream by disabling the pump. Follow lockout/tagout procedures. If necessary, drain the pipe before removing the pH probe.
3. Unscrew the collar at the top of the probe mount and remove the pH probe from the casing.
4. Clean probes before calibration. Use a soft cloth and clean water. Do NOT use cleaning agents or abrasives as this will damage the glass lens located on the bottom of the probe.
5. From the Hach sc200 controller's Main Menu, select **Sensor Setup** and press the green check mark symbol.
6. Select the pH probe to be calibrated from the menu and press the green check mark symbol.
7. Select **Calibrate** and press the green check mark symbol.
8. Select **2 Point Manual**. Select the **Output Mode**: The choices are Active, Hold, or Transfer. Choose **Hold** to hold the output at its present state during the calibration procedure. Press the green check mark symbol.

9. Place the pH probe in the pH 4.0 buffer solution and press the green check mark symbol.
10. Record the reading in the "Before pH 4 Calibration" box on *the pH Probe Calibration Record form found in Section 13.5.1 on Page 69.*
11. On the Hach controller screen, change the reading to pH 4.0, if the reading is not the same as the pH of the buffer solution.
12. Rinse the pH probe thoroughly with deionized or clean, potable water to prevent crossover contamination from one buffer solution to the next.
13. Place the pH probe in the pH 7.0 buffer solution and press the green check mark symbol.
14. Record the reading in the "Before pH 7 Calibration" box on the *pH Probe Calibration Record form found in Section 13.5.1 on Page 69.*
15. On the Hach controller screen, change the reading to pH of 7.0 if the reading is not the same as the pH of the buffer solution.

    A screen will display **2 Point Calibration Complete** and the slope (XX.X mV).
16. Record the slope on the *pH Probe Calibration Record* form below.
17. Select the available **Output Mode**. Choose **Active** to return the probe to active data measurement.
18. Complete the remainder of the ***pH Probe Calibration Record*** form below.
19. Return the probe to the probe mount and tighten the collar finger tight.
20. Restore function to any equipment that was taken out of service in Step 2.

13.5.1 Table 14: PH PROBE CALIBRATION RECORD

Date	
Time	
Operator	
Before pH 4 Calibration	
Before pH 7 Calibration	
Slope	
Probe Tag No.	
Probe Serial No.	

13.6 Replacing pH Probe Salt Bridge and Reference Solution

1. Hold the sensor firmly with the electrode tip facing upwards.
2. Remove the existing salt bridge by using a 15/16 wrench (24mm) and turning it counterclockwise.
3. Dispose of the salt bridge using an approved method.
4. Pour out the old reference filling solution.
5. Rinse the reservoir with distilled or de-ionized water.
6. Slowly refill the reservoir with Thermo Scientific AquaSensors Reference Filling Solution (P/N RCS02) so that the solution just covers the reference O-ring.

   NOTE: Do not overfill. Overfilling will lead to excessive pressures that will affect the junction potentials of the reference.

Figure 70: Hold Sensor with Electrode Tip Pointing Upwards.

7. Slowly screw the new salt bridge clockwise onto the sensor head until secure. Tighten the salt bridge with a 15/16 wrench (24mm) until snug.

   NOTE: Do not over tighten. Maximum torque: 10 inch-lbs (1.1 Nm)

8. After replacing the salt bridge and reference solution, calibrate the sensor.

13.7 pH Probe Cleaning

In order to maintain accurate measurement values, the sensor will need occasional maintenance. The harsher the process, the more maintenance the sensor will require. Proper and regular maintenance will yield a longer probe life. The recommended pH probe cleaning procedure is as follows:

1. Remove the probe from service and rinse or spray it with warm water to remove heavy deposits.
2. Soak the probe in a container of hot detergent water for 30 minutes. Do not use detergents that contain oily skin softeners like aloe or lanolin that can coat the glass electrode. Powdered Alconox™ and Dawn™ dishwashing liquid work well.
3. Use a soft-bristled brush, such as a soft toothbrush, and hot detergent water to scrub the entire electrode end of the sensor, being careful not to scratch or break the glass electrode.
4. Rinse the electrode end with clean warm water.
5. If deposits are still present on glass electrode repeat steps 2 and 3. In the case of lime or other mineral deposits a weak solution (about 0.1 M) of hydrochloric acid may be used. In some cases, a dilute solution (about 10:1) of water and chlorine bleach or a solution of water and EDTA may also work. Stubborn oil or grease deposits may require cleaning with a solvent such as acetone or alcohol. Verify that the sensor body is compatible with the solvent. Protein deposits may be cleaned with a pepsin-based cleaning solution. Bacterial or mold growths may be removed with dilute chlorine bleach.

6. Before returning the sensor to service, allow it to soak in water or buffer at ambient temperature for about an hour to stabilize.
7. After cleaning the probe, always calibrate the probe before placing back in service.

13.8 pH Probe Storage

The electrode has a protective cap that keeps it hydrated. If the electrode is taken out of operation and requires storage, it should be stored in pH electrode storage solution, RCS03.

For short-term storage, put several drops of storage solution on the absorbent material in the protective cap and replace the cap on the sensor. This keeps the process electrode and salt bridge moist.

For extended storage, repeat the above short-term storage procedure every 2 to 4 weeks, depending on the surrounding environmental conditions.

In the event of an extended system shutdown, the pH probes must be protected from drying out or freezing. Once the system has been shut down and drained of water, perform the following steps to maintain the pH probes for future use:

NOTE: In case some water is still in the piping, open the nearest upstream sample port valve and drain any remaining water into a bucket before removing a probe.

1. Isolate the pH probe from the water stream by disabling the pump. Follow lockout/tagout procedures. If necessary, drain the pipe before removing the pH probe.
2. Unscrew the collar at the top of the probe mount and pull the probe out of the pipe mounting saddle.
3. Fill the black protective cap with pH 4 buffer solution or deionized water to soak the sponge inside the cap.

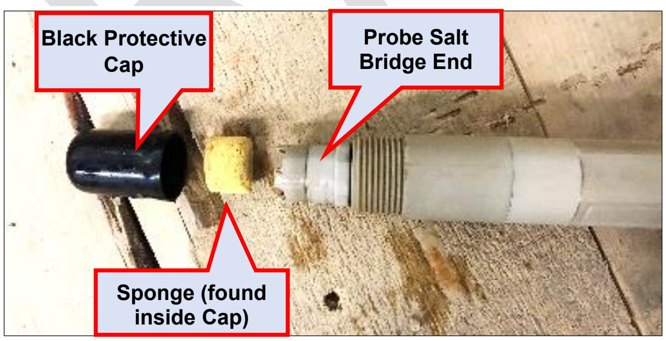


Figure 71: Preparing pH Probe for Storage

4. Place the protective cap securely on the end of the probe. This will prevent the salt bridge from drying out.
5. Repeat steps 1 and 2 every 2 to 4 weeks while the probe is removed from the water treatment train.

