

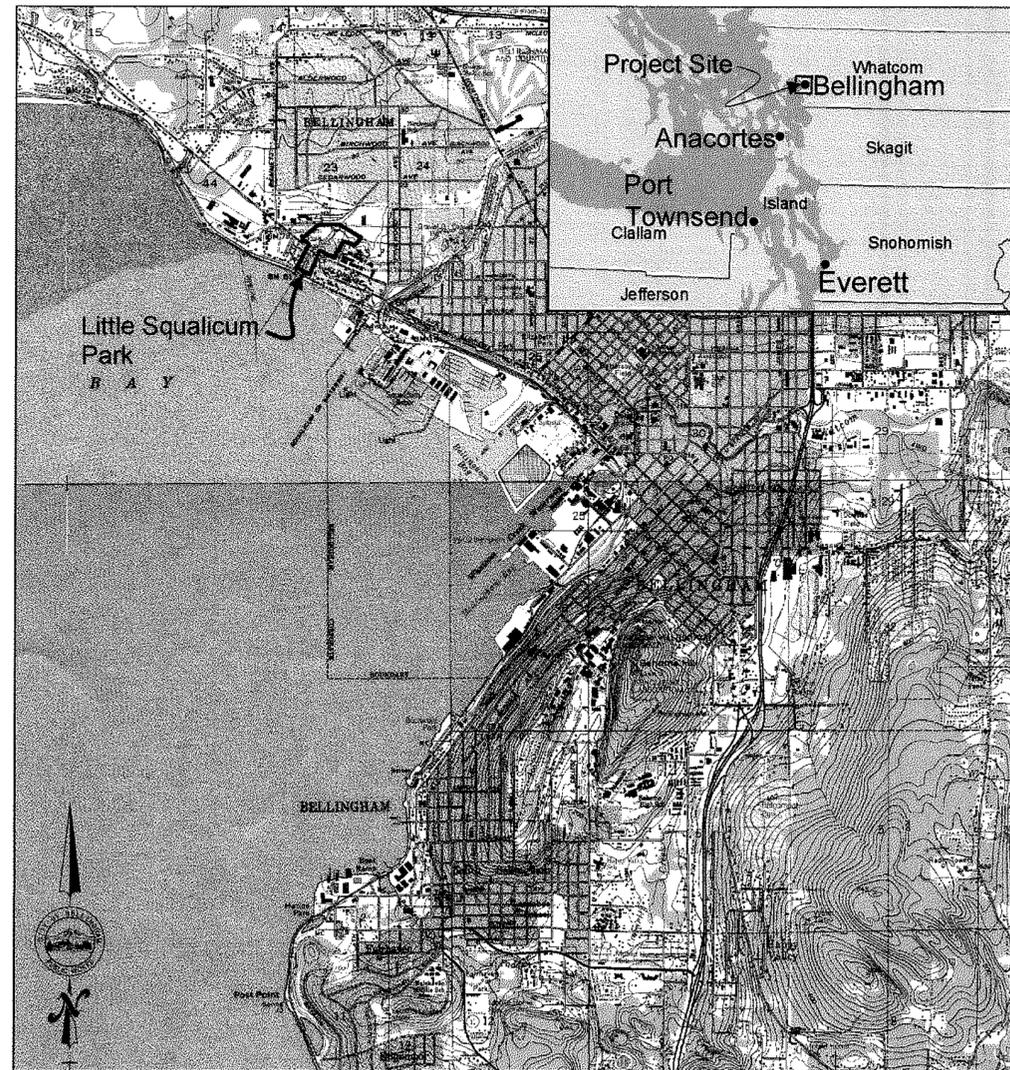
CITY OF BELLINGHAM

LITTLE SQUALICUM ESTUARY

PROJECT NO. EN-0033

BID No. 34B2017

LOCATION AND VICINITY MAP



SHEET INDEX

GENERAL "G" SHEETS

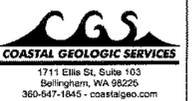
NAME	NUMBER	(SHEET # OF 26)
COVER SHEET - VICINITY MAP AND INDEX	G01	(SHEET 1 OF 26)
NOTES - LEGEND - ABBREVIATIONS	G02	(SHEET 2 OF 26)
OVERALL PROJECT LAYOUT	G03	(SHEET 3 OF 26)

CIVIL "C" SHEETS

NAME	NUMBER	
EXISTING CONDITIONS - SITE PLAN	C01	(SHEET 4 OF 26)
EXISTING CONDITIONS - SITE PLAN	C02	(SHEET 5 OF 26)
EXISTING CONDITIONS - OPTION A - BEACH NOURISHMENT	C03	(SHEET 6 OF 26)
TREE SALVAGE PLAN	C04	(SHEET 7 OF 26)
SWPPP PLAN	C05	(SHEET 8 OF 26)
SURVEY CONTROL PLAN	C06	(SHEET 9 OF 26)
SWPPP NOTES	C07	(SHEET 10 OF 26)
SOIL HANDLING PLAN	C08	(SHEET 11 OF 26)
PROPOSED CONDITIONS - ESTUARY GRADING PLAN	C09	(SHEET 12 OF 26)
PROPOSED CONDITIONS - ESTUARY GRADING PLAN	C10	(SHEET 13 OF 26)
PROPOSED CONDITIONS - STREAM REGRADE PLAN AND PROFILE	C11	(SHEET 14 OF 26)
PROPOSED CONDITIONS - CHANNEL CROSS SECTIONS	C12	(SHEET 15 OF 26)
PROPOSED CONDITIONS - TRAIL PLAN AND PROFILE	C13	(SHEET 16 OF 26)
PROPOSED CONDITIONS - OPTION A - BEACH NOURISHMENT	C14	(SHEET 17 OF 26)
PROPOSED CONDITIONS - LARGE WOOD, MULCHING AND TOPSOIL PLAN	C15	(SHEET 18 OF 26)
PROPOSED CONDITIONS - CROSS SECTIONS	C16	(SHEET 19 OF 26)
PROPOSED CONDITIONS - DETAILS	C17	(SHEET 20 OF 26)

STRUCTURAL "S" SHEETS

NAME	NUMBER	
SHEET PILE AND HEADWALL PLAN	S01	(SHEET 21 OF 26)
HEADWALL PLAN AND ELEVATIONS	S02	(SHEET 22 OF 26)
HEADWALL DETAILS	S03	(SHEET 23 OF 26)
HEADWALL STRUCTURAL NOTES	S04	(SHEET 24 OF 26)
SHEET PILE SECTIONS AND ELEVATIONS	S05	(SHEET 25 OF 26)
SHEET PILE SECTIONS AND ELEVATIONS	S06	(SHEET 26 OF 26)



G01

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	F.D.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE	
Horiz.	1" = NA
Vert.	1" = NA

DATUM	NAD 83/98
	NAVD88

Job No.	
Date	5/4/2018
Field Bk.	

LITTLE SQUALICUM ESTUARY
COVER SHEET - VICINITY MAP AND INDEX

SHEET	1	OF	26
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PROJECT DATUM

HORIZONTAL DATUM: NAD83/ 98 WASHINGTON STATE (NORTH ZONE)
PER CITY OF BELLINGHAM 2005 MODERNIZATION SURVEY.

VERTICAL DATUM: NAVD88 PER CITY OF BELLINGHAM 2009 HEIGHT
MODERNIZATION SURVEY

MEAN LOWER LOW WATER (MLLW): -0.48 FT (NAVD88)

MEAN HIGHER HIGH WATER (MHHW): +8.01 FT (NAVD88)

GENERAL NOTES

- ALL WORK SHALL CONFORM TO THE LATEST EDITION OF "STANDARD SPECIFICATIONS FOR ROAD BRIDGE AND MUNICIPAL CONSTRUCTION" CURRENT EDITION (WSDOT), THE "CITY OF BELLINGHAM DEVELOPMENT GUIDELINES AND IMPROVEMENT STANDARDS" AND "THE CITY OF BELLINGHAM PARKS AND RECREATION DESIGN STANDARD DETAILS" UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS. IN CASE OF A CONFLICT BETWEEN THE REGULATORY SPECIFICATIONS OR STANDARDS, THE MORE STRINGENT REQUIREMENT WILL PREVAIL. ALL REFERENCES TO "SPECIFICATION SECTIONS" REFER TO THE "STANDARD SPECIFICATIONS FOR ROAD BRIDGE AND MUNICIPAL CONSTRUCTION" UNLESS OTHERWISE NOTED.
- THE BEDDING FOR PVC PIPE SHALL BE PEA GRAVEL, ACCORDING TO CITY OF BELLINGHAM STANDARD PLAN NO. SS-750. ALL TRENCH BACKFILL UNDER EXISTING OR FUTURE PAVING SHALL BE BANK RUN GRAVEL FOR TRENCH BACKFILL AND SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY (MODIFIED PROCTOR).
- PLUG ALL CULVERTS, SEWERS, AND CONDUITS PRIOR TO ABANDONMENT AS PER STANDARD SPECIFICATIONS SECTION 7-08.3(4), EXCEPT FOR THE DECOMMISSIONED CULVERT.
- ALL LAWN AND VEGETATED AREAS OUTSIDE THE PROJECT LIMITS DISTURBED BY CONSTRUCTION EQUIPMENT, VEHICLES OR PERSONNEL SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, AT THE CONTRACTORS EXPENSE.
- THIS PROJECT MAY REQUIRE VARIOUS PERMITS AS OUTLINED IN THE PROJECT SPECIFICATION'S GENERAL PROVISIONS. ALL WORK SHALL BE PERFORMED IN A MANNER WHICH ENSURES CONFORMANCE WITH ANY PERMIT REQUIREMENTS.
- THE CONTRACTOR SHALL ATTEND PRE-CONSTRUCTION CONFERENCE WITH THE CITY OF BELLINGHAM ENGINEERING DIVISION PRIOR TO BEGINNING CONSTRUCTION.
- UNDERGROUND UTILITIES ARE KNOWN TO EXIST IN THE AREA OF CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE UTILITY OWNERS FOR LOCATIONS AND TO NOTIFY THE CITY PROJECT ENGINEER PROMPTLY OF ANY CONFLICT. THE ONE-CALL NUMBER FOR UNDERGROUND UTILITIES IS: 1-800-424-5555.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ADJACENT UTILITIES WHICH MAY INCLUDE, BUT ARE NOT LIMITED TO, WATER, SEWER, STORM SEWER, POWER, TELEPHONE, CABLE TV, GAS, IRRIGATION, AND STREET LIGHTING.
- THE CONTRACTOR SHALL NOTIFY RESIDENTS AND BUSINESSES 48 HOURS IN ADVANCE OF ANY WORK AFFECTING ACCESS OR SERVICE AND SHALL MINIMIZE INTERRUPTIONS TO DRIVEWAYS FOR RESIDENTS AND BUSINESSES ADJACENT TO THE PROJECT.
- PUBLIC RIGHTS-OF-WAY SHALL BE KEPT IN A CLEAN AND SERVICEABLE CONDITION AT ALL TIMES. IN THE EVENT MATERIALS ARE INADVERTENTLY DEPOSITED ON ROADWAYS, THE MATERIAL SHALL BE PROMPTLY REMOVED. MATERIALS ARE TO BE SWEEPED AND REMOVED WITH A VACUUM SWEEPER.
- PUBLIC AND PRIVATE DRAINAGE WAYS SHALL BE PROTECTED FROM POLLUTION. NO MATERIAL IS TO BE DISCHARGED TO, OR DEPOSITED IN STORMWATER SYSTEMS THAT MAY RESULT IN VIOLATION OF STATE OR FEDERAL WATER QUALITY STANDARDS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING, MAINTAINING, & REMOVING EROSION CONTROL MEASURES (SILT FENCE, ROCK CHECK DAMS, SILT PONDS, CATCH BASIN FILTERS, ETC...) THROUGHOUT THE DURATION OF THE PROJECT. ALL EROSION CONTROL WORK IS CONSIDERED INCIDENTAL TO THE ITEMS OF WORK IN THE CONTRACT FOR THIS PROJECT. REFER TO THE 'STORM WATER POLLUTION PREVENTION PLAN SHEETS AND BID ITEMS NOTED IN THE CONTRACT PORTION OF THE PROJECT SPECIFICATIONS FOR SPECIFIC EROSION CONTROL NOTES.
- CONTRACTOR SHALL STAKE OUT SENSITIVE AREAS AS IDENTIFIED ON THE PLANS AND IN THE FIELD BY THE PROJECT ENGINEER FOR APPROVAL BY CITY PROJECT ENGINEER PRIOR TO COMMENCING EARTHWORK.
- NO STAGING AREA IS PROVIDED FOR THIS PROJECT.
- ANY TEMPORARY STORAGE OF MATERIALS IN THE RIGHT OF WAY MORE THAN TWO WEEKS PRIOR TO INSTALLATION SHALL REQUIRE APPROVAL OF THE CITY PROJECT ENGINEER.
- STOCKPILING OF AGGREGATE BASE OR EXCAVATED MATERIALS IN THE RIGHT OF WAY SHALL NOT BE ALLOWED WITHOUT THE CITY PROJECT ENGINEER'S AUTHORIZATION.
- CONTRACTOR IS RESPONSIBLE FOR ALL PERMITS AND AUTHORIZATION FOR STAGING AREAS.
- CONSTRUCTION EQUIPMENT ACCESS MAY BE FROM LINDBERG AVENUE, OR WEST ILLINOIS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ACCESS AGREEMENTS REQUIRED FROM THE CITY OF BELLINGHAM PARKS DEPARTMENT.
- ALL MATERIALS HAULING SHALL BE VIA LINDBERG AVENUE ONLY.
- PROTECTION OF THE ENVIRONMENT: NO CONSTRUCTION RELATED ACTIVITY SHALL CONTRIBUTE TO THE DEGRADATION OF THE ENVIRONMENT, ALLOW MATERIAL TO ENTER SURFACE OR GROUND WATERS, OR ALLOW PARTICULATE EMISSIONS TO THE ATMOSPHERE, WHICH EXCEED STATE OR FEDERAL STANDARDS. ANY ACTIONS THAT POTENTIALLY ALLOW A DISCHARGE TO STATE WATERS MUST HAVE PRIOR APPROVAL OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY.

LEGEND:

FEATURE	EXISTING	PROPOSED
CONTOURS, MAJOR	---#---	---#---
CONTOURS, MINOR	---#---	---#---
CREEK/DRAINAGE	---	---
CONCRETE	[Pattern]	[Pattern]
GRAVEL	---	[Pattern]
SURVEY MONUMENT	⊙###	
PARK BOUNDARY	---	
PROPERTY LINES	---	
BNSF RN ROW	---	---
EASEMENT	---	---
OHWM	--- OHW ---	
MHHM	--- MHHW ---	--- MHHW ---
200' SHORELINE BUFFER	---	---
150' HCA BUFFER	---	---
BNSF RW CENTERLINE	---	---
TREE LINE	---	---
WETLANDS	[Pattern]	[Pattern]
EXISTING STREAM	[Pattern]	[Pattern]
NO GROUND DISTURBANCE AREA	[Pattern]	[Pattern]
MULCH	[Pattern]	[Pattern]
TOPSOIL	[Pattern]	[Pattern]
HYDROSEED	[Pattern]	[Pattern]
LARGE WOOD WITH ROOT WAD	[Pattern]	[Pattern]
WOOD GUARDRAIL	[Pattern]	[Pattern]
BEACH NOURISHMENT	[Pattern]	[Pattern]

ABBREVIATIONS

APN	ASSESSOR'S PARCEL NUMBER
BNSF RW	BNSF RAILWAY
CGS	COASTAL GEOLOGIC SERVICES
COB	CITY OF BELLINGHAM
CONC.	CONCRETE
EL./ELEV.	ELEVATION
EX./EXIST.	EXISTING
FT	FEET
MHHW	MEAN HIGHER-HIGH WATER
MLLW	MEAN LOWER-LOW WATER
NAVD88	NORTH AMERICAN VERTICAL DATUM 1988
OHWM	ORDINARY HIGH WATER MARK
RR	RAIL ROAD
R.O.W.	RIGHT OF WAY
SWPPP	STORMWATER POLLUTION PREVENTION PLAN
TBM	TEMPORARY BENCHMARK
TESC	TEMPORARY SEDIMENT AND EROSION CONTROL
TYP.	TYPICAL
WC	WHATCOM COUNTY

Date	No	Revision	By
5/4/18	4		
9/22/17	3	BID SUBMITTAL -- COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER: T.A.H.
DESIGNED/DRAWN: J.W.J./A.D.J.
INSPECTOR:

DIRECTOR PUBLIC WORKS: T.A.C.
CITY ENGINEER: C.M.A.S.
ASSISTANT DIRECTOR: E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE

Horiz. 1" = NA
Vert. 1" = NA

DATUM

NAD 83/98
NAVD88

Job No. _____

Date: 5/4/2018

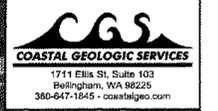
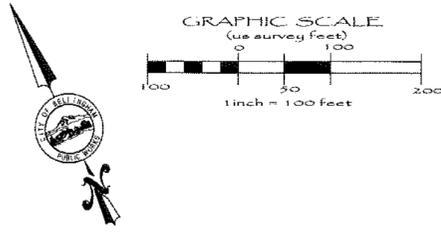
Field Bk. _____

LITTLE SQUALICUM ESTUARY
NOTES - LEGEND - ABBREVIATIONS

SHEET 2 OF 26



G02



G03

5/4/18	4	BID SUBMITTAL - COB COMMENTS	IAT
9/22/17	2	BID SUBMITTAL	IAT
6/26/17	1	DRAFT DESIGN	IAT
Date	No	Revision	By

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W.J./A.D.T.
INSPECTOR	

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CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE	
Horiz.	1" = NA
Vert.	1" = NA

DATUM	NAD 83/98
	NAVD88

Job No.	
Date	5/4/2018
Field Bk.	