13.9 System Disconnect and Circuit Breaker System

- The system disconnect is located on the unit exterior on the side of an electrical box. The external disconnect switch must be in the ON position for any part of the system to function. Pull the handle to the OFF position and complete any required lock out/tag out procedures before attempting any electrical work or repairs to the system. All electrical work or repairs must be done by qualified personnel or a Water Tectonics employee.
- The circuit breaker panel board and load center are located next to the control cabinet. If a circuit breaker has tripped, complete a thorough inspection of the associated system. A tripped breaker is likely an indication of a more serious issue.
- To reset a tripped breaker, move the breaker switch to the OFF position and then to the ON position.

13.10 Turbidity Probe Calibration

Perform this calibration per the schedule mandated by your regulatory agency. Keep a record of each calibration using the *Turbidity Probe Calibration Record form or similar found in Section 13.10.1 on Page 74.*

1. Assemble the following items for this calibration:
    a. Hach calibration kit (No. 57330-00), which includes a calibration chamber and clamp, as well as two bottles of 800 NTU turbidity standard solution.

       NOTE: If NOT using a calibration kit, obtain a clean, black plastic container that will hold approximately 1200 mls, a blackout cloth to cover it completely, and two bottles of 800 NTU turbidity standard solution (PN 2660549 or WT# 100118).

    b. Approximately 200 mls deionized water.

2. Set the Outmode:
    a. At the TREAT Hach controller's Main Menu, select **Sensor Setup** and press the green check mark symbol.

    b. Select the name of the sensor being calibrated and press the green check mark symbol.

    c. Select **Calibrate** and press the green check mark symbol.

    d. Select **Set Outmode**. The options are Active, Hold and Transfer. Select **Hold** to hold the output at its present state during the calibration procedure. Press the green check mark symbol.

3. Place the sensor in the calibration cylinder with deionized water and hold in place using the clamp. The tip of the probe should be approximately 1 inch below the surface of the water. If not using a kit with a clamp, hold the probe in the water and cover the probe and black plastic container with a blackout cloth. **The measurement must be taken with as little ambient light as possible.**

On the Hach controller, select **Sensor Measure** and press the green check mark symbol. Record the reading in the "Initial Reading" box on the *Turbidity Probe Calibration Record form or similar found in Section 13.10.1 on Page 74.*

4. Press "Back" to return to the Calibrate menu. Select **Offset**. Multiply the reading obtained in step 5 by -1, and enter that value. For example, if the reading obtained in Step 4 was 10 NTU, enter -10. Press Enter to save this value.
5. Rinse clean the outside of each bottle of 800 NTU turbidity standard solution to avoid contaminating the solution when the bottle is opened.
6. Gently invert both bottles of 800 NTU turbidity standard solution a minimum of **50 times**. Remove the lid and seal from each bottle.
7. Leaving the deionized water in the calibration cylinder or black plastic container, slowly pour the contents of both bottles into the calibration cylinder or black plastic container. **Do NOT create bubbles.**
8. Immediately place the probe tip in the calibration cylinder and hold in place with the clamp, or hold the probe in the black plastic container. The tip of the probe should be approximately 1 inch below the surface of the 800 NTU turbidity standard solution.
9. On the Hach controller, select **Sensor Measure** again. Allow the reading to become stable and record the value in the "Measured Value" box on the *Turbidity Probe Calibration Record* form below.
10. Calculate the factor using the following formula:

NEW FACTOR = SOLUTION NTU / MEASURED VALUE

11. For example, if the standard solution used is 800 NTU and the probe measures the turbidity of the sample at 750 NTU, the new factor would be calculated as:

New Factor = 800 / 750 = 1.07.

12. Write the calculation result in the "New Factor" box on the *Turbidity Probe Calibration Record* form below.
13. On the Hach controller, go back to the Main Menu and select **Sensor Setup**.
14. Select **Calibrate** and then open the **Factor Menu** and enter the factor that was calculated in Step 11.
15. Complete the remainder of the ***Turbidity Probe Calibration Record*** **form** provided below.

13.10.1 Table 15:Turbidity Probe Calibration Record

Date	
Time	
Operator	
Probe Tag No.	
Probe Serial No.	
Initial Reading	

$$\frac{\text{SOLUTION NTU}}{\text{MEASURED VALUE}} = \text{NEW FACTOR}$$

13.11 Verifying Level Transmitter Connections

The level transmitters connect inside an exterior junction box. Periodically check the level transmitter connections by verifying the level signals appear on the HMI. If the level signals do not appear or are inaccurate, verify the connections are secure inside the junction box by visually inspecting the terminals and lightly pulling on each wire.

14. Routine Maintenance Schedule

Refer to the accompanying manufacturers' manuals for instructions, if instructions for performing the following tasks are not in this manual.

Table 16:Routine Maintenance Schedule

Component	Maintenance Task	Daily	Weekly	Monthly	Quarterly	6 months	Annually
Air Compressor	Drain receiver tank condensate.	✓					
	Check lubricant level. Fill if necessary.	✓					
	Check for unusual noise or vibration. Verify that guards and covers are securely in place.	✓					
	Check for air leaks.		✓				
	Change lubricant.					✓	
Chemicals	Check quantities and top up as necessary.		✓				
Chemical and CO_2 Storage Tanks	Check quantities and top up, as necessary.		✓				
Chemical Pumps[1]	Check for proper flow rate				✓		
	Check bleed valve is operating correctly				✓		
	Check metering diaphragm for damage[3]				✓		
	Check hydraulic line, and bypass line are fixed to liquid end				✓		
	Check liquid end, suction, bleed and discharge valves are tight				✓		
	Check discharge and bypass lines for kinks				✓		
	Check all electrical connections are intact				✓		
	Check integrity of the housing				✓		
	Check dosing head screws are tight				✓		

Component	Maintenance Task	Daily	Weekly	Monthly	Quarterly	6 months	Annually
Clearwell, Settling, & Source Tanks	Drain and clean.					✓	
Conductivity Probe	Inspect sensor for damage				✓		
	Calibrate Probe[2]	Per schedule mandated by your regulatory agency					
	Clean Probe.				✓		
EC System	Inspect system for leaks and loose power cables.		✓				
	Inspect Treatment Cell Plate Stacks for wear or buildup. Clean or replace, as necessary.		✓				
EC and MF Pumps	Check for worn or damaged parts and loose bolts.			✓			
	Inspect impeller, seals, fastening bolts and bearings.						✓
Flowmeter	Check for proper flow rate		✓				
	Inspect for loose cables, screws and integrity of power supply and process connections						✓
Media Filter	Replace filtration media.						✓
	Automatic backflush.	When differential pressure is > 10 psid.					
pH Probe	Clean Probe[1].				✓		
	Replace salt bridge & fill solution[3]						✓
	Inspect probe for damage				✓		
	Calibrate Probe			✓			
		Or more often as mandated by your regulatory agency.					
Turbidity Probe	Clean Probe[1].			✓			
	Calibrate Probe			✓			
		Or more often as mandated by your regulatory agency.					