LITTLE SQUALICUM ESTUARY
OVERALL PROJECT LAYOUT

SHEET	3	OF	26
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CONTACT PERSON: FREEMAN ANTHONY PROJECT ENGINEER AT (360)-778-7900

MATCHLINE - SEE SHEET C03



LEGEND:

FEATURE	EXISTING
CONTOURS, MAJOR	---#---
CONTOURS, MINOR	---#---
CREEK/DRAINAGE	---
CONCRETE	---#---
GRAVEL	---#---
SURVEY MONUMENT	⊙###
PARK BOUNDARY	---#---
PROPERTY LINES	---
BNSF RR ROW	---
EASEMENT	---
OHWM	---#---
MHHM	---#---
200' SHORELINE BUFFER	---
150' HCA BUFFER	---
BNSF RW CENTERLINE	---
TREE LINE	---
WETLANDS	---
EXISTING STREAM	---
NO GROUND DISTURBANCE AREA	---

- SURVEY NOTES:**
- 1) SURVEY COMPLETED BY PACIFIC SURVEY AND ENGINEERING MARCH 2016.
 - 2) PURPOSE OF SURVEY: THE PURPOSE OF THIS SURVEY WAS TO PROVIDE DESIGN-LEVEL TOPOGRAPHIC DETAIL IN AREAS PROPOSED TO BE RE-CONSTRUCTED AS PART OF A PLANNED ESTUARY INSTALLATION. NEW SURVEY DATA WAS COMBINED WITH CITY OF BELLINGHAM 2013 LIDAR.
 - 3) DATA FOR THIS SURVEY WAS GATHERED BY FIELD TRAVERSE UTILIZING ELECTRONIC DATA COLLECTION IN MARCH 2016.
 - 4) EQUIPMENT USED: THEODIT 00'01.5" EDM: ± 2PPM, ± 3MM
 - 5) HORIZONTAL DATUM: NAD 83/98, WASHINGTON STATE PLANE NORTH ZONE, PER 2007 CITY OF BELLINGHAM CADASTRAL SURVEY & PUBLISHED CONTROL POINTS (SEE CONTROL TABLE FOR COORDINATES)
 - 6) VERTICAL DATUM: NAVD 88, PER CITY OF BELLINGHAM 2009 HEIGHT MODERNIZATION PROJECT & PUBLISHED BENCHMARKS. PRIMARY PROJECT BENCHMARK: CITY OF BELLINGHAM CONTROL POINT #5849, AT THE NORTHEAST QUADRANT OF PATTON AND WEST ALIQUIS. THE PUBLISHED NAVD88 ELEVATION FOR CONTROL POINT #5849 IS 70.461 FEET (OFFSITE, NOT SHOWN). (SEE CONTROL TABLE FOR PROJECT TEMPORARY BENCHMARK ELEVATIONS)
 - 7) SUB-SURFACE UTILITY LOCATES WERE NOT PERFORMED AT THE TIME OF THIS SURVEY. PACIFIC SURVEYING AND ENGINEERING IS NOT RESPONSIBLE FOR ANY SUB-SURFACE CONDITIONS NOT SHOWN.
 - 8) THIS IS NOT A BOUNDARY SURVEY. PARCEL, RIGHT OF WAY & EASEMENT DETERMINATIONS PER LITTLE SQUALICUM PARK LIDAR VERIFICATION & TOPOGRAPHY MAP PREPARED BY WILSON SURVEYING AND ENGINEERING FOR THE CITY OF BELLINGHAM DEPARTMENT OF PUBLIC WORKS IN APRIL OF 2014. SUPPLEMENTAL INTERIOR SUBJECT PROPERTY LINWORK PER CITY OF BELLINGHAM G.I.S. NO TITLE REPORT WAS PROVIDED BY THE CLIENT AND NO BOUNDARY MONUMENTATION WAS SET DURING THIS SURVEY.
 - 9) WETLANDS AND ORDINARY HIGH WATER DELINEATION SHOWN PER THE CRITICAL AREAS DELINEATION REPORT FOR LITTLE SQUALICUM PARK ESTUARY RESTORATION PROJECT, PREPARED JUNE 2014 BY NORTHWEST ECOLOGICAL SERVICES, LLC.
 - 10) ADDITIONAL TOPOGRAPHY SHOWN ON SHEETS C03 AND C14 WAS DERIVED FROM THE CITY OF BELLINGHAM'S 2013 LIDAR MAPPING DATA, AS PUBLISHED BY THE PUGET SOUND LIDAR CONSORTIUM.

PRIMARY SURVEY CONTROL TABLE

MON.	NORTHING	EASTING	ELEVATION	DESCRIPTION
202	648707.3341	1234544.5930	27.489	FOUND REBAR WITH ORANGE CAP (TBM)
203	648247.5754	1234289.1870	19.725	FOUND REBAR WITH ORANGE CAP (TBM)
204	648546.8180	1234435.3090	20.098	FOUND REBAR WITH ORANGE CAP (TBM)
210	648126.6086	1234494.9170	16.970	SET REBAR WITH ORANGE CAP (TBM)
1208	649412.6267	1236864.9380	NA	CITY OF BELLINGHAM MON. #1208 (OFFSITE, NOT SHOWN)
2998	649056.3612	1234329.4480	NA	CITY OF BELLINGHAM MON. #2998 (OFFSITE, NOT SHOWN)
5849	-	-	70.461	CITY OF BELLINGHAM MON. #5849 (OFFSITE, NOT SHOWN)

811 Call 811
two business days before you dig

THEODORE A. HARRIS
REGISTERED PROFESSIONAL ENGINEER
No. 23070

CGS
COASTAL GEOLOGIC SERVICES
1711 Ellis St., Suite 103
Bellingham, WA 98225
360-847-1845 - coastalgeo.com

C01

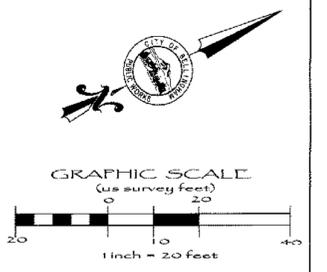
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT	PROJECT ENGINEER	T.A.H.	DIRECTOR PUBLIC WORKS	T.A.C.	CITY OF BELLINGHAM, WASHINGTON	SCALE	DATUM	Job No.	LITTLE SQUALICUM ESTUARY EXISTING CONDITIONS - SITE PLAN	SHEET 4 OF 26
9/22/17	2	BID SUBMITTAL	AT	DESIGNED/DRAWN	J.W.J./A.D.T.	CITY ENGINEER	C.M.A.S.	PUBLIC WORKS DEPARTMENT	Horiz. 1" = 20'	NAD 83/98	Date 5/4/2018		
6/26/17	1	DRAFT DESIGN	AT	INSPECTOR		ASSISTANT DIRECTOR	E.C.J.	ENGINEERING DIVISION	Vert. 1" = NA	NAVD88	Field Bk.		

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



LEGEND:

FEATURE	EXISTING
CONTOURS, MAJOR	— # —
CONTOURS, MINOR	— # —
CREEK/DRAINAGE	— # —
CONCRETE	— # —
GRAVEL	— # —
SURVEY MONUMENT	— # —
PARK BOUNDARY	— # —
PROPERTY LINES	— # —
BNSF RN ROW	— # —
EASEMENT	— # —
OHWM	— # —
MHHM	— # —
200' SHORELINE BUFFER	— # —
150' HCA BUFFER	— # —
BNSF RW CENTERLINE	— # —
TREE LINE	— # —
WETLANDS	— # —
EXISTING STREAM	— # —



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two business days
before you dig



CGS
COASTAL GEOLOGIC SERVICES
1711 Ellis St., Suite 103
Bellingham, WA 98225
360-647-1645 - coastageo.com

C02

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL -- COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1" = 20'
Vert. 1" = 10'

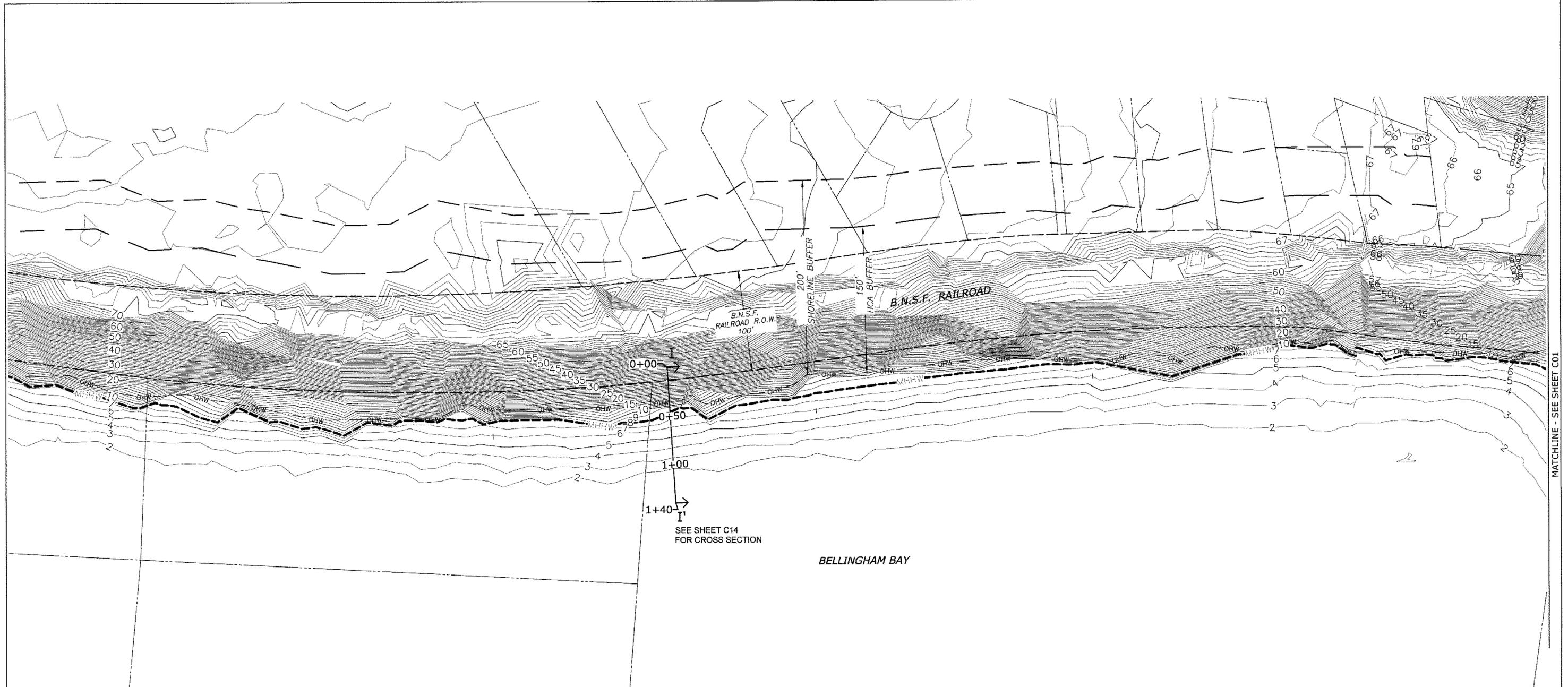
DATUM
NAD 83/98
NAVD88

Job No. _____
Date 5/4/2018
Field Bk. _____

LITTLE SQUALICUM ESTUARY
EXISTING CONDITIONS - SITE PLAN

SHEET 5 OF 26

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



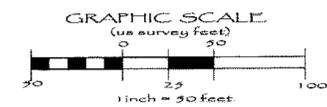
MATCHLINE - SEE SHEET C01

SEE SHEET C14
FOR CROSS SECTION

BELLINGHAM BAY

LEGEND:

FEATURE	EXISTING
CONTOURS, MAJOR	---#---
CONTOURS, MINOR	---#---
PROPERTY LINES	---
BNSF RN ROW	---
OHWM	--- OHW ---
MHHW	--- MHHW ---
200' SHORELINE BUFFER	---
150' HCA BUFFER	---



811 Call 811
two business days
before you dig

C03

Date	No	Revision	By
5/4/18	4		
9/22/17	3	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W.J./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1" = 50'
Vert. 1" = NA

DATUM
NAD 83/98
NAVD88

Job No. _____
Date 5/4/2018
Field Bk. _____

LITTLE SQUALICUM ESTUARY
EXISTING CONDITIONS - OPTION A- BEACH NOURISHMENT

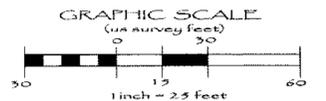
SHEET 6 OF 26

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900

TREE SALVAGE LEGEND:

LARGE TREES

Site #	Species	Diameter (in)
1	Alder	13
2	Black Cottonwood	40
3	Alder	17
4	Big Leaf Maple	7
5	Alder	12
6	Alder	15
7	Alder	17
8	Alder	15
9	Alder	14
10	Alder?	19
11	Alder	24
12	Black Cottonwood	23
13	Alder	17
14	Red Alder	18
15	Red Alder	19



811 Call 811
two business days
before you dig

C04

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.	DIRECTOR PUBLIC WORKS	T.A.C.
DESIGNED/DRAWN	J.W.J./A.D.T.	CITY ENGINEER	C.M.A.S.
INSPECTOR		ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

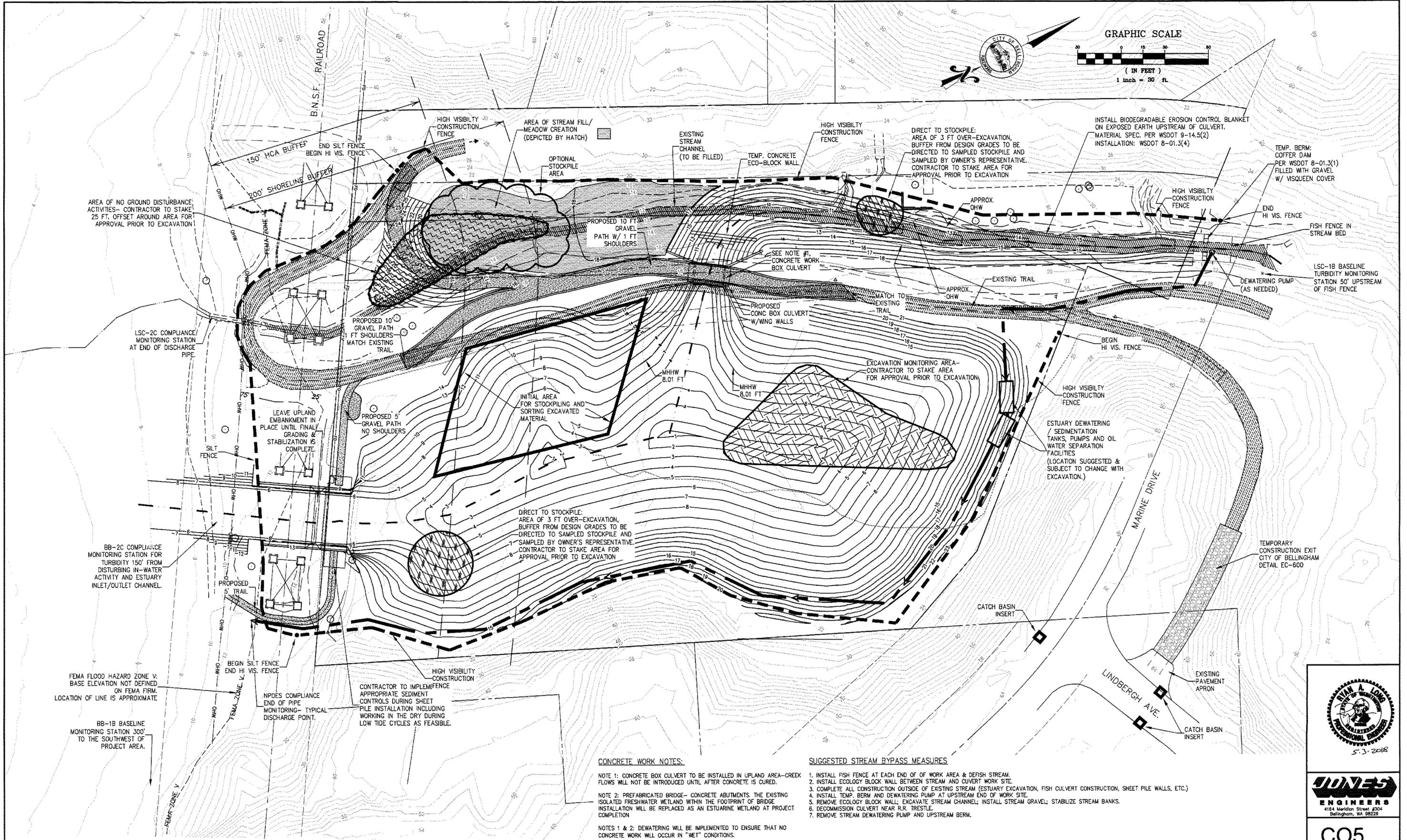
SCALE
Horiz. 1" = 20'
Vert. 1" = 10'

DATUM
NAD 83/98
NAVD88

Job No. _____
Date 5/4/2018
Field Bk. _____

LITTLE SQUALICUM ESTUARY
TREE SALVAGE PLAN

SHEET 7 OF 26



150' HCA BUFFER
200' SHORELINE BUFFER
AREA OF NO GROUND DISTURBANCE ACTIVITIES- CONTRACTOR TO STAKE 25 FT. OFFSET AROUND AREA FOR APPROVAL PRIOR TO EXCAVATION

END SILT FENCE BEGIN HI VIS. FENCE
HIGH VISIBILITY CONSTRUCTION FENCE
AREA OF STREAM FILL/ MEADOW CREATION (DEPICTED BY HATCH)
OPTIONAL STOCKPILE AREA
EXISTING STREAM CHANNEL (TO BE FILLED)
TEMP. CONCRETE ECO-BLOCK WALL
HIGH VISIBILITY CONSTRUCTION FENCE
DIRECT TO STOCKPILE: AREA OF 3 FT OVER-EXCAVATION, BUFFER FROM DESIGN GRADES TO BE DIRECTED TO SAMPLED STOCKPILE AND SAMPLED BY OWNER'S REPRESENTATIVE. CONTRACTOR TO STAKE AREA FOR APPROVAL PRIOR TO EXCAVATION

INSTALL BIODEGRADABLE EROSION CONTROL BLANKET ON EXPOSED EARTH UPSTREAM OF CULVERT. MATERIAL SPEC. PER WSDOT 9-14.5(2) INSTALLATION: WSDOT 8-01.3(4)

TEMP. BERM: COFFER DAM PER WSDOT 8-01.3(1) FILLED WITH GRAVEL W/ VISQUEEN COVER
END HI VIS. FENCE
FISH FENCE IN STREAM BED
LSC-1B BASELINE TURBIDITY MONITORING STATION 50' UPSTREAM OF FISH FENCE

DEWATERING PUMP (AS NEEDED)

APPROX. OHW
EXISTING TRAIL
MATCH TO EXISTING TRAIL
PROPOSED CONG BOX CULVERT W/WING WALLS
EXCAVATION MONITORING AREA- CONTRACTOR TO STAKE AREA FOR APPROVAL PRIOR TO EXCAVATION

PROPOSED 10 FT GRAVEL PATH 1 FT SHOULDERS
MATCH EXISTING TRAIL
PROPOSED 5 FT GRAVEL PATH NO SHOULDERS
INITIAL AREA FOR STOCKPILING AND SORTING EXCAVATED MATERIAL
MHHW 8.01 FT
MHHW 8.01 FT

ESTUARY DEWATERING / SEDIMENTATION TANKS, PUMPS AND OIL WATER SEPARATION FACILITIES (LOCATION SUGGESTED & SUBJECT TO CHANGE WITH EXCAVATION.)

TEMPORARY CONSTRUCTION EXIT CITY OF BELLINGHAM DETAIL EC-600

LEAVE UPLAND EMBANKMENT IN PLACE UNTIL FINALLY GRADING & STABILIZATION IS COMPLETE

BB-2C COMPLIANCE MONITORING STATION FOR TURBIDITY 150' FROM DISTURBING IN-WATER ACTIVITY AND ESTUARY INLET/OUTLET CHANNEL.

PROPOSED 5' TRAIL
CATCH BASIN INSERT

BB-1B BASELINE MONITORING STATION 300' TO THE SOUTHWEST OF PROJECT AREA.

FEMA FLOOD HAZARD ZONE V: BASE ELEVATION NOT DEFINED ON FEMA FIRM. LOCATION OF LINE IS APPROXIMATE

BEGIN SILT FENCE END HI VIS. FENCE
HIGH VISIBILITY CONSTRUCTION FENCE
CONTRACTOR TO IMPLEMENT APPROPRIATE SEDIMENT CONTROLS DURING SHEET PILE INSTALLATION INCLUDING WORKING IN THE DRY DURING LOW TIDE CYCLES AS FEASIBLE.

NPDES COMPLIANCE END OF PIPE MONITORING- TYPICAL DISCHARGE POINT.

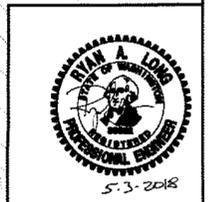
AREA OF 3 FT OVER-EXCAVATION, BUFFER FROM DESIGN GRADES TO BE DIRECTED TO SAMPLED STOCKPILE AND SAMPLED BY OWNER'S REPRESENTATIVE. CONTRACTOR TO STAKE AREA FOR APPROVAL PRIOR TO EXCAVATION

CONCRETE WORK NOTES:

- NOTE 1: CONCRETE BOX CULVERT TO BE INSTALLED IN UPLAND AREA-- EXCESS FLOWS WILL NOT BE INTRODUCED UNTIL AFTER CONCRETE IS CURED.
- NOTE 2: PREFABRICATED BRIDGE- CONCRETE ABUTMENTS, THE EXISTING ISOLATED FRESHWATER WETLAND WITHIN THE FOOTPRINT OF BRIDGE INSTALLATION WILL BE REPLACED AS AN ESTUARINE WETLAND AT PROJECT COMPLETION
- NOTES 1 & 2: DEWATERING WILL BE IMPLEMENTED TO ENSURE THAT NO CONCRETE WORK WILL OCCUR IN "WET" CONDITIONS.

SUGGESTED STREAM BYPASS MEASURES

1. INSTALL FISH FENCE AT EACH END OF OF WORK AREA & DERISH STREAM.
2. INSTALL ECOLOGY BLOCK WALL BETWEEN STREAM AND CULVERT WORK SITE.
3. COMPLETE ALL CONSTRUCTION OUTSIDE OF EXISTING STREAM (ESTUARY EXCAVATION, FISH CULVERT CONSTRUCTION, SHEET PILE WALLS, ETC.)
4. INSTALL TEMP. BERM AND DEWATERING PUMP AT UPSTREAM END OF WORK SITE.
5. REMOVE ECOLOGY BLOCK WALL; EXCAVATE STREAM CHANNEL; INSTALL STREAM GRAVEL; STABILIZE STREAM BANKS.
6. DECOMMISSION CULVERT NEAR R.R. TRESTLE.
7. REMOVE STREAM DEWATERING PUMP AND UPSTREAM BERM.



CO5

4	5/04/18	BID SUBMITTAL - COB COMMENTS	AT
3	9/22/17	BID SUBMITTAL	AT
2	6/26/17	DRAFT DESIGN	AT
1			
Date	No	Revision	By

PROJECT ENGINEER	R.L.
DESIGNED/DRAWN	R.L. / D.N.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.L.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

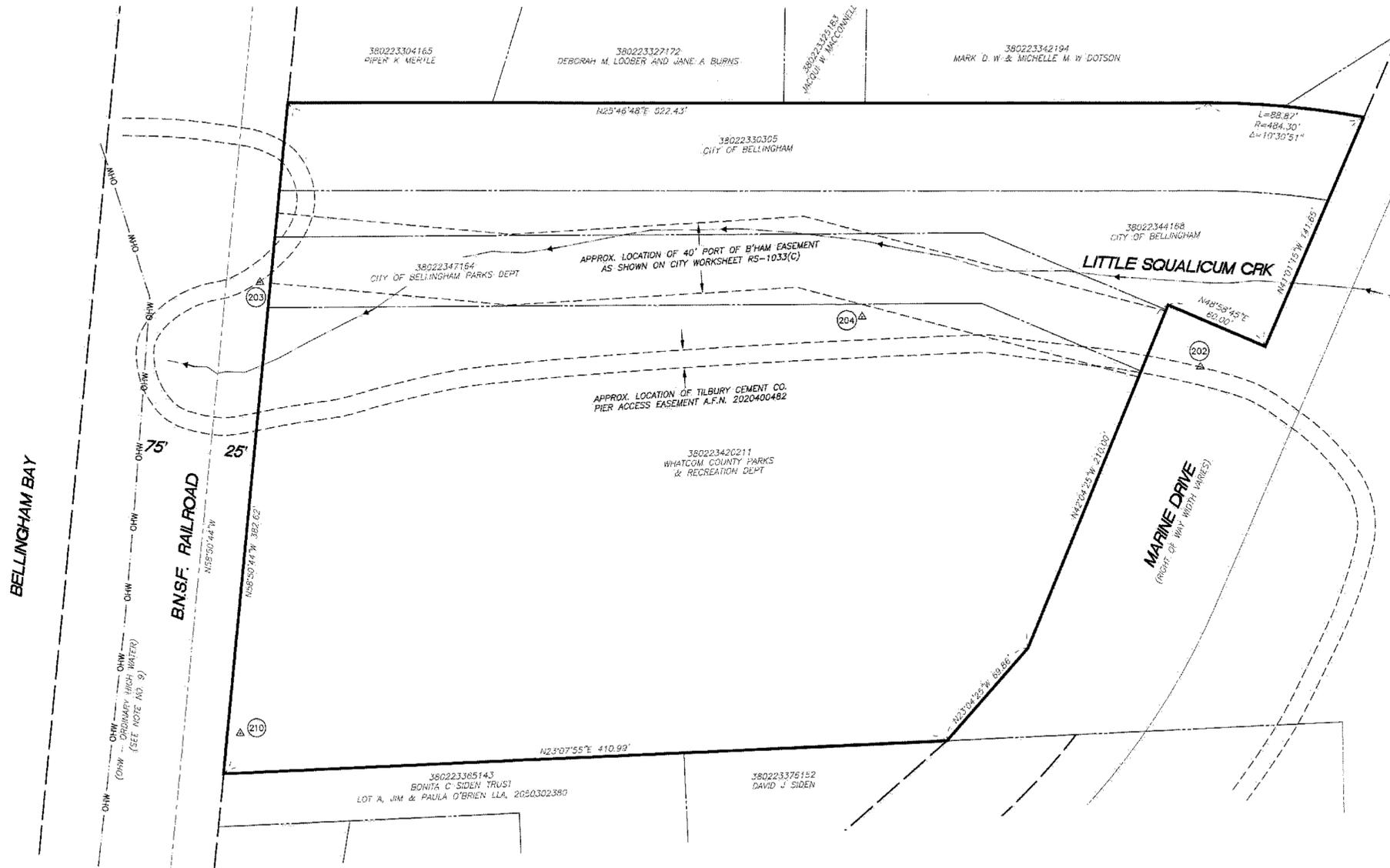
SCALE
Horiz. 1" = 30'
Vert. 1" = N/A

DATUM
NAD 83/98
NAVD88

Job. No. _____
Date 05/04/2018
Field Bk. _____

LITTLE SQUALICUM ESTUARY
SWPPP PLAN

SHEET 8 OF 28



SURVEY NOTES:

- 1) SURVEY COMPLETED BY PACIFIC SURVEY AND ENGINEERING MARCH 2016.
- 2) PURPOSE OF SURVEY: THE PURPOSE OF THIS SURVEY WAS TO PROVIDE DESIGN-LEVEL TOPOGRAPHIC DETAIL IN AREAS PROPOSED TO BE RE-CONSTRUCTED AS PART OF A PLANNED ESTUARY INSTALLATION. NEW SURVEY DATA WAS COMBINED WITH CITY OF BELLINGHAM 2013 LIDAR.
- 3) DATA FOR THIS SURVEY WAS GATHERED BY FIELD TRAVERSE UTILIZING ELECTRONIC DATA COLLECTION IN MARCH 2016.
- 4) EQUIPMENT USED: THEOMAT 00'01.5" EDM: ± 2PPM, ± 3MM
- 5) HORIZONTAL DATUM: NAD 83/98, WASHINGTON STATE PLANE NORTH ZONE, PER 2007 CITY OF BELLINGHAM CADASTRAL SURVEY & PUBLISHED CONTROL POINTS (SEE CONTROL TABLE FOR COORDINATES)
- 6) VERTICAL DATUM: NAVD 88, PER CITY OF BELLINGHAM 2009 HEIGHT MODERNIZATION PROJECT & PUBLISHED BENCHMARKS. PRIMARY PROJECT BENCHMARK: CITY OF BELLINGHAM CONTROL POINT #5849, AT THE NORTHEAST QUADRANT OF PATTON AND WEST ILLINOIS. THE PUBLISHED NAVD88 ELEVATION FOR CONTROL POINT #5849 IS 70.461 FEET (OFFSITE, NOT SHOWN). (SEE CONTROL TABLE FOR PROJECT TEMPORARY BENCHMARK ELEVATIONS)
- 7) SUB-SURFACE UTILITY LOCATES WERE NOT PERFORMED AT THE TIME OF THIS SURVEY. PACIFIC SURVEYING AND ENGINEERING IS NOT RESPONSIBLE FOR ANY SUB-SURFACE CONDITIONS NOT SHOWN.
- 8) THIS IS NOT A BOUNDARY SURVEY. PARCEL RIGHT OF WAY, & EASEMENT DETERMINATIONS PER LITTLE SQUALICUM PARK LIDAR VERIFICATION & TOPOGRAPHY MAP PREPARED BY WILSON SURVEYING AND ENGINEERING FOR THE CITY OF BELLINGHAM DEPARTMENT OF PUBLIC WORKS IN APRIL OF 2014. SUPPLEMENTAL INTERIOR SUBJECT PROPERTY LINEWORK PER CITY OF BELLINGHAM G.I.S. NO TITLE REPORT WAS PROVIDED BY THE CLIENT AND NO BOUNDARY MONUMENTATION WAS SET DURING THIS SURVEY.
- 9) WETLANDS AND ORDINARY HIGH WATER DELINEATION SHOWN PER THE CRITICAL AREAS DELINEATION REPORT FOR LITTLE SQUALICUM PARK ESTUARY RESTORATION PROJECT, PREPARED JUNE 2014 BY NORTHWEST ECOLOGICAL SERVICES, LLC.
- 10) ADDITIONAL TOPOGRAPHY SHOWN ON SHEETS C03 AND C14 WAS DERIVED FROM THE CITY OF BELLINGHAM'S 2013 LIDAR MAPPING DATA, AS PUBLISHED BY THE PUGET SOUND LIDAR CONSORTIUM.

PRIMARY SURVEY CONTROL TABLE				
MON.	NORTHING	EASTING	ELEVATION	DESCRIPTION
202	648707.3341	1234544.5930	27.489	FOUND REBAR WITH ORANGE CAP (TBM)
203	648247.5754	1234269.1870	19.725	FOUND REBAR WITH ORANGE CAP (TBM)
204	648546.8160	1234435.3090	20.098	FOUND REBAR WITH ORANGE CAP (TBM)
210	648126.6086	1234494.9170	16.970	SET REBAR WITH ORANGE CAP (TBM)
1208	649412.6267	1236864.9380	NA	CITY OF BELLINGHAM MON. #1208 (OFFSITE, NOT SHOWN)
2998	649056.3612	1234329.4480	NA	CITY OF BELLINGHAM MON. #2998 (OFFSITE, NOT SHOWN)
5849	-	-	70.461	CITY OF BELLINGHAM MON. #5849 (OFFSITE, NOT SHOWN)



C06

811 Call 811
two business days
before you dig

Date	No.	Revision	By
	4		
	3		
	2		
	1		

PROJECT ENGINEER RL
DESIGNED/DRAWN RL/D.N.
INSPECTOR _____

DIRECTOR PUBLIC WORKS T.A.C.
CITY ENGINEER C.M.A.S.
ASSISTANT DIRECTOR E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1" = 40'
Vert. 1" = NA

DATUM
NAD 83/98
NAVD88

Job No. _____
Date 11.22.17
Field Bk. _____

LITTLE SQUALICUM ESTUARY
SURVEY CONTROL

SHEET **9** OF **26**

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT 778-7800

EROSION CONTROL REQUIREMENTS FOR LITTLE SQUALICUM PARK ESTUARY

Note: Items in **italics** are taken directly from the WSDOE Stormwater Manual general requirements for erosion control. Items in **bold text** are site specific prescriptions generated by the Engineer.

REFERENCE ALSO PLAN SHEET SC1-C3

ELEMENT 1: MARK CLEARING LIMITS

• 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.

• Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practical.

Additional Guidance

• Plastic, metal, or fabric fence may be used to mark the clearing limits. [Note: the difference between the practical use and proper installation of silt fencing and the proper use of clearing boundary fencing.]

• 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.

Prior to beginning construction, the limits of disturbance shall be staked on the site by the project engineer. Flogging and Silt Fence will be installed around the perimeter of the site along the limits of disturbance as shown on the approved Plan (Sheet C1), and shall be maintained throughout construction.

NOTE: CONTRACTOR TO STAKE 25' OFF SET OF NO DISTURBANCE AREAS

- BMP C233 Reinforced Silt Fence
- BMP C103 High Visibility Fencing

ELEMENT 2: ESTABLISH CONSTRUCTION ACCESS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Limit construction vehicle access and exit to one route, if possible. Stabilize access points with a pad of quarry spalls, crushed rock, or other equivalent BMPs, to minimize tracking sediment onto roads.

• Locate where wash or tire baths can be installed on the site, if the stabilized construction entrance is not effective in preventing tracking sediment onto roads.

• If sediment is tracked off site, clean the affected roadway 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 pick up and transport the sediment to a controlled sediment disposal area.

• Conduct street washing only after sediment is removed in accordance with the above bullet. Control street wash wastewater by pumping back on site or otherwise preventing it from discharging into systems tributary to waters of the State.

Additional Guidance

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

Access to the site shall be by way of the existing trail / access road off of Lindsburgh Ave near Marine Drive. A temporary construction cut shall be constructed at this location.