1 - Cleaning frequency is application dependent. More or less frequent cleaning will be appropriate in some applications.

2 – Cleaning frequency is application dependent. More or less frequent cleaning will be appropriate in some applications.

3 – Salt bridge replacement frequency is application dependent. More or less frequent replacement will be appropriate in some applications.

15. Troubleshooting

This section provides a guide to troubleshooting problems that may occur during normal operation. Computer diagnostic assistance is available from Water Tectonics for all electrical/electronic parts and for component analysis.

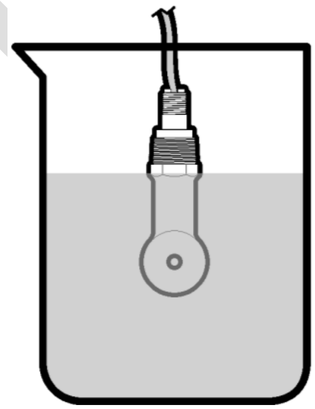
Troubleshooting basic pump operations and plumbing is beyond the scope of this document. A qualified technician familiar with the setup and installation of the equipment is assumed to have performed basic hydraulic system checks.

For automatic sampling, monitoring, and data recording equipment and filtration system troubleshooting, refer to the manufacturer’s documentation.

Table 17: Troubleshooting Guide

Problem	Diagnosis	Action
Discharge or recycle is turbid or looks dirty. **Note:** Though there are many factors that can	Media filter did not complete backflush cycle.	Perform a manual backflush as described in the media filter manufacturer's documentation.

contribute to this condition, an operator can check for certain causes immediately.	If system is also not meeting current (amperage) targets, the cells are clogged, loaded with material, or consumed.	Inspect cells and check maintenance records. Refer to the *Conductivity Probe Calibration* *The Conductivity Probe* should be calibrated per the schedule mandated by your regulatory agency while the system is in operation. Calibration with a reference solution is the preferred method, but calibration with process solution can be done if no reference solution is available. **NOTE:** When a damaged or malfunctioning Conductivity Probe has been replaced, complete the Zero Calibration procedure (as outlined on Page 17 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* that accompanies this manual) for the new Conductivity Probe before calibrating with one of the following methods. **15.1.1 Calibration with a Reference Solution** This calibration method adjusts the Conductivity Probe reading to match the value of a reference solution. Use a reference solution that is at the same value or higher than the expected measurement readings. 19. Thoroughly rinse the cleaned Conductivity Probe in deionized water.

		20. Put the Conductivity Probe in the reference solution. Support the Conductivity Probe so that it does not touch the container. **Ensure that there is at least 2 inches of space between the Conductivity Probe and the sides of the container**. Stir the Conductivity Probe in the solution to remove bubbles.  *Figure 69: Conductivity Probe in Reference Solution* 21. Wait for the Conductivity Probe and solution temperature to equalize. This can take 30 minutes or more if the temperature difference between the process and reference solution is significant. 22. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**. 23. Select **Sample Cal** and push **ENTER**.

24. Select the calibration for the specified parameter, which is **COND**, and push **ENTER**.

NOTE: Refer to the sensor configuration menu if the necessary option is not shown.

25. If the passcode is enabled in the security menu for the controller, enter the passcode.
26. Select the option for the output signal during calibration:

Table 10: Output Signal Options for Calibration

Option	Descriptio
Active	The instrum calibration p
Hold	The probe c the calibrat
Transfer	A preset c controller u

27. With the Conductivity Probe in the reference solution, push **ENTER**.
28. Enter the reference temperature of the reference solution and push **ENTER**.
29. Enter the slope of the reference solution and push **ENTER**.
30. Wait for the value to stabilize and push **ENTER**. **NOTE:** The screen may advance to the next step automatically.

		31. Enter the value of the reference solution and push **ENTER**. 32. Review the calibration result: • Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown. • Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information. 33. If the calibration passed, push **ENTER** to continue. 34. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*.

		35. On the New Sensor screen, select whether the Conductivity Probe is new: **Table 11: Conductivity Probe Options for Calibration** Option: Yes — The Conduct… controller. Th… the Conductiv… Option: No — The Conducti… 36. Return the Conductivity Probe to the treatment train and push **ENTER**. The output signal returns to the active state, and the measured sample value is shown on the measure screen. **NOTE:** If the output mode was set to HOLD or TRANSFER, select the delay time until the outputs return to the active state. **15.1.2 Calibration with the Process Sample** For this type of calibration, the Conductivity Probe can remain in the process sample, or a portion of the process sample can be removed for calibration. The reference value must be determined with a secondary verification instrument. 14. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**. 15. Select **Sample Cal** and push **ENTER**.

		16. Select the type of calibration, which is **COND**, and push **ENTER**. **NOTE:** Refer to the sensor configuration menu if the necessary option is not shown. 17. If the passcode is enabled in the security menu for the controller, enter the passcode. 18. Select the option for the output signal during calibration: **Table 12: Output Signal Options for Calibration** Option | Descriptio Active | The instru calibration Hold | The probe the calibra Transfer | A preset controller u 19. With the Conductivity Probe in the process sample, push **ENTER**. The measured value is shown. 20. Wait for the value to stabilize and push **ENTER**. 21. Measure the TDS value with a secondary verification instrument. Use the arrow keys to enter the measured value and push **ENTER**. 22. Review the calibration result:

		• Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown. • Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to the Troubleshooting section on Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information. 23. If the calibration passed, push **ENTER** to continue. 24. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*. 25. On the New Sensor screen, select whether the probe is new:

<table>
<tr><th>Problem</th><th>Diagnosis</th><th>Action</th></tr>
<tr><td></td><td></td><td>

Table 13: Calibration Options for New Sensor

Option	Description
Yes	The Conduct controller. The Conductivity
No	The Conducti

26. Return the Conductivity Probe to the treatment train and push **ENTER**.

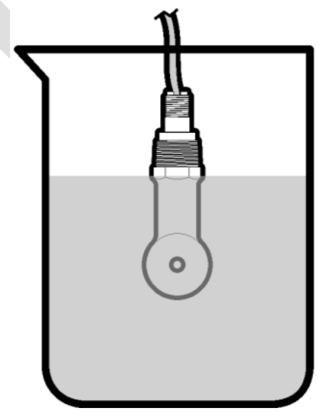
The output signal returns to the active state, and the measured sample value is shown on the measure screen.