- BMP C105: Stabilized Construction Entrance/Exit
- BMP C106: Wheel Wash
- BMP C107: Construction Road/Parking Area Stabilization

ELEMENT 3: CONTROL FLOW RATES

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Flow rate of stormwater runoff from the project site, as required by local plan approval authority, 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

Where necessary to comply with the bullet above, construct stormwater retention or detention facilities as one of the first steps in grading. Assume that detention facilities function properly before constructing site improvements (e.g. impervious surfaces).

If permanent infiltration ponds are used for flow control during construction, protect these facilities from siltation during the construction phase.

Because the project is adjacent to Bellingham Bay it will not cause streambank erosion due to any increase of stormwater flow rates due to construction. Care will need to be taken to control the turbidity of water leaving the site. All storm runoff should be directed to a "Baker tank" or tonka tank on the SWPPP plan.

Recommended BMPs

- BMP C240: Sediment Trap
- BMP C242: Temporary Sediment Pond

Note: The certified 10-year storm runoff flow rate from the 2.9 acre work site 0.43 cfs. The dewatering inflow rate may exceed this rate.

ELEMENT 4: INSTALL SEDIMENT CONTROLS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

The Permittee must design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, the Permittee must design, install and maintain such controls to:

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

• 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 existing stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.

• Direct stormwater runoff from disturbed areas through a sediment pond 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 meet the flow control performance standard in Element #3, bullet #1.

• Locate BMPs intended to trap sediment on a site in a manner to avoid interference with the movement of various sediments attempting to enter off channel areas or drainages.

• Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal, and maximize stormwater infiltration, unless infeasible.

• Where feasible, design outlet structures that withdraw suspended stormwater from the surface to avoid discharging sediment that is still suspended lower in the water column.

Additional Guidance

• 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 the sand using the construction outlet control is used for permanent stormwater controls, the appropriate outlet structure must be installed after the soil disturbance has ended.

• Seed and mulch earthen structures such as dams, dikes, and diversions according to the timing indicated in Element #5.

• 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.

• If installing a floating pump structure, include a stopper to prevent the pump basket from hitting the bottom of the pond.

Sediment removal BMPs to be used on this site include:

- BMP C232: Gravel Filter Berm
- BMP C233 Silt Fence
- BMP C240 Sediment Trap
- BMP C240 Temporary Sediment Pond

ELEMENT 5: STABILIZE SOILS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• 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 early on areas to be paved, and dust control.

• Control stormwater volume and velocity within the site to minimize soil erosion.

• 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.

• Soils must not remain exposed and unworked for more than the time periods set forth below to prevent erosion.

• During the dry season (May 1 - Sept. 30): 7 days

• During the wet season (October 1 - April 30): 2 days

• Stabilize soils at the end of the shift before a holiday or weekend if needed based on the weather forecast.

• Stabilize soil stockpiles from erosion, protect with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

• Minimize the amount of soil exposed during construction activity.

• Minimize the disturbance of steep slopes.

• Minimize soil compaction and, unless infeasible, preserve topsoil.

Additional Guidance

• Soils must not remain exposed and unworked for more than the time periods set forth above to prevent erosion for linear projects.

• Soil stabilization measures 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.

Soil stabilization BMPs to be used on this site include:

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C124: Sodding
- BMP C130: Surface Roughening
- BMP C140: Dust Control

SITE ELEMENT 6: PROTECT SLOPES

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• 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).

• Divert off-site stormwater (and/or ground water away from slopes and disturbed areas with interceptor dikes, pipes, and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.

• At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion.

• Temporary pipe slope drains must handle the peak 10 minute velocity of flow from a Type 1A, 10 - year, 24 hour frequency storm for the developed condition. Alternatively, the 10 year, 1 - hour flow rate predicted by an approved continuous runoff model, increased by a factor of 1.6, may be used. 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 Hydrology Model (WHHM) to predict flows, bare soil areas should be modeled as "landscaped" area.

• Place excavated material on the uphill side of trenches, consistent with safety and space considerations.

• Place check dams at regular intervals within construction channels that are cut down a slope.

Additional Guidance

• Where 15 - minute time steps are available in an approved continuous runoff model, they may be used directly without a correction factor.

• Consider soil type and its potential for erosion.

• Stabilize soils on slopes, as specified in Element #5.

• BMP combinations are the most effective method of protecting slopes with disturbed soils. For example use both mulching and straw erosion control blankets in combination.

Recommended BMPs

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C122: Mats and Blankets
- BMP C130: Surface Roughening
- BMP C200: Interceptor Dike and Swale
- BMP C201: Gross Lined Channels

NOTE: EVEN THOUGH WSDOE BMPs ALLOW FOR USE OF STRAW TO COVER BARE EARTH, NO STRAW IS TO BE USED ON THIS JOB SITE.

BMP C203: Triangular Silt Dike (Geotextile Encased Check Dam)

ELEMENT 7: PROTECT DRAIN INLETS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• 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.

• 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

• Where possible, 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 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.

Recommended BMPs

- BMP C220: Storm Drain Inlet Protection
- Bellingham Detrit EC - 820 Catch Basin Insert

Three catchbasin inserts will be required near the site entrance: Two on Lindsburgh Ave. and one on Marine Drive.

ELEMENT 8: STABILIZE CHANNELS AND OUTLETS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Design, construct, and stabilize all on-site conveyance channels to prevent erosion from the following expected peak flows:

• Channels must handle the peak 10 minute velocity of flow from a Type 1A, 10 year, 24 hour frequency storm for the developed condition. Alternatively, the 10 year, 1 hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. 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 Hydrology Model (WHHM) to predict flows, bare soil areas should be modeled as "landscaped" area.

• Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches at the outlets of all conveyance systems.

Additional Guidance

The best method for stabilizing channels is to completely line the channel with a blanket product first. Then, add check dams as necessary to function as an anchor and to slow the flow of water.

The 15 - minute time step WHHM predicted flow rate in Little Squalicum Creek for the 10 - year recurrent storm event is 106 cfs. Because of the difficulty of pumping this volume of water around the site, the regrading of the stream channel and connection to the estuary should be avoided until after the estuary is completely excavated, and the fish culvert completed. The re grading of the stream channel should be done at the absolute driest time of the year, and in accordance with the HPA issued by WDFW.

Additional Guidance

• Also, construction of the trail ramp, which requires fill material to be placed in the streambed should be delayed until the stream has been diverted to the estuary. OR, alternatively a temporary 42" culvert may be placed under the trail and meadow fill.

Recommended BMPs:

- BMP C202: Channel Lining
- BMP C122: Mats and Blankets

ELEMENT 9: CONTROL POLLUTANTS

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants.

• 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.

Additional Guidance

• 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.

• Conduct maintenance, fueling, and repair of heavy equipment and vehicles using spill prevention and control measures. Clean contaminated surfaces immediately following any spill incident.

• Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed loop recirculation or upland land application, or to the sanitary sewer, with local sewer district approval.

• 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.

• Use BMPs to prevent contamination of stormwater runoff by pH modifying sources. The sources for this contamination include, but are not limited to: bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete production and sawing, exposed aggregate processes, dewatering concrete vaults, concrete pumping and mixer washout waters.

• Adjust the pH of stormwater if necessary to prevent violations of the water quality standards.

• Assume that washout of concrete trucks is performed off-site or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Do not dump excess concrete on site, except in designated concrete washout areas. Concrete spillage or concrete discharge to surface waters of the State is prohibited.

• Obtain written approval from Ecology before using chemical treatment other than CO₂ or dry ice to adjust pH.

Additional Guidance

• Wheel wash or tire bath wastewater should not include wastewater from concrete washout areas.

• 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 rising, over the vehicle.

Recommended BMPs:

- BMP C151: Concrete Handling
- BMP C152: Materials Delivery, Storage and Containment
- BMP C154: Concrete Washout Area
- BMP C251: Construction Stormwater Filtration
- BMP C253 pH Control for High pH Water

ELEMENT 10: CONTROL DEWATERING

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Discharge foundation, vault, and trench dewatering water, which have characteristics similar to stormwater runoff off the site, into a controlled conveyance system before discharge to a sediment trap or sediment pond.

• Discharge clean, non turbid de-watering water, such as well point ground water, to systems tributary to, or directly into surface waters of the State, as specified in Element #9, provided the de-watering flow does not cause erosion or flooding of receiving waters or interfere with the operation of the system. Do not route clean dewatering water through stormwater sediment ponds. 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.

• Handle highly turbid or contaminated dewatering water separately from stormwater.

• Other treatment or disposal options may include:

1. Infiltration.
2. Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters.
3. Ecology approved on-site chemical treatment or other suitable treatment technologies.
4. Sanitary or combined sewer discharge with local sewer district approval, if there is no other option.
5. Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

Additional Guidance

• Channels must be stabilized, as specified in Element #8.

• 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.

It is expected that dewatering of the estuary excavation work will be required because of perched ground water and tidal incursion through coarse material antipacked in the deeper parts of the fill. This water will need to be pumped to the "Baker tank" as shown on the SWPPP plan.

ELEMENT 11: MAINTAIN BMPs

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• 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.

• 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

• Note: Some temporary erosion and sediment control BMPs are bio degradable and designed to remain in place following construction such as compost socks.

• 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.

Recommended BMPs:

- BMP C150: Materials On Hand
- BMP C160: Certified Erosion and Sediment Control Lead

ELEMENT 12: MANAGE THE PROJECT

• Construction Stormwater General Permit and Municipal Stormwater Permit Requirements

• Phase development projects to the maximum degree practicable and take into account secondary work limits.

• Inspection and monitoring inspect, maintain, and repair all BMPs as needed to assure continued performance of their intended function. Conduct site inspections and monitoring in accordance with the Construction Stormwater General Permit or local plan approval authority.

• Maintaining an updated construction SWPPP. Maintain, update, and implement the SWPPP in accordance with the Construction Stormwater General Permit and Municipal Stormwater Permit Requirements.

• Projects that disturb one or more acres must have, site inspections conducted by a Certified Erosion and Sediment Control Lead (CESCL). Project sites less than one acre (not part of a larger common plan of development or sale) may have a person without CESCL certification conduct inspections. By the initiation of construction, the SWPPP must identify the CESCL or inspector, who shall be present on site or on-call at all times.

Additional Guidance for Site Inspections

• The CESCL or inspector (project sites less than one acre) must have the skills to assess the site.

• Site conditions and construction activities that could impact the quality of stormwater.

• Effectiveness of erosion and sediment control measures used to control the 25 quality of stormwater discharges.

• Based on the results of the inspection, construction site operators must correct the 3i problems identified by:

• Reviewing the SWPPP for compliance with the 13 construction SWPPP 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 possible within 10 days, the construction site operator may request an extension within the day response period.

• Documenting BMP implementation and maintenance in the site log book (sites larger than 1 acre).

• The CESCL or inspector must inspect all areas disturbed by construction activities, all BMPs, and all stormwater discharges 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.

Additional Guidance

• Phasing of Construction.

Phase development projects where feasible in order to prevent soil erosion and, to the maximum extent practical, and prevent transporting 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.

Seasonal Work Limitations

From October 1 through April 30, clearing, grading, and other soil disturbing activities is permitted only if shown to the satisfaction of the local permitting authority that the site operator will prevent silt-laden runoff from leaving the site through a combination of the following:

1. Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters.
2. Limit activities and the extent of disturbed areas.
3. Proposed erosion and sediment control measures.

Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance. The local permitting authority has the discretion to take enforcement action such as the issuance of a violation, administrative order, penalty, or stop-work order under the following circumstances:

• If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard, or

• If clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained.

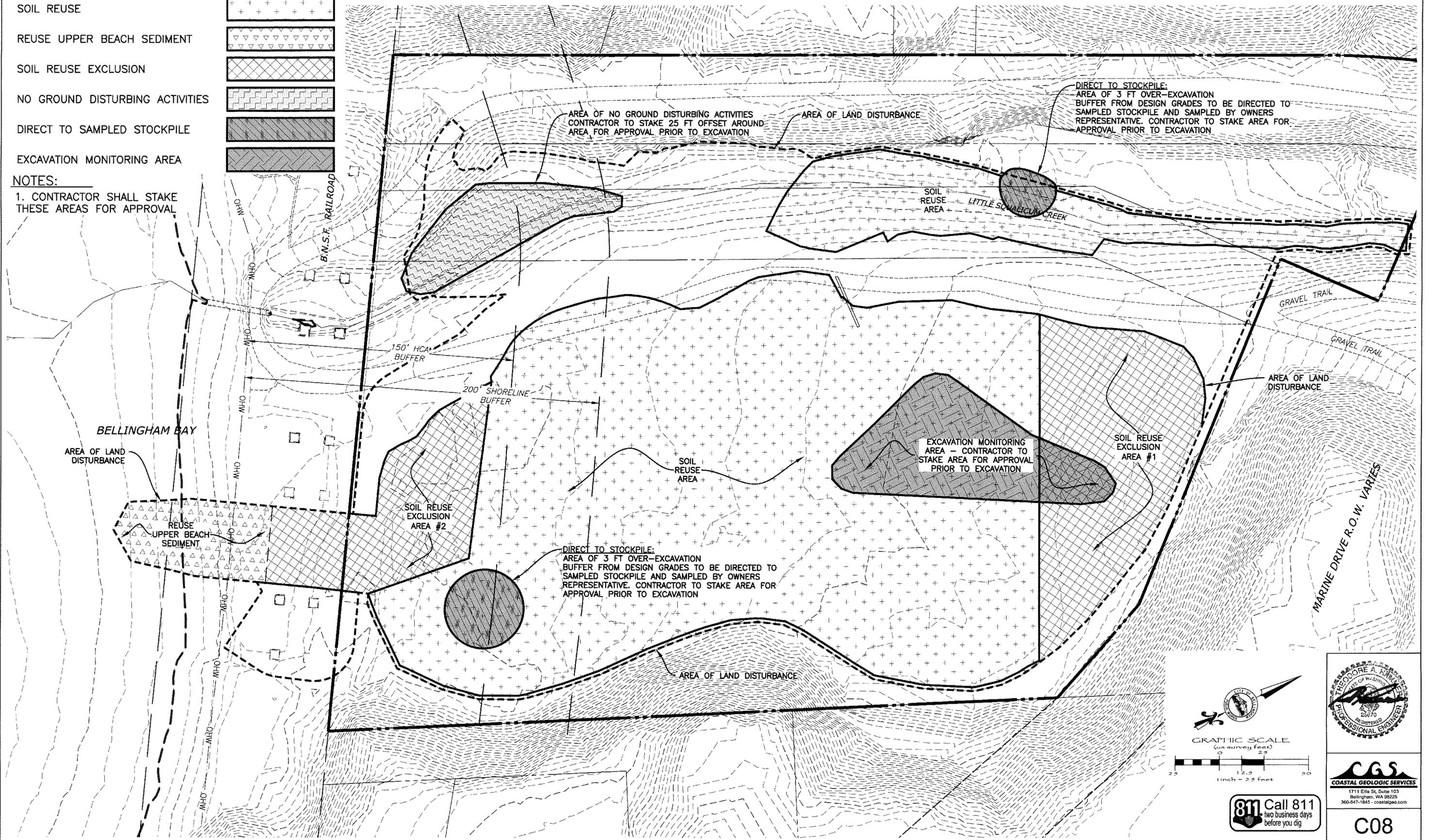
The following activities are exempt from the seasonal clearing and grading limitations:

LEGEND:

SOIL REUSE	
REUSE UPPER BEACH SEDIMENT	
SOIL REUSE EXCLUSION	
NO GROUND DISTURBING ACTIVITIES	
DIRECT TO SAMPLED STOCKPILE	
EXCAVATION MONITORING AREA	

NOTES:

1. CONTRACTOR SHALL STAKE THESE AREAS FOR APPROVAL



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C08

5/4/18	4	BID SUBMITTAL -- COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT
Date	No	Revision	By

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W.J./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
 PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE
 Horiz. 1" = 20'
 Vert. 1" = NA

DATUM
 NAD 83/98
 NAVD88

Job. No. _____
 Date 5/4/2018
 Field Bk. _____

LITTLE SQUALICUM ESTUARY
 SOIL HANDLING PLAN

SHEET 11 OF 26

PROPOSED CONDITIONS NOTES

- 1 PROJECT WORK AREA - CLEARING LIMITS
- 2 EXTENT OF ESTUARY EXCAVATION - DAYLIGHT
- 3 NEW SHEET PILE WALL AND ABUTMENTS - SEE S SHEETS
- 4 EXCAVATE ESTUARY
- 5 REALIGNED GRAVEL TRAIL - SEE DETAIL, SHEET C13
- 6 NEW GRAVEL TRAIL - SEE SHEET C13
- 7 NEW BOX CULVERT AND WING WALLS - SEE S SHEETS
- 8 REALIGN CREEK - SEE SHEETS C10, C11 AND C12
- 9 DECOMMISSION CULVERT - SEE SHEET C05 AND C13
- 10 PREFABRICATED PEDESTRIAN BRIDGE - SEE S SHEETS

LEGEND:

FEATURE	EXISTING	PROPOSED
CONTOURS, MAJOR	---#---	---#---
CONTOURS, MINOR	---#---	---#---
CREEK/DRAINAGE	---	---
CONCRETE	---	---
GRAVEL	---	---
SURVEY MONUMENT	---	---
PARK BOUNDARY	---	---
PROPERTY LINES	---	---
BNSF RR ROW	---	---
EASEMENT	---	---
OHWM	---	---
MHHM	---	---
200' SHORELINE BUFFER	---	---
150' HCA BUFFER	---	---
BNSF RW CENTERLINE	---	---
TREE LINE	---	---
EXISTING STREAM	---	---
NO GROUND DISTURBANCE AREA	---	---

MATCHLINE - SEE SHEET C14



BELLINGHAM BAY
 REMOVE ANY LARGE WOOD WITHIN WORK AREA AND REDISTRIBUTE ON BEACH AT SAME ELEVATION OUTSIDE OF EXCAVATION AREA

SDCULV#10961
 IE-8.1, 36" CONC.