NOTE: If the output mode is set to HOLD or TRANSFER, select the delay time until the outputs return to the active state.

Inspecting, Cleaning, and Replacing EC Cells section.

</td></tr>
<tr><td>Voltage readings are high and preset amperage is not met.</td><td>Current (amperage) target set point is incorrect. A typical target amperage is approximately 100 A.</td><td>Verify the set points on the HMI. (Voltage is adjusted programmatically to meet the target setpoint.)</td></tr>
</table>

	Cells are clogged, loaded with material, or consumed.	Inspect cells and check maintenance records. Refer to the *Conductivity Probe Calibration* *The Conductivity Probe* should be calibrated per the schedule mandated by your regulatory agency while the system is in operation. Calibration with a reference solution is the preferred method, but calibration with process solution can be done if no reference solution is available. **NOTE:** When a damaged or malfunctioning Conductivity Probe has been replaced, complete the Zero Calibration procedure (as outlined on Page 17 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* that accompanies this manual) for the new Conductivity Probe before calibrating with one of the following methods. **15.1.3 Calibration with a Reference Solution** This calibration method adjusts the Conductivity Probe reading to match the value of a reference solution. Use a reference solution that is at the same value or higher than the expected measurement readings. 37. Thoroughly rinse the cleaned Conductivity Probe in deionized water.

		38. Put the Conductivity Probe in the reference solution. Support the Conductivity Probe so that it does not touch the container. **Ensure that there is at least 2 inches of space between the Conductivity Probe and the sides of the container**. Stir the Conductivity Probe in the solution to remove bubbles.  *Figure 69: Conductivity Probe in Reference Solution* 39. Wait for the Conductivity Probe and solution temperature to equalize. This can take 30 minutes or more if the temperature difference between the process and reference solution is significant. 40. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**. 41. Select **Sample Cal** and push **ENTER**.

		42. Select the calibration for the specified parameter, which is **COND**, and push **ENTER**. **NOTE:** Refer to the sensor configuration menu if the necessary option is not shown. 43. If the passcode is enabled in the security menu for the controller, enter the passcode. 44. Select the option for the output signal during calibration: **Table 10: Output Signal Options for Calibration** Option | Descriptio Active | The instrum calibration Hold | The probe the calibrat Transfer | A preset controller u 45. With the Conductivity Probe in the reference solution, push **ENTER**. 46. Enter the reference temperature of the reference solution and push **ENTER**. 47. Enter the slope of the reference solution and push **ENTER**. 48. Wait for the value to stabilize and push **ENTER**. **NOTE:** The screen may advance to the next step automatically.

		49. Enter the value of the reference solution and push **ENTER**. 50. Review the calibration result: • Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown. • Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information. 51. If the calibration passed, push **ENTER** to continue. 52. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*.

53. On the New Sensor screen, select whether the Conductivity Probe is new:

Table 11: Conductivity Probe Options for Calibration

Option	Description
Yes	The Conduct controller. The the Conductiv
No	The Conducti

54. Return the Conductivity Probe to the treatment train and push **ENTER**.

The output signal returns to the active state, and the measured sample value is shown on the measure screen.

NOTE: If the output mode was set to HOLD or TRANSFER, select the delay time until the outputs return to the active state.

15.1.4 Calibration with the Process Sample

For this type of calibration, the Conductivity Probe can remain in the process sample, or a portion of the process sample can be removed for calibration. The reference value must be determined with a secondary verification instrument.

27. Push the **MENU** key and select **Sensor Setup**, [Select Sensor], **Calibrate**.

28. Select **Sample Cal** and push **ENTER**.

29. Select the type of calibration, which is **COND**, and push **ENTER**.

NOTE: Refer to the sensor configuration menu if the necessary option is not shown.

30. If the passcode is enabled in the security menu for the controller, enter the passcode.

31. Select the option for the output signal during calibration:

Table 12: Output Signal Options for Calibration

Option	Descriptio
Active	The instru calibration
Hold	The probe the calibra
Transfer	A preset controller

32. With the Conductivity Probe in the process sample, push **ENTER**. The measured value is shown.

33. Wait for the value to stabilize and push **ENTER**.

34. Measure the TDS value with a secondary verification instrument. Use the arrow keys to enter the measured value and push **ENTER**.

35. Review the calibration result:

		• Passed—the Conductivity Probe is calibrated and ready to measure samples. The slope and/or offset values are shown. • Failed—either the calibration slope or offset is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to the Troubleshooting section on Page 22 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual* for more information. 36. If the calibration passed, push **ENTER** to continue. 37. If the option for operator ID is set to Yes in the Calibration Options menu, enter an operator ID. If necessary, refer to the Change Calibration Options on Page 21 of the *Hach 3725E2T Inductive Conductivity Sensors User Manual*. 38. On the New Sensor screen, select whether the probe is new:

Problem	Diagnosis	Action
		Table 13: Calibration Options for New Sensor <table><tr><th>Option</th><th>Description</th></tr><tr><td>Yes</td><td>The Conduct controller. The Conductivity P</td></tr><tr><td>No</td><td>The Conducti</td></tr></table>39. Return the Conductivity Probe to the treatment train and push **ENTER**. The output signal returns to the active state, and the measured sample value is shown on the measure screen. **NOTE:** If the output mode is set to HOLD or TRANSFER, select the delay time until the outputs return to the active state. Inspecting, Cleaning, and Replacing EC Cells section.
	Conductivity is below designed system specifications.	Check the salt level in the brine tote. Add salt if necessary. Verify the brine pump is functioning properly.

Problem	Diagnosis	Action
There is no water running through the system when system is set to AUTO.	The ON setpoint for the water level in the source tank is too low to activate the supply pumps.	Adjust pump ON setpoint to below water level. **Caution:** Do not attempt to draw water from below the water intake level or damage to the pumps may occur.

	Source tank level transmitter is not functioning.	Verify connection between level transmitter and system. Refer to the *pH Probe Calibration* *To* ensure proper operation, the pH probes should be calibrated monthly, or more often as mandated by your regulatory agency. Keep records of the calibrations of each probe on a copy of the *sample pH Probe Calibration Record form or similar found in Section 13.5.1 on Page 69.* The Hach sc200 controllers are capable of four different calibration types. WaterTectonics recommends performing the 2 Point Manual Calibration. To calibrate the pH probes, complete the following steps. Refer also to the Hach DPD1P1 probe documentation. 21. For this calibration, obtain two different pH buffer solutions (a buffer solution with a pH of 4.0 and a second buffer solution with a pH of 7.0 are recommended). 22. Before performing the calibration, isolate the pH probe from the water stream by disabling the pump. Follow lockout/tagout procedures. If necessary, drain the pipe before removing the pH probe.

		23. Unscrew the collar at the top of the probe mount and remove the pH probe from the casing. 24. Clean probes before calibration. Use a soft cloth and clean water. Do NOT use cleaning agents or abrasives as this will damage the glass lens located on the bottom of the probe. 25. From the Hach sc200 controller's Main Menu, select **Sensor Setup** and press the green check mark symbol. 26. Select the pH probe to be calibrated from the menu and press the green check mark symbol. 27. Select **Calibrate** and press the green check mark symbol. 28. Select **2 Point Manual**. Select the **Output Mode**: The choices are Active, Hold, or Transfer. Choose **Hold** to hold the output at its present state during the calibration procedure. Press the green check mark symbol. 29. Place the pH probe in the pH 4.0 buffer solution and press the green check mark symbol. *30.* Record the reading in the "Before pH 4 Calibration" box on *the pH Probe Calibration*

		Record form found in Section 13.5.1 on Page 69. 31. On the Hach controller screen, change the reading to pH 4.0, if the reading is not the same as the pH of the buffer solution. 32. Rinse the pH probe thoroughly with deionized or clean, potable water to prevent crossover contamination from one buffer solution to the next. 33. Place the pH probe in the pH 7.0 buffer solution and press the green check mark symbol. *34.* Record the reading in the "Before pH 7 Calibration" box on the *pH Probe Calibration Record form found in Section 13.5.1 on Page 69.* 35. On the Hach controller screen, change the reading to pH of 7.0 if the reading is not the same as the pH of the buffer solution. A screen will display **2 Point Calibration Complete** and the slope (XX.X mV). 36. Record the slope on the *pH Probe Calibration Record* form below. 37. Select the available **Output Mode**. Choose **Active** to return the

probe to active data measurement.

38. Complete the remainder of the ***pH Probe Calibration Record*** form below.
39. Return the probe to the probe mount and tighten the collar finger tight.
40. Restore function to any equipment that was taken out of service in Step 2.

15.1.5 Table 14: PH PROBE CALIBRATION RECORD

Date
Time
Operator
Before pH 4 Calibration
Before pH 7 Calibration
Slope
Probe Tag No.
Probe Serial No.

15.2 Replacing pH Probe Salt Bridge and Reference Solution

9. Hold the sensor firmly with the electrode tip facing upwards.
10. Remove the existing salt bridge by using a 15/16

		wrench (24mm) and turning it counterclockwise. 11. Dispose of the salt bridge using an approved method. 12. Pour out the old reference filling solution. 13. Rinse the reservoir with distilled or de-ionized water. 14. Slowly refill the reservoir with Thermo Scientific AquaSensors Reference Filling Solution (P/N RCS02) so that the solution just covers the reference O-ring. **NOTE: Do not overfill.** Overfilling will lead to excessive pressures that will affect the junction potentials of the reference. 15. Slowly screw the new salt bridge clockwise onto the sensor head until secure. Tighten the salt bridge with a 15/16 wrench (24mm) until snug. **NOTE: Do not over tighten.** Maximum torque: 10 inch-lbs (1.1 Nm) 16. After replacing the salt bridge and reference solution, calibrate the sensor. **15.3 pH Probe Cleaning** In order to maintain accurate measurement values, the sensor will need occasional maintenance. The harsher the process, the more maintenance the sensor will

		require. Proper and regular maintenance will yield a longer probe life. The recommended pH probe cleaning procedure is as follows: 8. Remove the probe from service and rinse or spray it with warm water to remove heavy deposits. 9. Soak the probe in a container of hot detergent water for 30 minutes. Do not use detergents that contain oily skin softeners like aloe or lanolin that can coat the glass electrode. Powdered Alconox™ and Dawn™ dishwashing liquid work well. 10. Use a soft-bristled brush, such as a soft toothbrush, and hot detergent water to scrub the entire electrode end of the sensor, being careful not to scratch or break the glass electrode. 11. Rinse the electrode end with clean warm water. 12. If deposits are still present on glass electrode repeat steps 2 and 3. In the case of lime or other mineral deposits a weak solution (about 0.1 M) of hydrochloric acid may be used. In some cases, a dilute solution (about 10:1) of water and chlorine bleach or a solution of water and EDTA may also work. Stubborn oil or grease deposits may require cleaning with a solvent such as acetone or alcohol. Verify that the

sensor body is compatible with the solvent. Protein deposits may be cleaned with a pepsin-based cleaning solution. Bacterial or mold growths may be removed with dilute chlorine bleach.

13. Before returning the sensor to service, allow it to soak in water or buffer at ambient temperature for about an hour to stabilize.
14. After cleaning the probe, always calibrate the probe before placing back in service.

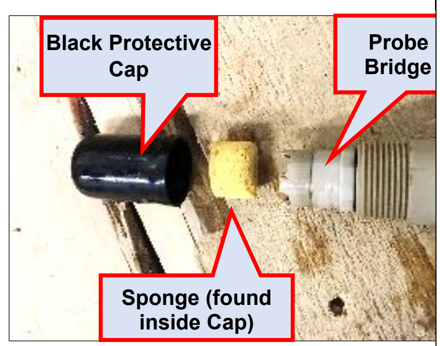
15.4 pH Probe Storage

The electrode has a protective cap that keeps it hydrated. If the electrode is taken out of operation and requires storage, it should be stored in pH electrode storage solution, RCS03.

For short-term storage, put several drops of storage solution on the absorbent material in the protective cap and replace the cap on the sensor. This keeps the process electrode and salt bridge moist.

For extended storage, repeat the above short-term storage procedure every 2 to 4 weeks, depending on the surrounding environmental conditions.

In the event of an extended system shutdown, the pH probes must be protected from drying out or freezing. Once

		the system has been shut down and drained of water, perform the following steps to maintain the pH probes for future use: **NOTE:** In case some water is still in the piping, open the nearest upstream sample port valve and drain any remaining water into a bucket before removing a probe. 6. Isolate the pH probe from the water stream by disabling the pump. Follow lockout/tagout procedures. If necessary, drain the pipe before removing the pH probe. 7. Unscrew the collar at the top of the probe mount and pull the probe out of the pipe mounting saddle. 8. Fill the black protective cap with pH 4 buffer solution or deionized water to soak the sponge inside the cap.  *Figure 71: Preparing pH Probe for Storage* 9. Place the protective cap securely on the end of the probe. This will

		prevent the salt bridge from drying out. 10. Repeat steps 1 and 2 every 2 to 4 weeks while the probe is removed from the water treatment train. **15.5 System Disconnect and Circuit Breaker System** • The system disconnect is located on the unit exterior on the side of an electrical box. The external disconnect switch must be in the ON position for any part of the system to function. Pull the handle to the OFF position and complete any required lock out/tag out procedures before attempting any electrical work or repairs to the system. All electrical work or repairs must be done by qualified personnel or a Water Tectonics employee. • The circuit breaker panel board and load center are located next to the control cabinet. If a circuit breaker has tripped, complete a thorough inspection of the associated system. A tripped breaker is likely an indication of a more serious issue.