SIGN: BEACH RULES
 GARBAGE CAN

GARBAGE CAN
 8x10 BENCH BUMP OUT LOCATION TO BE CONFIRMED IN THE FIELD BY COB STAFF

BNSF RR TRESTLE FOOTING (TYPICAL)

MHO

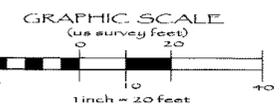
VAULT: FIBER-OPTIC

200' SHORELINE BUFFER

BNSF RAILROAD

200' SHORELINE BUFFER

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Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
 PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE	Horiz. 1" = 20'
	Vert. 1" = NA

DATUM	NAD 83/98
	NAVD88

Job No.	
Date	5/4/2018
Field Bk.	

LITTLE SQUALICUM ESTUARY
 PROPOSED CONDITIONS - ESTUARY GRADING PLAN

SHEET 12 OF 26

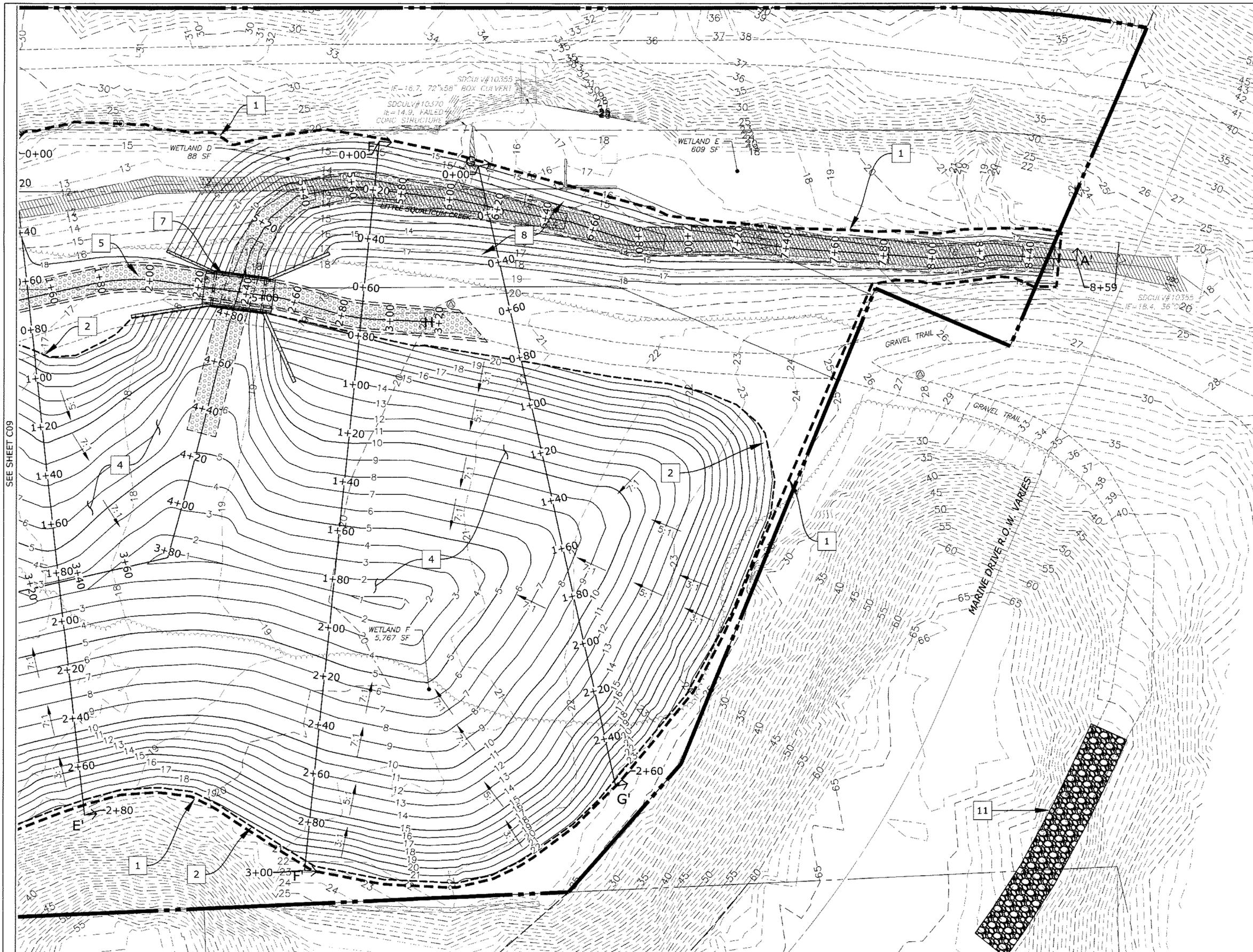
CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7300



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C09

SEE SHEET C10



LEGEND:

FEATURE	EXISTING	PROPOSED
CONTOURS, MAJOR	---#---	---#---
CONTOURS, MINOR	---#---	---#---
CREEK/DRAINAGE	---#---	---#---
CONCRETE	[Pattern]	[Pattern]
GRAVEL	[Pattern]	[Pattern]
SURVEY MONUMENT	⊕###	⊕###
PARK BOUNDARY	---#---	---#---
PROPERTY LINES	---#---	---#---
EASEMENT	---#---	---#---
OHWM	---#---	---#---
MHHM	---#---	---#---
OHWM	---#---	---#---
MHHM	---#---	---#---
TREE LINE	---#---	---#---
EXISTING STREAM	---#---	---#---

- PROPOSED CONDITIONS NOTES:**
- 1 PROJECT WORK AREA - CLEARING LIMITS
 - 2 EXTENT OF ESTUARY EXCAVATION - DAYLIGHT
 - 3 NEW SHEET PILE WALL AND ABUTMENTS - SEE S SHEETS - NOT USED THIS SHEET
 - 4 EXCAVATE ESTUARY
 - 5 REALIGNED GRAVEL TRAIL - SEE DETAIL, SHEET C13
 - 6 NEW GRAVEL TRAIL - SEE SHEET C13 - NOT USED THIS SHEET
 - 7 NEW BOX CULVERT AND WING WALLS - SEE S SHEETS
 - 8 REALIGN CREEK - SEE SHEETS C10, C11 AND C12
 - 9 BECOMMISSION CULVERT - SEE SHEET C06 AND C15 - NOT USED THIS SHEET
 - 10 PREFABRICATED PEDESTRIAN BRIDGE - SEE S SHEETS - NOT USED THIS SHEET
 - 11 STABILIZED CONSTRUCTION ENTRANCE - SEE DETAIL, SHEET C17

SEE SHEET C09



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C10

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	3	BID SUBMITTAL	AT
6/26/17	2	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.	DIRECTOR PUBLIC WORKS	T.A.C.
DESIGNED/DRAWN	J.W./A.D.T.	CITY ENGINEER	C.M.A.S.
INSPECTOR		ASSISTANT DIRECTOR	F.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE
 Horiz. 1" = 20'
 Vert. 1" = NA

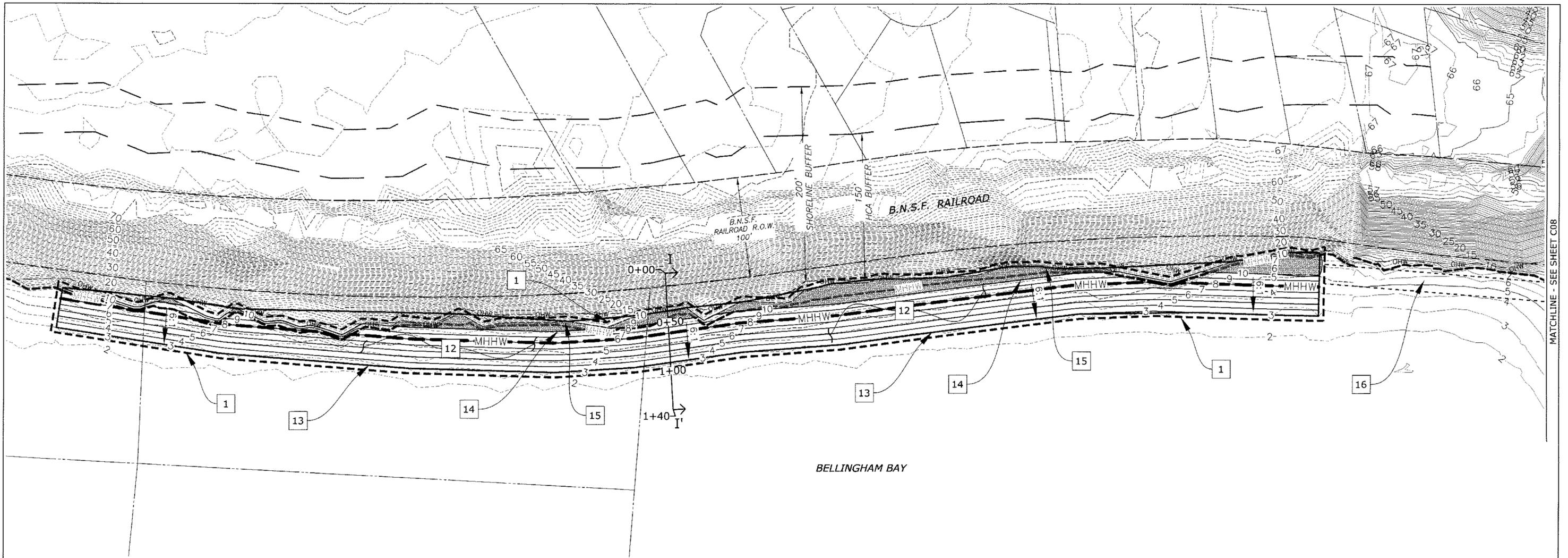
DATUM
 NAD 83/98
 NAVD88

Job No. _____
 Date 5/4/2018
 Field Bk. _____

LITTLE SQUALICUM ESTUARY
PROPOSED CONDITIONS - ESTUARY GRADING PLAN

SHEET 13 OF 26

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900

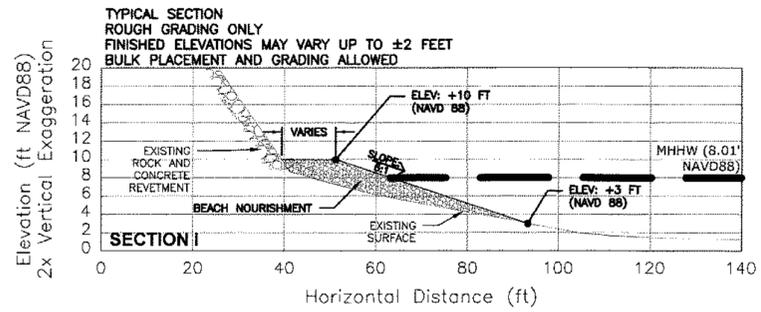


MATCHLINE - SEE SHEET C08

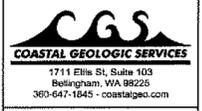
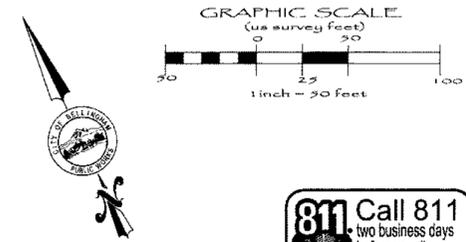
- PROPOSED CONDITIONS NOTES:**
- 1 PROJECT WORK AREA - CLEARING LIMITS
 - 2 EXTENT OF ESTUARY EXCAVATION - DAYLIGHT - NOT USED THIS SHEET
 - 3 NEW SHEET PILE WALL AND ADJUSTMENTS - SEE 9 SHEETS - NOT USED THIS SHEET
 - 4 EXCAVATE ESTUARY - NOT USED THIS SHEET
 - 5 REALIGNED GRAVEL TRAIL - SEE DETAIL SHEET 013 - NOT USED THIS SHEET
 - 6 NEW GRAVEL TRAIL - SEE SHEET 013 - NOT USED THIS SHEET
 - 7 NEW BOX CULVERT AND WING WALLS - SEE 9 SHEETS - NOT USED THIS SHEET
 - 8 REALIGN CREEK - SEE SHEETS 010, 011 AND 012 - NOT USED THIS SHEET
 - 9 DECOMMISSION CULVERT - SEE SHEET 005 AND 013 - NOT USED THIS SHEET
 - 10 PREFABRICATED PEDESTRIAN BRIDGE - SEE 9 SHEETS - NOT USED THIS SHEET
 - 11 STABILIZED CONSTRUCTION ENTRANCE - SEE DETAIL SHEET 017 - NOT USED THIS SHEET
 - 12 PLACE BEACH NOURISHMENT SEDIMENT
 - 13 BEACH NOURISHMENT TOE +3 FT NAVD88
 - 14 BEACH NOURISHMENT TOP +10 FT NAVD88
 - 15 BEACH NOURISHMENT LANDWARD EXTENT
 - 16 BEACH NOURISHMENT ACCESS CORRIDOR, 25 FT WIDTH

LEGEND:

FEATURE	EXISTING	PROPOSED
CONTOURS, MAJOR	---#---	---#---
CONTOURS, MINOR	---#---	---#---
PROPERTY LINES	---	---
BNSF RN ROW	---	---
MHHM	---MHHW---	---MHHW---
200' SHORELINE BUFFER	---	---
BEACH NOURISHMENT	---	---[Pattern]---



- BEACH NOURISHMENT NOTES:**
1. BEACH NOURISHMENT MATERIAL SHALL BE PLACED OVER INTERTIDAL BEACH DOWN AS LOW AS +3 FT ELEVATION, INCLUDING OVER EXISTING ROCK AND CONCRETE REVETMENT AND SCATTERED ROCKS AND CONCRETE.
 2. BEACH NOURISHMENT MATERIAL SHALL NOT BE PLACED ATOP LARGE WOOD THAT EXCEEDS 12" IN DIAMETER.
 3. LARGE WOOD ON THE BEACH THAT EXCEED 12" IN DIAMETER SHALL BE MOVED ASIDE PRIOR TO SEDIMENT PLACEMENT, AND REPLACED ON UPPER MOST BEACH AFTER.



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C14

Date	No	Revision	By
5/4/18	4		
9/22/17	2	BID SUBMITTAL - COB COMMENTS	AT
6/26/17	1	BID SUBMITTAL	AT
		DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W.J./A.D.T.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	F.C.I.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE

Horiz.	1" = 50'
Vert.	1" = NA

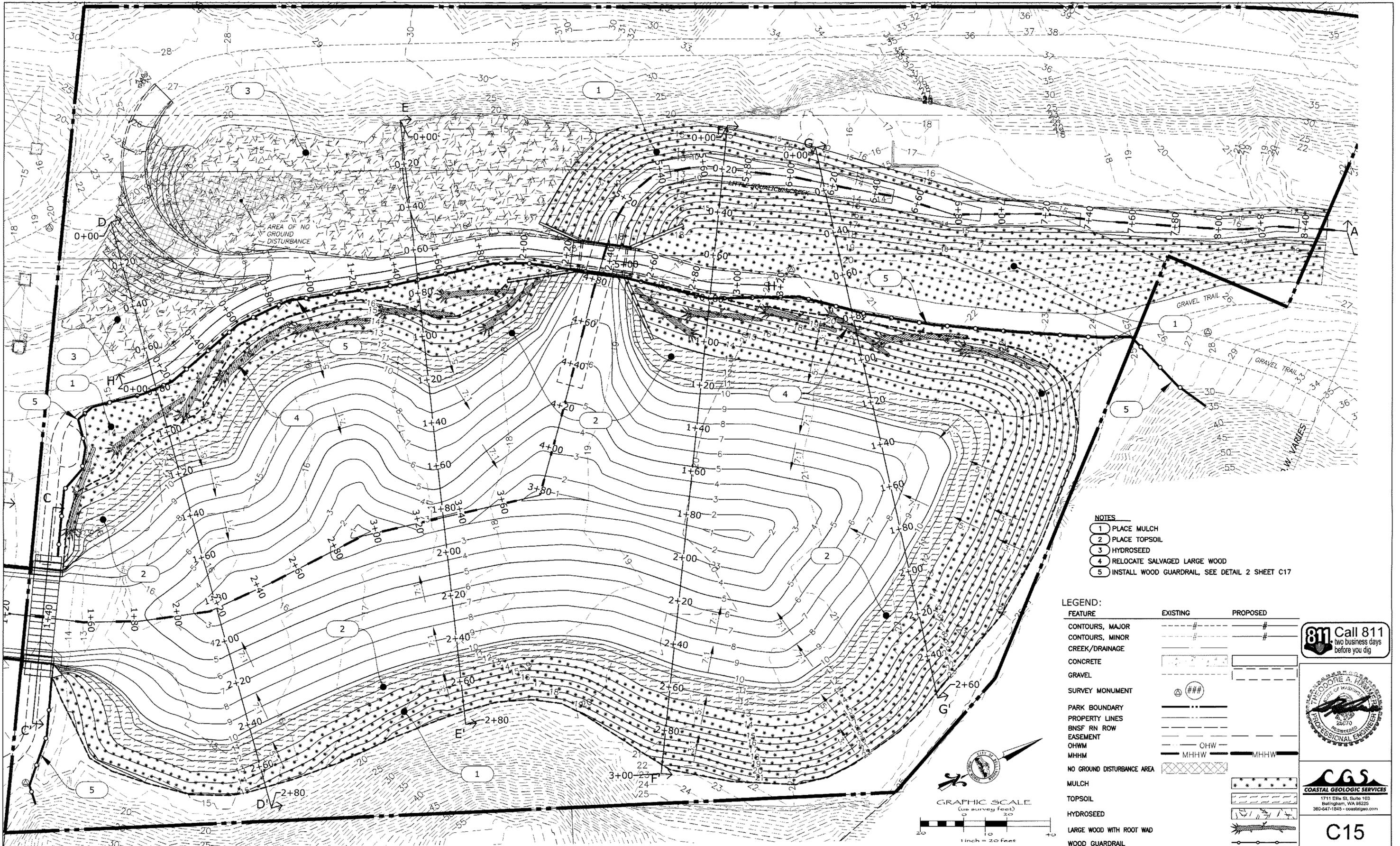
DATUM
NAD 83/98
NAVD88

Job No.	
Date	5/4/2018
Field Bk.	