		• To reset a tripped breaker, move the breaker switch to the OFF position and then to the ON position. **15.6 Turbidity Probe Calibration** Perform this calibration per the schedule mandated by your regulatory agency. Keep a record of each calibration using the *Turbidity Probe Calibration Record form or similar found in Section 13.10.1 on Page 74.* 16. Assemble the following items for this calibration: a. Hach calibration kit (No. 57330-00), which includes a calibration chamber and clamp, as well as two bottles of 800 NTU turbidity standard solution. **NOTE:** If NOT using a calibration kit, obtain a clean, black plastic container that will hold approximately 1200 mls, a blackout cloth to cover it completely, and two bottles of 800 NTU turbidity standard

		solution (PN 2660549 or WT# 100118). b. Approximately 200 mls deionized water. 17. Set the Outmode: a. At the TREAT Hach controller's Main Menu, select **Sensor Setup** and press the green check mark symbol. b. Select the name of the sensor being calibrated and press the green check mark symbol. c. Select **Calibrate** and press the green check mark symbol. d. Select **Set Outmode**. The options are Active, Hold and Transfer. Select **Hold** to hold the output at its present state during the calibration procedure. Press the green check mark symbol. 18. Place the sensor in the calibration cylinder with deionized water and hold in place using the clamp. The tip of the probe should be

		approximately 1 inch below the surface of the water. If not using a kit with a clamp, hold the probe in the water and cover the probe and black plastic container with a blackout cloth. **The measurement must be taken with as little ambient light as possible.** On the Hach controller, select **Sensor Measure** and press the green check mark symbol. Record the reading in the "Initial Reading" box on the *Turbidity Probe Calibration Record form or similar found in Section 13.10.1 on Page 74.* 19. Press "Back" to return to the Calibrate menu. Select **Offset**. Multiply the reading obtained in step 5 by -1, and enter that value. For example, if the reading obtained in Step 4 was 10 NTU, enter -10. Press Enter to save this value. 20. Rinse clean the outside of each bottle of 800 NTU turbidity standard solution to avoid contaminating the solution when the bottle is opened. 21. Gently invert both bottles of 800 NTU turbidity standard solution a minimum of **50 times**. Remove the lid and seal from each bottle.

		22. Leaving the deionized water in the calibration cylinder or black plastic container, slowly pour the contents of both bottles into the calibration cylinder or black plastic container. **Do NOT create bubbles.** 23. Immediately place the probe tip in the calibration cylinder and hold in place with the clamp, or hold the probe in the black plastic container. The tip of the probe should be approximately 1 inch below the surface of the 800 NTU turbidity standard solution. 24. On the Hach controller, select **Sensor Measure** again. Allow the reading to become stable and record the value in the "Measured Value" box on the *Turbidity Probe Calibration Record* form below. 25. Calculate the factor using the following formula: NEW FACTOR = SOLUTION NTU / MEASURED VALUE 26. For example, if the standard solution used is 800 NTU and the probe measures the turbidity of the sample at 750 NTU, the new

factor would be calculated as:

New Factor = 800 / 750 = 1.07.

27. Write the calculation result in the "New Factor" box on the *Turbidity Probe Calibration Record* form below.
28. On the Hach controller, go back to the Main Menu and select **Sensor Setup**.
29. Select **Calibrate** and then open the **Factor Menu** and enter the factor that was calculated in Step 11.
30. Complete the remainder of the ***Turbidity Probe Calibration Record* form** provided below.

15.6.1 Table 15:Turbidity Probe Calibration Record

Date	
Time	
Operator	
Probe Tag No.	
Probe Serial No.	
Initial Reading	

Verifying Level Transmitter Connection section.

	Source tank level transmitter setpoints are incorrect.	Adjust the source tank ON and OFF setpoints. Refer to the **Error! Reference source not found.** section.
	Pipes are frozen due to low temperature.	Turn on the heater in the unit and increase the thermostat setting. Do not try to operate the system with frozen pipes.
	Influent pipe is leaking.	Inspect influent pipe and repair leaks.
Media filter is continuously in backflush cycle.	Pressure differential control setting is incorrect.	Verify that the pressure differential control setting is correct. Refer to the *Media Filter Operations* section and media filter manufacturer’s documentation.
	Backflush setting control knobs are incorrect.	Verify the preset and timing settings. Refer to the *Media Filter Operations* section and media filter manufacturer’s documentation.
Media filter pressure differential is high.	Possible filter blinding.	Perform multiple manual backflushes until the condition clears.

Problem	**Diagnosis**	**Action**
EC supply pump or MF supply pump will not start and the SYSTEM ALERT/FAIL indicator is illuminated.	A circuit breaker or motor start protector is tripped.	Check and reset the system breakers and motor start protector. Inspect the system for signs of more significant problems.
	A VFD is in a fault condition.	Inspect the VFD displays inside the control cabinet. Refer to the *Teco N3 Instruction Manual* for error codes and reset instructions.

15.7 HMI Warnings and Alarms

Error detection has been designed into the Allied Recycling Water Treatment System. Many components provide feedback to the PLC. The PLC will alert the operator by generating an alarm at the HMI when readings from components reach setpoints that indicate component problems or other problems that affect the system as a whole. If necessary, setpoint values can be adjusted on the HMI.

The sections below include alarms for typical errors and suggest places to start troubleshooting. This is not an exhaustive list. For troubleshooting of problems with specific components, refer to the zip file of manufacturer's manuals that accompanies this manual.

Some alarms listed below are warnings. These indicate problems that will not stop the system, but indicate less critical problems, or problems that, if left unattended, will eventually trigger an alarm. Errors are alarms that will stop the system, and must be corrected before water treatment can continue.