LITTLE SQUALICUM ESTUARY
PROPOSED CONDITIONS - OPTION A- BEACH NOURISHMENT

SHEET	17	OF	26
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CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



- NOTES**
- 1 PLACE MULCH
 - 2 PLACE TOPSOIL
 - 3 HYDROSEED
 - 4 RELOCATE SALVAGED LARGE WOOD
 - 5 INSTALL WOOD GUARDRAIL, SEE DETAIL 2 SHEET C17

LEGEND:

FEATURE	EXISTING	PROPOSED
CONTOURS, MAJOR	---#---	---#---
CONTOURS, MINOR	---#---	---#---
CREEK/DRAINAGE	---	---
CONCRETE	---	---
GRAVEL	---	---
SURVEY MONUMENT	⊙###	---
PARK BOUNDARY	---	---
PROPERTY LINES	---	---
BNSF RN ROW	---	---
EASEMENT	---	---
OHWM	---	---
MHHM	---	---
NO GROUND DISTURBANCE AREA	⊗	---
MULCH	---	---
TOPSOIL	---	---
HYDROSEED	---	---
LARGE WOOD WITH ROOT WAD	---	---
WOOD GUARDRAIL	---	---

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C15

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.	DIRECTOR PUBLIC WORKS	T.A.C.
DESIGNED/DRAWN	J.W.J./A.D.T.	CITY ENGINEER	G.M.A.S.
INSPECTOR		ASSISTANT DIRECTOR	E.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1" = 20'
Vert. 1" = 10'

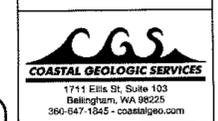
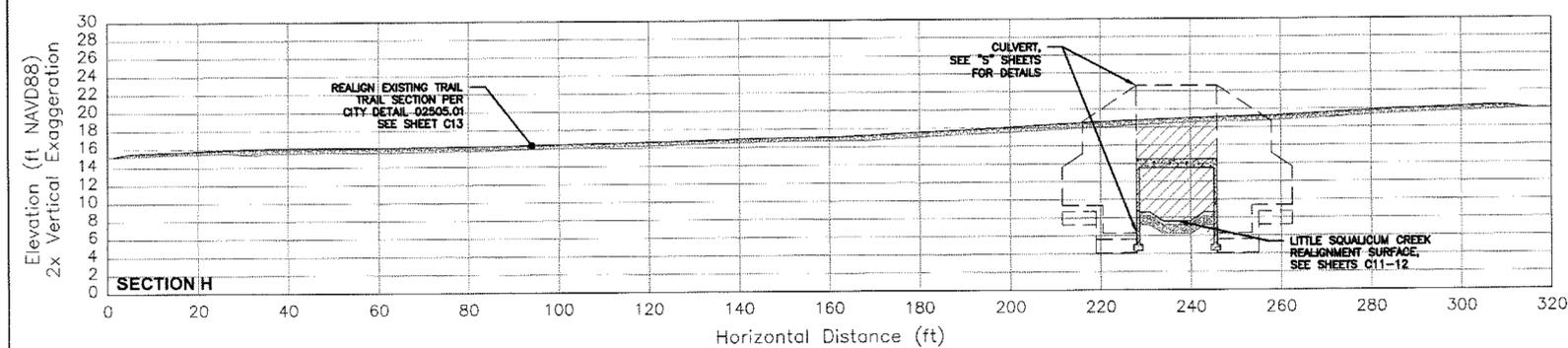
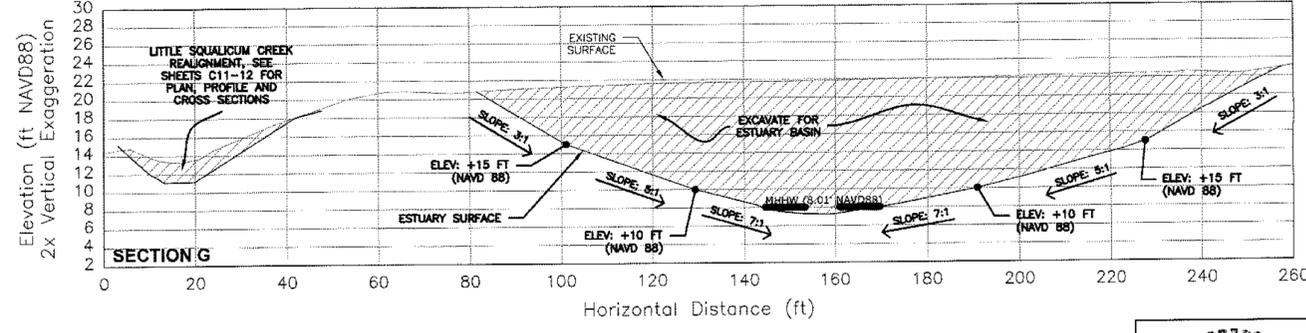
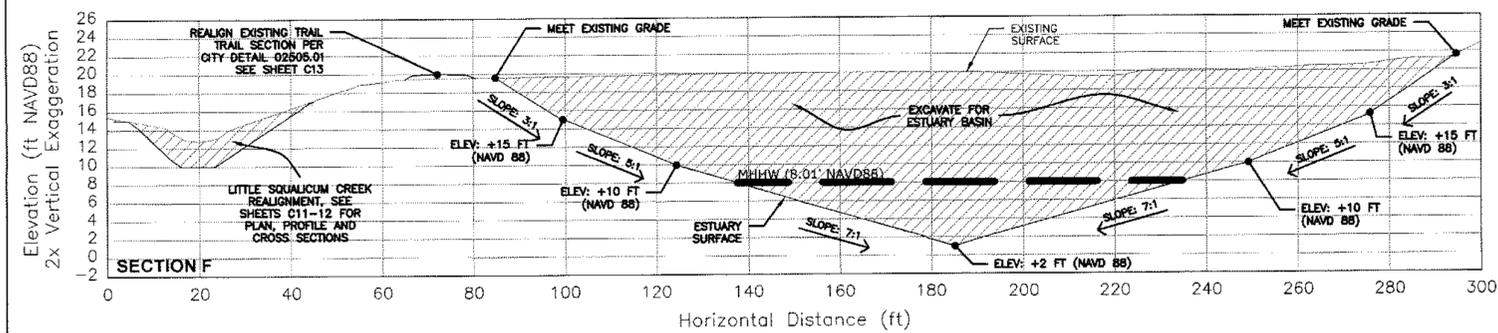
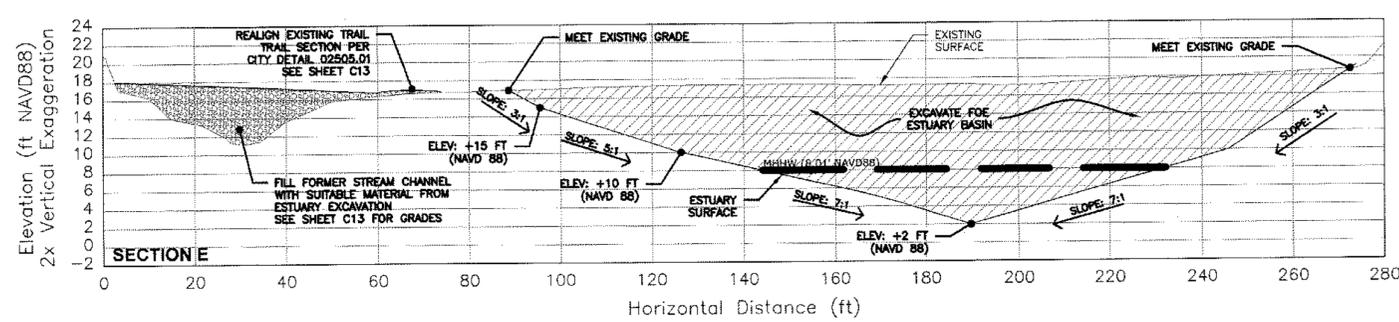
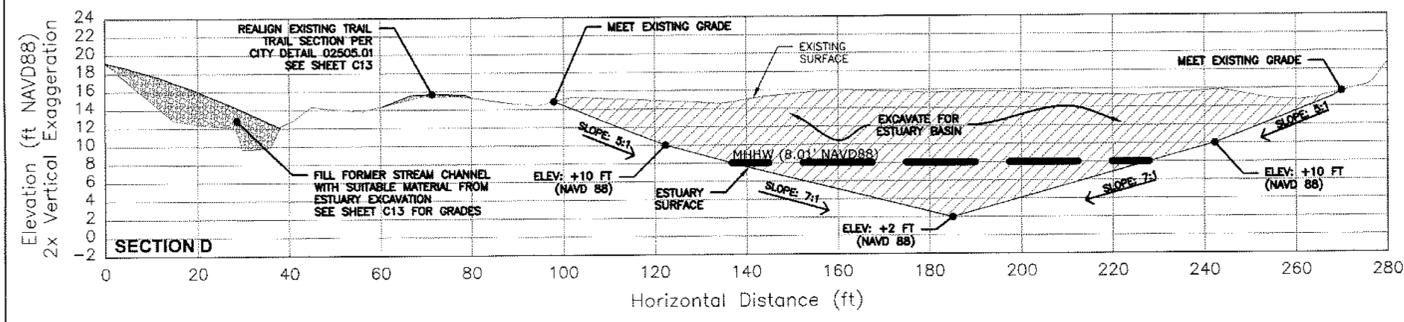
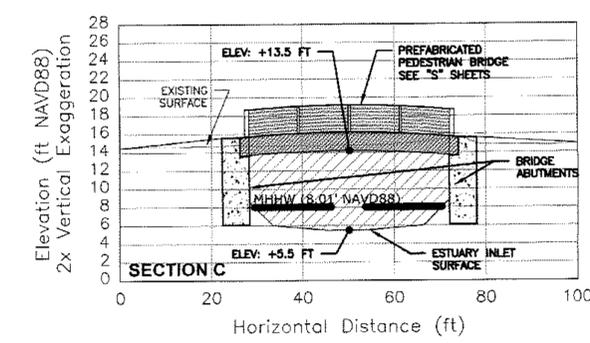
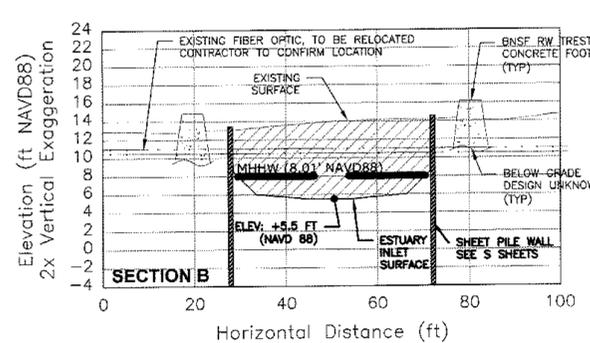
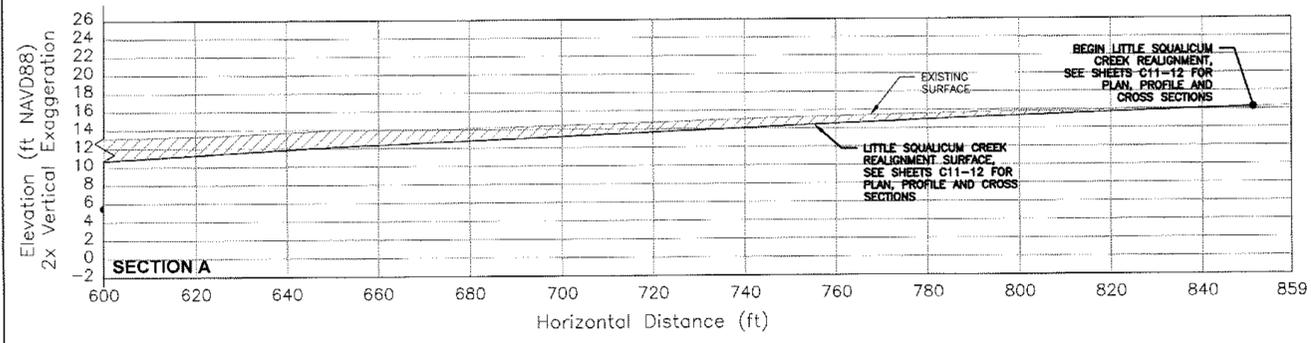
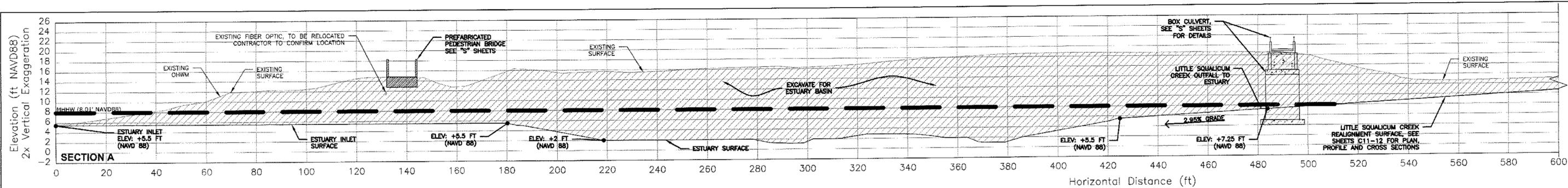
DATUM
NAD 83/98
NAVD88

Job No. _____
Date 5/4/2018
Field Bk. _____

LITTLE SQUALICUM ESTUARY
PROPOSED CONDITIONS - LARGE WOOD, MULCHING AND TOPSOIL PLAN

SHEET 18 OF 26

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



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C16

5/4/18	4	BID SUBMITTAL -- COB COMMENTS	AT
6/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT
Date	No	Revision	By

PROJECT ENGINEER	T.A.H.
DESIGNED/DRAWN	J.W.J./A.D.J.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	P.M.A.S.
ASSISTANT DIRECTOR	F.C.J.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE
Horiz. 1" = 20'
Vert. 1" = 10'

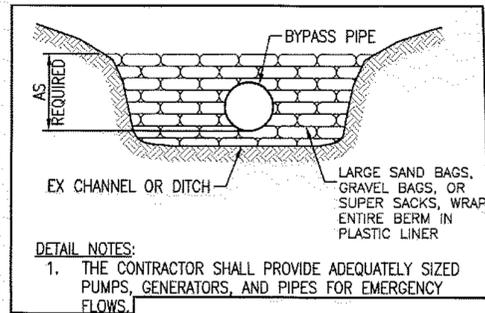
DATUM
NAD 83/98
NAVD88

Job No. _____
Date 5/4/2018
Field Bk. _____

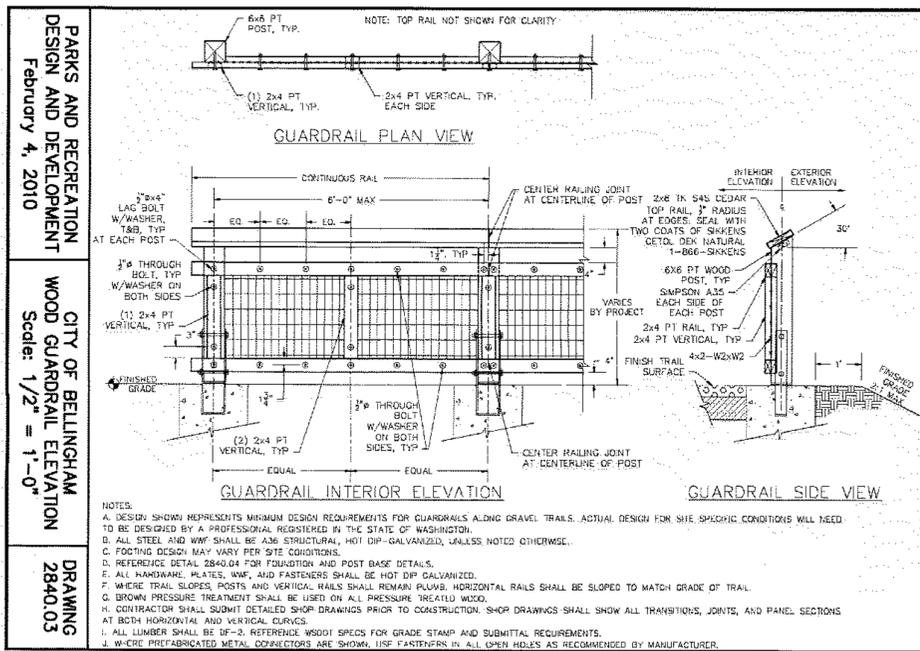
LITTLE SQUALICUM ESTUARY
PROPOSED CONDITIONS - CROSS SECTIONS

SHEET 19 OF 26

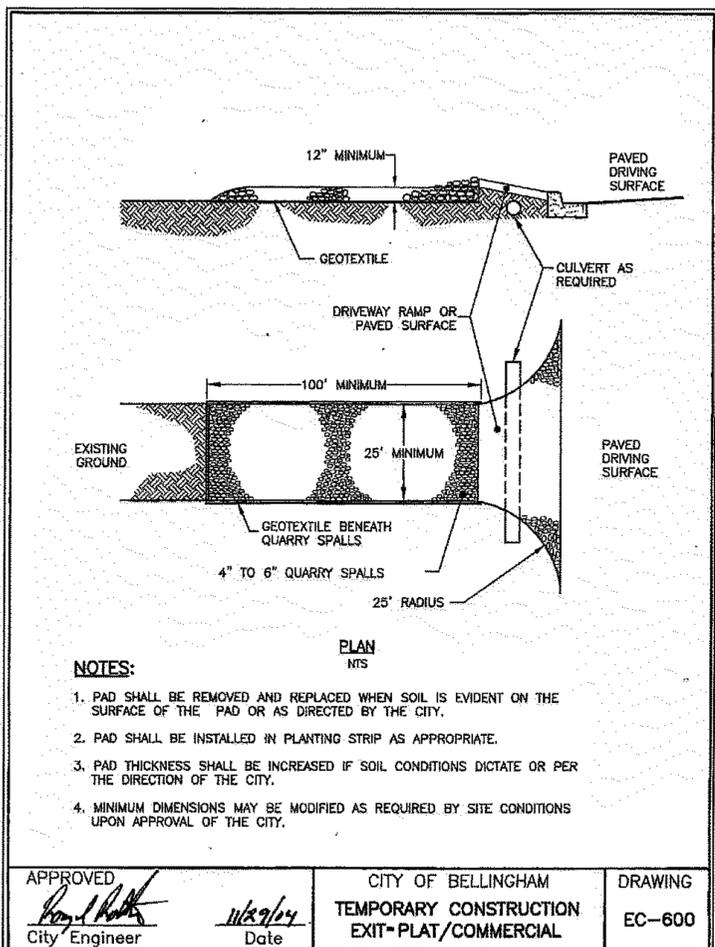
CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