15.7.1 EC Cell Errors and Warnings

Alarm Text	Diagnosis	Corrective Action
Error EC1 GENERAL DIGITAL ALARM	• The PLC has received an over-temperature reading from either an EC cell or a subsystem power supply, or a current deviation condition has been detected.	• Check EC cell(s) and clean, repair or replace, as necessary. • Verify that the Jandy Valve opens when called to open. • Verify that the manual override switch on the back of the Jandy Valve is either up or down, NOT in the horizontal (off) position.
Error EC1 SUBSYSTEM GENERAL ALARM		
Error EC2 SUBSYSTEM GENERAL ALARM		
Error EC3 SUBSYSTEM GENERAL ALARM		
Error EC4 SUBSYSTEM GENERAL ALARM		
Error EC5 SUBSYSTEM GENERAL ALARM		

Alarm Text	Diagnosis	Corrective Action
Error PS1 CELL 1 TEMP HI	• The PLC has received a value above the high alarm setpoint from an EC Treatment Cell Temperature Switch	• Check that the EC cell leads and jumpers between the cells are connected and that the connections are clean, dry, and tightened. • Check the EC cells for proper flow - cell isolation valves are open. • Check the EC cells for excessive wear - thin or eroded EC cell plates. • Check for debris build up on the EC cell plates, foreign material or other blockage. • Check the EC power supply output amperage with a clamp on meter. • Check the EC power supply for proper 4-20 mA input signal.
Error PS1 CELL 2 TEMP HI		
Error PS1 CELL 3 TEMP HI		
Error PS1 CELL 4 TEMP HI		
Error PS1 CELL 5 TEMP HI		
Error PS1 CELL 6 TEMP HI		
Error PS2 CELL 1 TEMP HI		
Error PS2 CELL 2 TEMP HI		
Error PS2 CELL 3 TEMP HI		
Error PS2 CELL 4 TEMP HI		
Error PS2 CELL 5 TEMP HI		
Error PS2 CELL 6 TEMP HI		
Error PS3 CELL 1 TEMP HI		
Error PS3 CELL 2 TEMP HI		
Error PS3 CELL 3 TEMP HI		
Error PS3 CELL 4 TEMP HI		
Error PS3 CELL 5 TEMP HI		
Error PS3 CELL 6 TEMP HI		
Error PS4 CELL 1 TEMP HI		
Error PS4 CELL 2 TEMP HI		
Error PS4 CELL 3 TEMP HI		
Error PS4 CELL 4 TEMP HI		
Error PS4 CELL 5 TEMP HI		
Error PS4 CELL 6 TEMP HI		
Error PS5 CELL 1 TEMP HI		
Error PS5 CELL 2 TEMP HI		
Error PS5 CELL 3 TEMP HI		
Error PS5 CELL 4 TEMP HI		
Error PS5 CELL 5 TEMP HI		
Error PS5 CELL 6 TEMP HI		

Alarm Text	Diagnosis	Corrective Action
Error EC PS1 CURRENT FEEDBACK SIGNAL OVER THRESHOLD	• The PLC is not receiving a current feedback signal from the EC power supply (PS1, PS2, or PS3), or is not receiving a signal of the expected strength.	• Call WaterTectonics if power supply frequently returns an over-current signal.
Error EC PS2 CURRENT FEEDBACK SIGNAL UNDER THRESHOLD		
Error EC PS2 CURRENT FEEDBACK SIGNAL OVER THRESHOLD		
Error EC PS3 CURRENT FEEDBACK SIGNAL UNDER THRESHOLD		
Error EC PS3 CURRENT FEEDBACK SIGNAL OVER THRESHOLD		
Error EC1 VOLTAGE FEEDBACK SIGNAL UNDER THRESHOLD	• The PLC is not receiving a voltage feedback signal from the EC 1, 2, or 3, or is not receiving a signal of the expected strength.	• Call WaterTectonics if power supply frequently returns an over-voltage signal.
Error EC1 VOLTAGE FEEDBACK SIGNAL OVER THRESHOLD		
Error EC2 VOLTAGE FEEDBACK SIGNAL UNDER THRESHOLD		
Error EC2 VOLTAGE FEEDBACK SIGNAL OVER THRESHOLD		
Error EC3 VOLTAGE FEEDBACK SIGNAL UNDER THRESHOLD		
Error EC3 VOLTAGE FEEDBACK SIGNAL OVER THRESHOLD		
Error EC4 VOLTAGE FEEDBACK SIGNAL UNDER THRESHOLD		
Error EC4 VOLTAGE FEEDBACK SIGNAL OVER THRESHOLD		
Error EC SYSTEM 1 POWER SUPPLY OVER TEMP	• The PLC has received a value above the high alarm setpoint from the EC Power Supply.	• Verify the main control panel ventilation fans are running when the ambient temperature is above 81 degrees F. • Check the fan filters and exhaust filters for accumulation of dust or other debris. • Clean filters and exhaust filters.
Error EC SYSTEM 2 POWER SUPPLY OVER TEMP		
Error EC SYSTEM 3 POWER SUPPLY OVER TEMP		
Error EC SYSTEM 4 POWER SUPPLY OVER TEMP		
Error EC SYSTEM 5 POWER SUPPLY OVER TEMP		

Alarm Text	• Diagnosis	• Corrective Action
Error EC1 POWER SUPPLY +/- DEVIATION Amps. Setpoint Amps.	• The PLC is receiving feedback from the EC power supply that indicates a deviation from the amperage setpoint.	• Check that the EC cell leads and jumpers between the cells are connected and that the connections are clean, dry, and tightened. • Check the EC cells for proper flow - cell isolation valves are open. • Check the EC cells for excessive wear - thin or eroded EC cell plates. • Check for debris build up on the EC cell plates, foreign material or other blockage. • Check the EC power supply output amperage with a clamp on meter. • Check the EC power supply for proper 4-20 mA input signal.
Error EC2 POWER SUPPLY +/- DEVIATION Amps. Setpoint Amps.		
Error EC3 POWER SUPPLY +/- DEVIATION Amps. Setpoint Amps.		
Error EC4 POWER SUPPLY +/- DEVIATION Amps		
Error EC5 POWER SUPPLY +/- DEVIATION Amps		

15.7.2 Flowmeter Errors and Warnings

Alarm Text	Diagnosis	Corrective Action
Error EC1 FLOW PULSE FAIL (WAITS 120s FOR RESPONSE)	• The PLC is no longer receiving a signal from the Flow Meter.	• Verify there is sufficient water flow rate, and the flow rate is being displayed on the flow meter and the HMI. • Call WaterTectonics for assistance.
Error EC FLOW METER SIGNAL OVER THRESHOLD	• The PLC is receiving a signal from the Flow Meter that is not of the expected strength.	• Call WaterTectonics for assistance.
Error MF FLOW METER SIGNAL UNDER THRESHOLD		
Error MF FLOW METER SIGNAL OVER THRESHOLD		