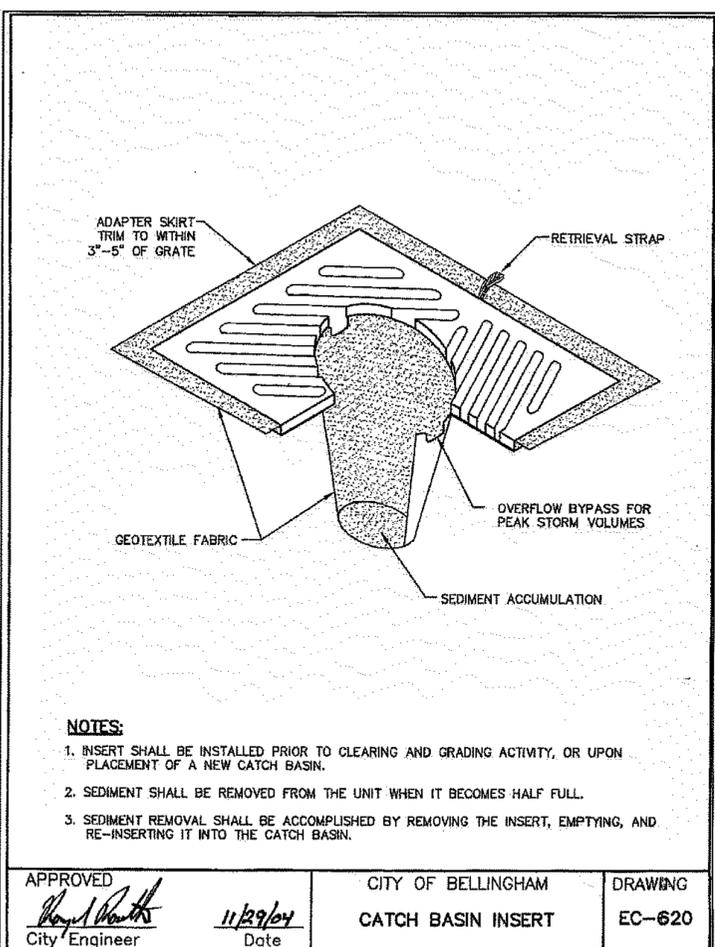
1 COFFER DAM DETAIL
 NOT TO SCALE



2 WOOD GUARDRAIL DETAIL
 NOT TO SCALE



3 TEMPORARY CONSTRUCTION EXIT
 NOT TO SCALE



4 CATCH BASIN INSERT
 NOT TO SCALE

Date	No	Revision	By
5/4/18	4	BID SUBMITTAL - COB COMMENTS	AT
9/22/17	2	BID SUBMITTAL	AT
6/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	T.A.H.	DIRECTOR PUBLIC WORKS	T.A.C.
DESIGNED/DRAWN	J.W.J./A.D.T.	CITY ENGINEER	C.M.A.S.
INSPECTOR		ASSISTANT DIRECTOR	F.C.I.

CITY OF BELLINGHAM, WASHINGTON
 PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE
 Horiz. 1" = 20'
 Vert. 1" = 10'

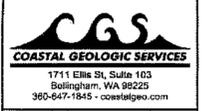
DATUM
 NAD 83/98
 NAVD88

Job No. _____
 Date 5/4/2018
 Field Bk. _____

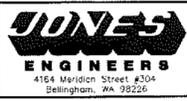
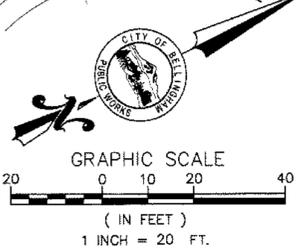
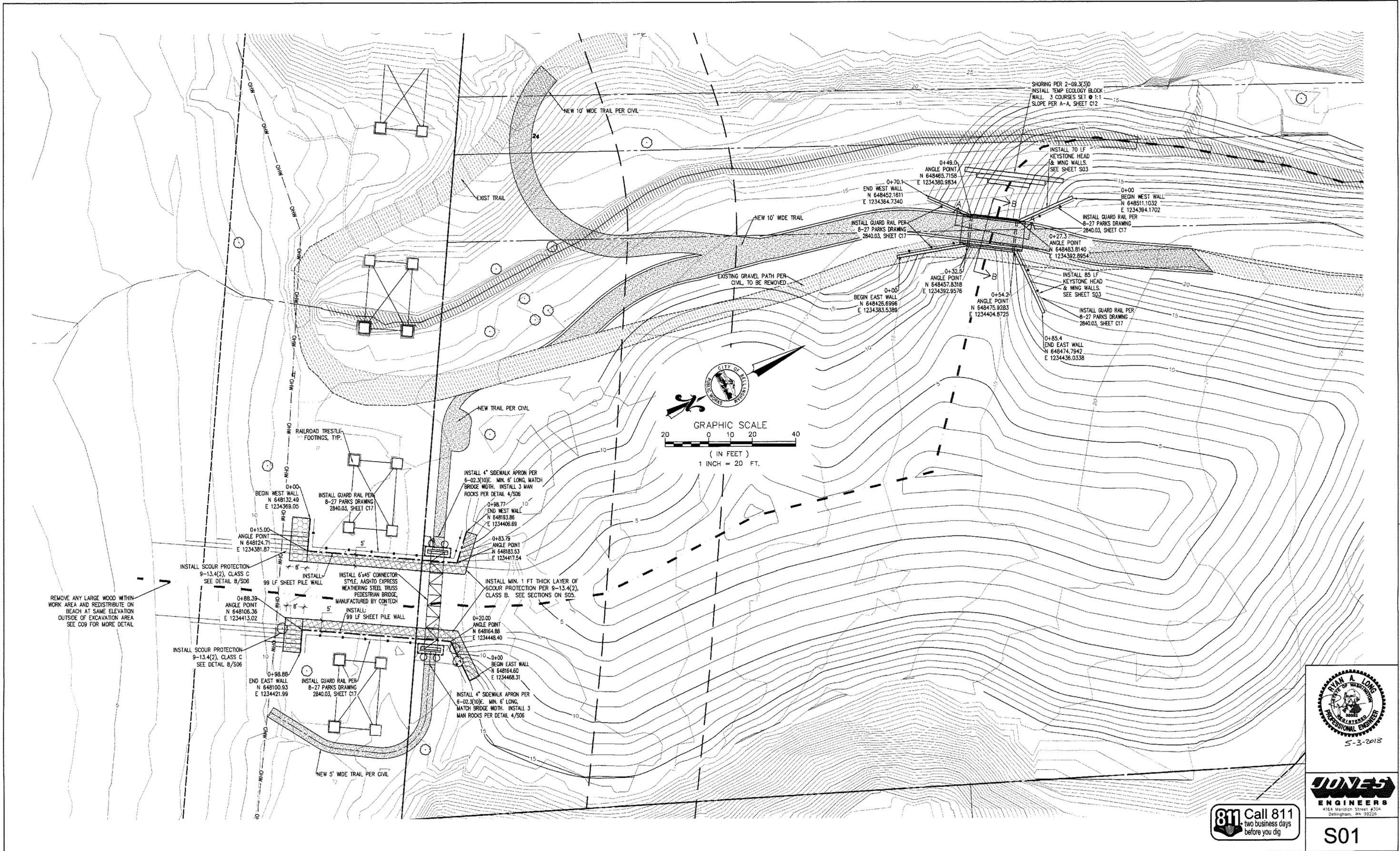
LITTLE SQUALICUM ESTUARY
 DETAILS

SHEET 20 OF 26

CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT (360)-778-7900



C17



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S01

05/04/18	3	BID SUBMITTAL - COB COMMENTS	AT
09/22/17	2	BID SUBMITTAL	AT
06/26/17	1	DRAFT DESIGN	AT
Date	No	Revision	By

PROJECT ENGINEER	R.L.
DESIGNED/DRAWN	R.L. / D.N.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.L.

CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE	Horiz. 1" = 20'
	Vert. 1" = N/A

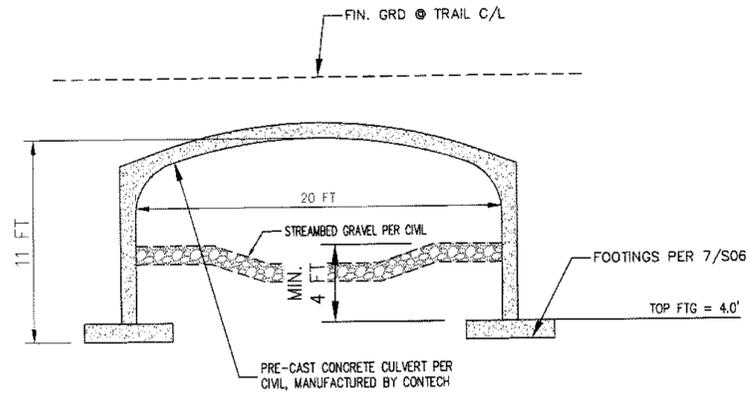
DATUM	NAD 83/98
	NAVD88

Job. No.	
Date	05/04/2018
Field Bk.	

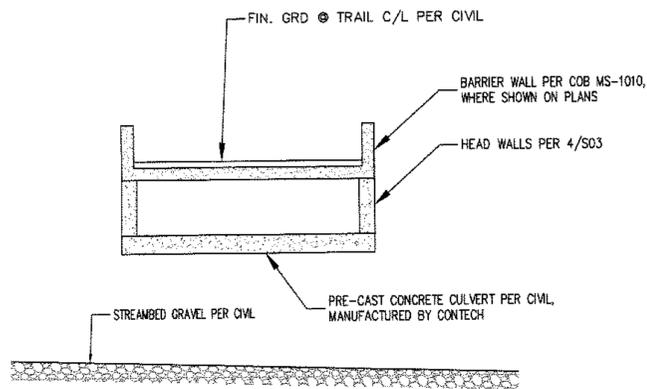
LITTLE SQUALICUM ESTUARY
SHEET PILE & HEADWALL PLAN

SHEET	21	OF	26
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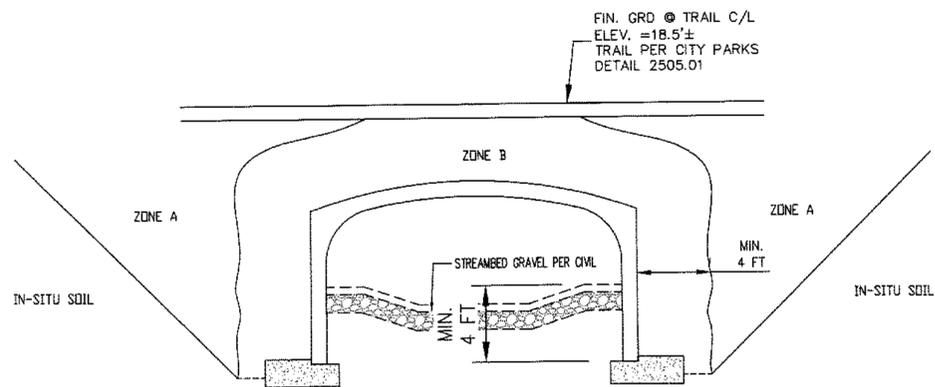
CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT 778-7900



SECTION A-A THROUGH CULVERT



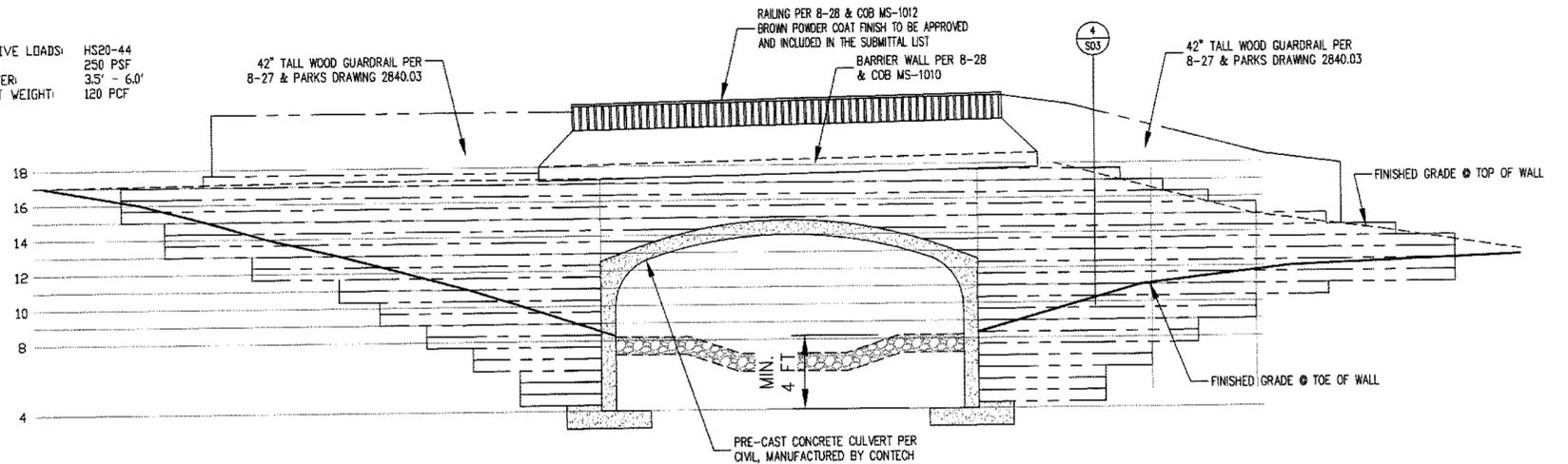
SECTION B-B THROUGH CULVERT



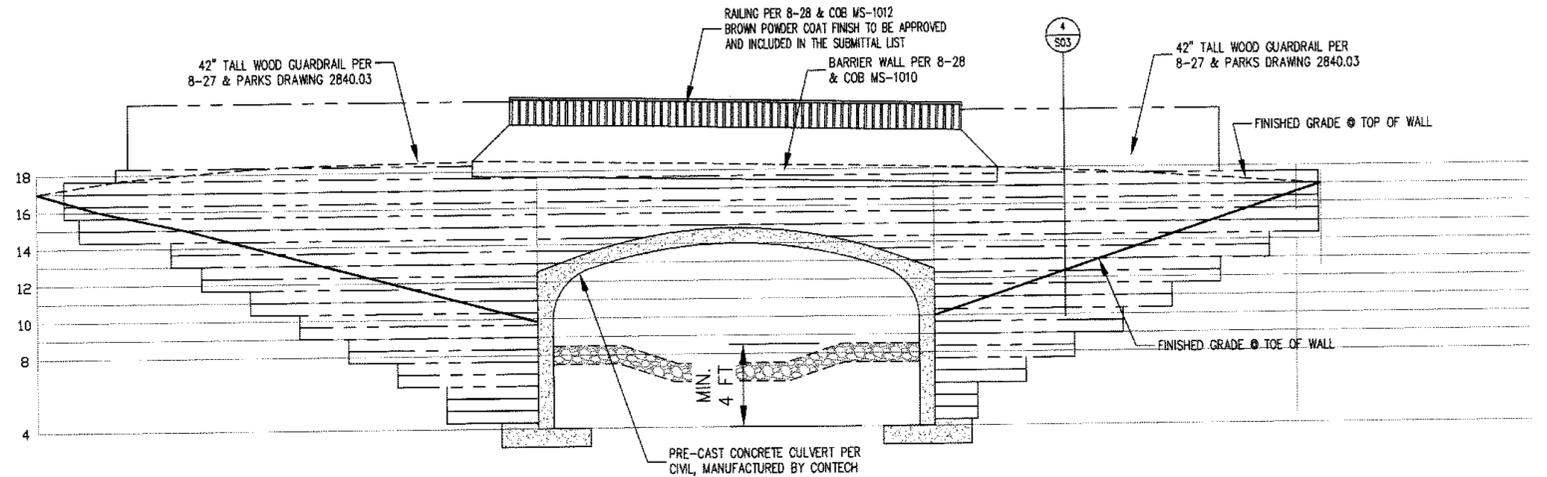
ZONE A: SUITABLE NATIVE OR COMMON BORROW SUITABLE CONFORMING TO 9-03.14(3) COMPACTED TO 95% MDD PER 2-03.3(14)C, METHOD B.
 ZONE B: STRUCTURAL BACKFILL PER CONTECH & GEOTECH SPECIFICATIONS. PERMEABLE BALLAST PER 9-03.9(2) COMPACTED TO 95% MDD PER 2-03.3(14)C, METHOD C.