15.7.3 Input/Output & Other Errors and Warnings

Alarm Text	Diagnosis	Corrective Action
Error PLC ANALOG I/O FAULT. Channel Number	• The PLC is indicating a fault at a particular channel. This indicates a problem with the PLC.	• Call WaterTectonics for assistance.
Error ANALOG INPUT MODULE 1 FAULT. Channel Number		
Error ANALOG OUTPUT MODULE 1 FAULT. Channel Number		
Error ANALOG INPUT MODULE 2 FAULT. Channel Number		
Error DIGITAL I/O MODULE 1 FAULT. Channel Number		
Error PLC DIGITAL I/O FAULT. Channel Number		
Error DIGITAL I/O MODULE 2 FAULT. Channel Number		

15.7.4 Pump Errors and Warnings

Alarm Text	Diagnosis	Corrective Action
Error MF PUMP LOW FLOW GPM •	• The pump is running, but did not achieve a flowrate above the low flow alarm setpoint before the error delay setpoint.	• Verify pump is running correctly. • Verify motor rotation is correct. • If this alarm is triggered frequently, either lengthen the low flow error delay setpoint, or decrease the flow meter low flow limit setpoint on Configuration Page 1.
Error EC PUMP MOTOR FAIL	• The PLC received a motor fail signal from the EC1 Pump.	•
Error EC PUMP FAIL INPUT		
Error MF PUMP MOTOR FAIL	• The PLC received a motor fail signal from the MF Pump.	
Error MF PUMP FAIL INPUT	• The PLC called the MF Pump to run, but received no run feedback.	

15.7.5 Tank Level Errors and Warnings

Alarm Text	Diagnosis	Corrective Action
Warning RESERVIOR TANK LOW LEVEL Inches	• LT-T-PT has sent a signal to the PLC that the water level in the Reservoir (T-PT) is at or below the low setpoint.	• Check actual tank water level. • Check for broken or leaking piping, tank, or valve. • Allow the reservoir to fill, if necessary. • NOTE: The purpose of this alarm is to protect the EC pump from running dry, which could damage the pump. If the EC pump is still running when this alarm is triggered, adjust the EC pump STOP setpoint so that it is ABOVE the LT-T-PT low setpoint. • Check level transmitter current and wiring. • Check the level transmitter fuse. •
Error RESERVOIR LOLO Inches	• LT-T-PT has sent a signal to the PLC indicating that the water level in the EC Feed Reservoir (T-PT) is at or below the low low setpoint.	
Warning RESERVOIR HI LEVEL Inches	• LT-T-PT has sent a signal to the PLC indicating that the water level in the EC Feed Reservoir (T-PT) is at or above the high setpoint.	• Check actual tank water level. • Check sensor calibration.
Error RESERVOIR HIHI LEVEL. Water Level Inches	• LT-T-PT has sent a signal to the PLC that the water level in the EC Feed Reservoir (T-PT) is at or above the high high setpoint.	

Alarm Text	Diagnosis	Corrective Action
Warning CLEAR WELL TANK LOW LEVEL Inches	• LT-T-CW has sent a signal to the PLC that the water level in the Clearwell Tank is at or below the low setpoint.	• Check actual tank water level. • Check for broken or leaking piping, tank, or valve. • Allow the reservoir to fill, if necessary. • NOTE: The purpose of this alarm is to protect the EC pump from running dry, which could damage the pump. If the EC pump is still running when this alarm is triggered, adjust the EC pump STOP setpoint so that it is ABOVE the LT-T-CW low setpoint. • Check level transmitter voltage and wiring.
Error CLEAR WELL TANK LOLO Inches	• LT-T-CW has sent a signal to the PLC indicating that the water level in the Clearwell Tank is at or below the low low setpoint.	
Warning CLEAR WELL HI LEVEL Inches	• LT-T-CW has sent a signal to the PLC indicating that the water level in the Clearwell Tank is at or above the high setpoint.	• Check actual tank water level. • Check sensor calibration.
Warning CLEAR WELL TANK HIHI Inches	• LT-T-CW has sent a signal to the PLC that the water level in Clearwell Tank is at or above the high high setpoint.	
Error CLEAR WELL HIGH HIGH FLOAT	• The water level in the clearwell tank is high enough to lift the high high float (LSHH-CW). Or the float circuit is open.	• Check actual tank water level. • Check sensor wiring and position.

15.7.6 Other Errors

Alarm Text	Diagnosis	Corrective Action
Error AC POWER LOSS	• This alarm is triggered when AC electrical power is lost from the system. • Note: This alarm is sent after power has been restored to the system.	• Check the digital input to the PLC for the AC power.
Error E-STOP HAS BEEN PRESSED	• The PLC has received a 0-Volt signal from the E-Stop, indicating the E-Stop Button has been pressed.	• Untwist the E-Stop Button.
Error SYSTEM HAS BEEN IN RECIRCULATE MODE FOR GREATER THAN MINUTES	• This is caused by the treated water not meeting this discharge requirements for more than 90 minutes. The discharge parameters are measured by the pH (PH-MF) and turbidity (TURB-MF) probes.	• Check the pH probe and Turbidity probe calibration and their associated chemicals: CO_2, Caustic, and polymer.

Alarm Text	Diagnosis	Corrective Action
Error EC VALVE FAIL	• The PLC commanded the EC Valve to open or close. The PLC either still has feedback from the previous valve condition, or failed to receive the open/closed feedback in X seconds.	• Verify the EC Valve OPEN/AUTO/CLOSE switch is in the AUTO position. • switch Make sure the UPS in the MCP is on. • Verify the valve is in automatic mode by pushing the manual adjustment wheel in. • Check to make sure the valve is moving properly. • Open valve housing and check the limit switches to make sure they are making contact. • Check wiring and voltage.
Error BACKWASH RESPONSE ALARM	• A backflush has been called but there has not been any backflush feedback for 90 seconds.	• Verify the Media Filter Controller HOA switch is in the AUTO position. • Verify the preset and timing settings. Refer to the Media Filter Operations section and media filter manufacturer's documentation.

16. Appendix A - Operations Log

OPERATIONS LOG					
Site		Operator		Date	
Chemical Tote ID		Start Time		End Time	
Tote Quantity	Full 3/4 1/2 1/4	Flow Totalizer	Initial:		
			Final:		
Pre-treat Dose Rate	gph ml/min = ppm	Flow Rate (gpm)	Note changes in Comments below.		
Standard Dose Rate	gph ml/min = ppm	Volume Discharged (gal)			
Total Dose Rate (ppm) Pre + Standard Rates	ppm	Media Filter Backflush Cycle Setting	Timing:		
			Pres. Diff.:		

Water Quality/Performance Monitoring

Time	Sample	Location	Turb (NTU)	pH	Comments
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				
	Grab/Online				

Online meters performing correctly vs grab samples?	Y N	

If no, what was the corrective action taken:

Comments:

Technician Signature