TYPICAL BACKFILL AROUND CON/SPAN BRIDGE

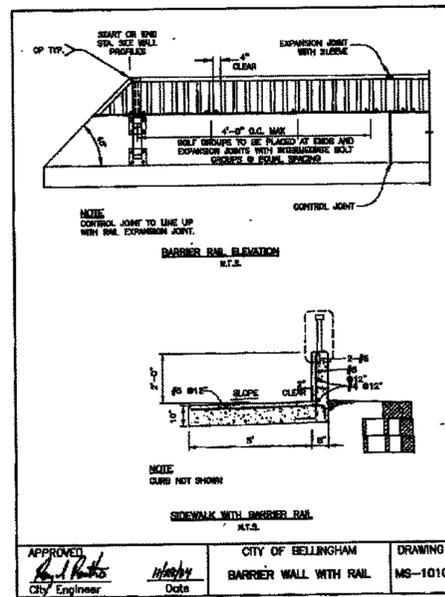
DESIGN LIVE LOADS: HS20-44
 SOIL COVER: 250 PSF
 SOIL UNIT WEIGHT: 3.5' - 6.0' 120 PCF



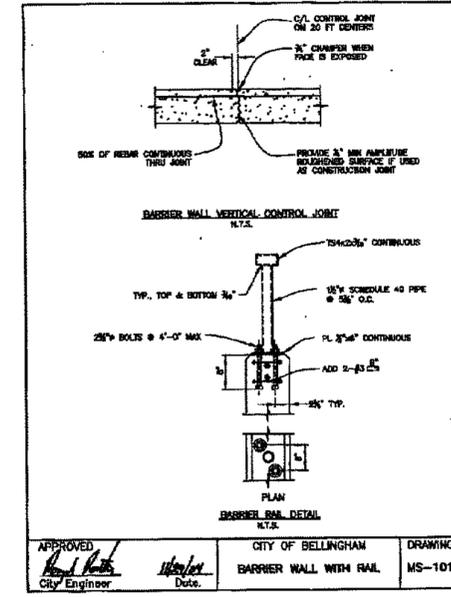
DOWNSTREAM WALL PROFILE



UPSTREAM WALL PROFILE



APPROVED: *[Signature]* City Engineer
 DATE: *[Date]*
 CITY OF BELLINGHAM
 BARRIER WALL WITH RAIL
 DRAWING MS-1010



APPROVED: *[Signature]* City Engineer
 DATE: *[Date]*
 CITY OF BELLINGHAM
 BARRIER WALL WITH RAIL
 DRAWING MS-1012



811 Call 811
 two business days
 before you dig

S02

05/04/18	3	BID SUBMITTAL - COB COMMENTS	AT
08/22/17	2	BID SUBMITTAL	AT
06/26/17	1	DRAFT DESIGN	AT
Date	No	Revision	By

PROJECT ENGINEER	RL
DESIGNED/DRAWN	RL / D.N.
INSPECTOR	

DIRECTOR PUBLIC WORKS	I.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.L.

CITY OF BELLINGHAM, WASHINGTON
 PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE
 Horiz. 1" = 20'
 Vert. 1" = N/A

DATUM
 NAD 83/98
 NAVD88

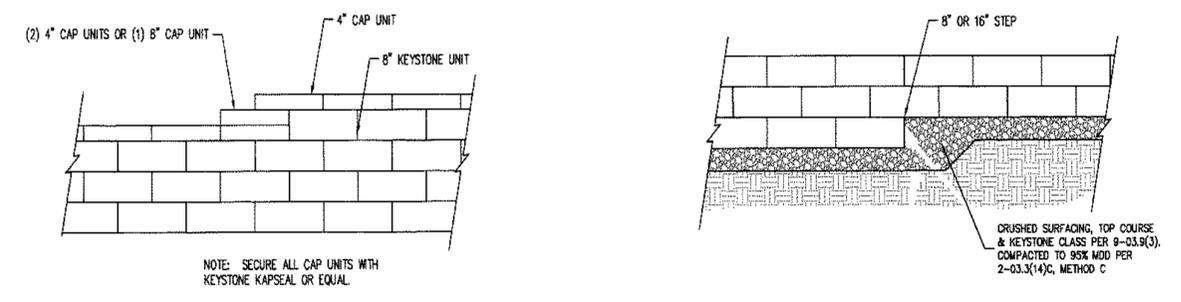
Job No.
 Date 05/04/2018
 Field Bk.

LITTLE SQUALICUM ESTUARY
 CULVERT SECTIONS & HEADWALL PROFILES

SHEET 22 OF 26

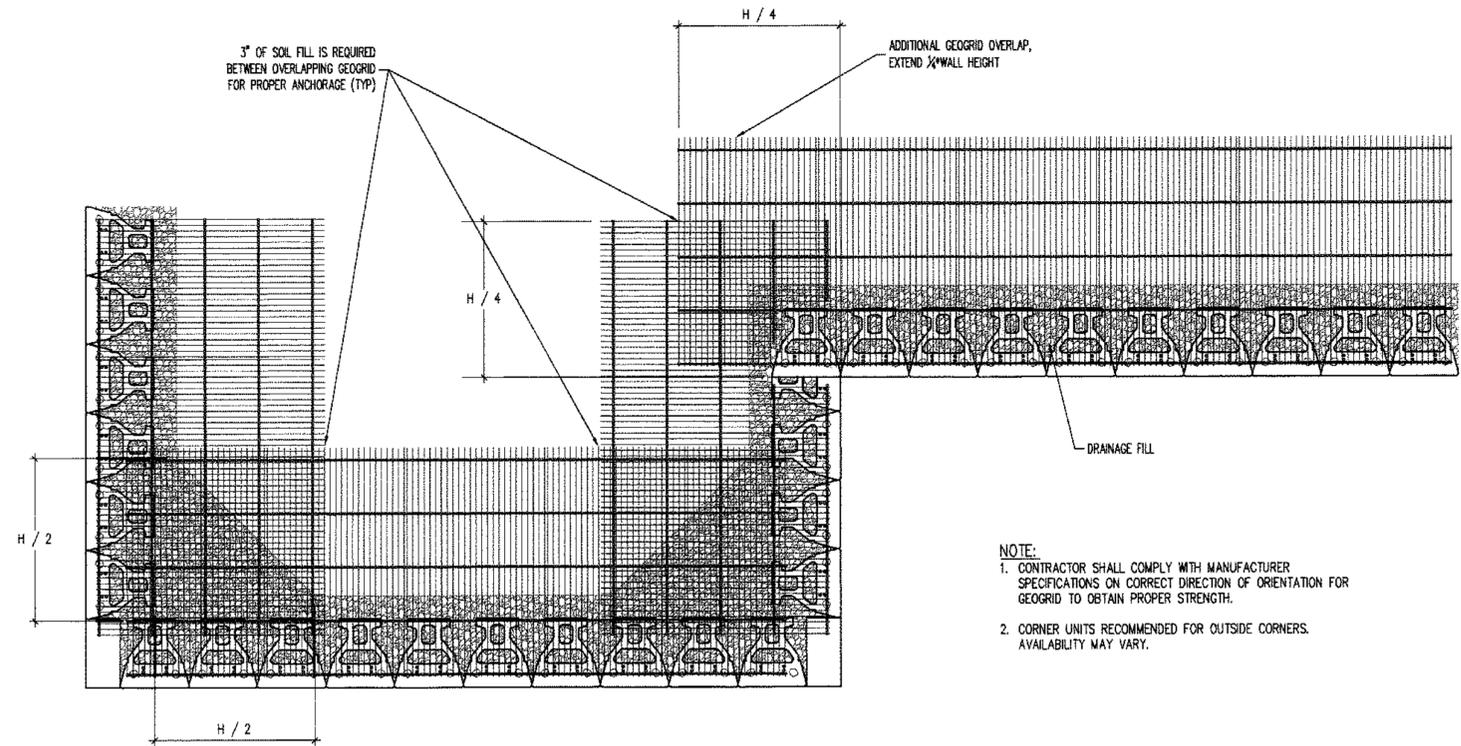
CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT 778-7900

NOTE: ALL KEYSTONE BLOCKS TO BE TAN WITH A SPLIT FACE FINISH



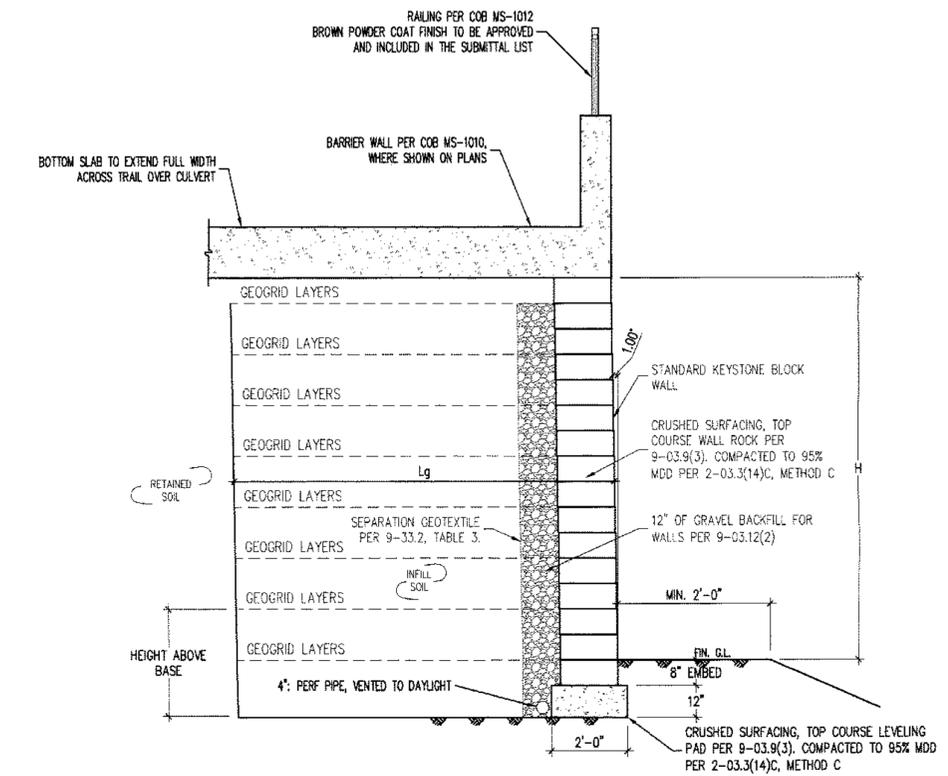
1 KEYSTONE - STEP IN WALL TOP
S03 SCALE: N.T.S.

2 KEYSTONE - STEP IN WALL BOTTOM
S03 SCALE: N.T.S.



NOTE:
1. CONTRACTOR SHALL COMPLY WITH MANUFACTURER SPECIFICATIONS ON CORRECT DIRECTION OF ORIENTATION FOR GEOGRID TO OBTAIN PROPER STRENGTH.
2. CORNER UNITS RECOMMENDED FOR OUTSIDE CORNERS. AVAILABILITY MAY VARY.

3 GEOGRID AT CORNERS
S03 SCALE: N.T.S.



NOTE: ALL KEYSTONE WALLS SHALL HAVE A SITE SPECIFIC GEOTECHNICAL INVESTIGATION TO DETERMINE ADEQUACY OF SOIL BEARING CAPACITY.

GEOGRID SCHEDULE		GEOGRID				
H (FT)	ANGLE (DEGREES)	SOIL WEIGHT = 120 PCF WALL WEIGHT = 130 PCF MINIMUM BEARING (PSF)	TYPE	ABOVE COURSE NUMBERS	HEIGHT ABOVE BASE (FT)	LENGTH Lg (FT)
0 - 4	1	1500	STRATAGRID SG200	1, 3, 5, 6	0.67, 2.00, 3.33, 4.00	5.5
6' - 0"	1	2000	STRATAGRID SG200	1, 3, 5, 7, 9	0.67, 2.00, 3.33, 4.67, 6.00	6.0
8' - 0"	1	2500	STRATAGRID SG200 STRATAGRID SG350	5, 7, 9, 11, 12 1, 3	3.33, 4.67, 6.00, 7.33, 8.00 0.67, 2.0	7.5
10' - 0"	1	2500	STRATAGRID SG200 STRATAGRID SG350	7, 9, 11, 13, 14 1, 3, 5	4.67, 6.00, 7.33, 8.67, 9.33 0.67, 2.00, 3.33	8.5
12' - 0"	1	3000	STRATAGRID SG200 STRATAGRID SG350	9, 11, 13, 15, 17 1, 3, 5, 7	6.00, 7.33, 8.67, 10.0, 11.33 0.67, 2.00, 3.33, 4.67	8.5
14' - 0"	1	3000	STRATAGRID SG200 STRATAGRID SG350	11, 13, 15, 17, 19 1, 2, 3, 5, 7, 9	7.33, 8.67, 10.0, 11.33, 12.67 0.67, 1.33, 2.00, 3.33, 4.67, 6.00	9.0

INFILL SOILS SHALL BE CRUSHED SURFACING BASE COURSE PER 9-03.9(3). COMPACTED TO 95% MDD PER 2-03.3(14)C, METHOD C.
RETAINED SOILS MAY BE UNDISTURBED NATIVE SOILS OR COMMON BORROW PER 9-03.14(3), OPTION 1 COMPACTED TO 95% MDD PER 2-03.3(14)C, METHOD A SEE CIVIL FOR COMMON BORROW PLACED UNDER TRAILS.

4 KEYSTONE WALL - TYPICAL SECTION
S03 SCALE: N.T.S.



S03



CONTACT PERSON: FREEMAN ANTHONY, PROJECT ENGINEER AT 778-7900

STRUCTURAL NOTES

1. REFERENCE CODES & STANDARDS

International Building Code (IBC) 2015 Edition
 Washington State Building Code (Washington Administrative Code (WAC) Title 51)
 American Concrete Institute, ACI 318-14
 Minimum Design Loads for Buildings and Other Structures, ASCE 7-10

2. DESIGN LOADS AND CRITERIA

Culvert Loads HS20-44 Loading - 16 KIP Wheel Loads	Seismic Design Category	D
	Seismic Site Class	D
	Foundation Allowable Soil Bearing Capacity (DL + LL)	2000 psf
	Foundation Soil Coefficient Of Friction	0.35
	Unsaturated Soil Unit Weight	120 PCF
	Saturated Soil Unit Weight	140 PCF
	Lateral Pressures	
	Above Water Table (Active)	45 PCF
	Above Water Table (At Rest)	100 PCF
	Below Water Table (At Rest)	120 PCF
	Passive Pressure	200 PCF

3. SPECIFICATIONS

3.1 Design, material and workmanship shall be in accordance with the latest version of the following Codes And Standards contained herein, unless otherwise modified on the drawings or specifications.

ACI 211	Standard Practice For Selecting Proportions For Normal, Heavyweight, & Mass Concrete
ACI 301	Specifications For Structural Concrete For Buildings
ACI 305	Hot Weather Concreting
ACI 306	Standard Specification For Cold Weather Concreting
ACI 308	Standard Practice For Curing Concrete
ACI 318-14	Building Code Requirements For Reinforced Concrete
ACI 347	Guide To Formwork For Concrete
ACI SP-66	Detailing Manual
CRSI-PI	Recommended Practice For "Placing Reinforcing Bars" 1992, 6th Ed.

4. CAST-IN-PLACE CONCRETE

4.1 Cast-in-place normal-weight concrete materials, mixing, placing, and testing shall conform to 9-01, with mix design in conformance with ACI 211.1 & 301.

4.2 Material specifications, unless noted otherwise:

USE	MIN. 28-DAY	MAX. WATER-CEMENT RATIO	
		NON-AIR ENTRAINED	AIR ENTRAINED
CULVERT FOOTING & BRIDGE ABUTMENT	4000 PSI	0.45	0.40

Use Type I cement per 9-01.2(1) unless noted otherwise. Use Type I-A cement where air entrainment is required. Slump shall be 4 1/2 inches plus or minus 1 inch per ASTM C94-17a.

4.3 Chemical Admixtures conforming to 9-23.6 may be incorporated in the concrete design mixes and must be used in strict accordance with the manufacturer's recommendations, subject to Engineer's approval.

4.4 During periods of cold weather, batching, placing, and curing of concrete shall conform to ACI 306R. Do not place concrete on frozen subgrade or in contact with forms, reinforcing, or embeds that are less than 33F.

4.5 During periods of hot weather, batching, placing, and curing of concrete shall conform to ACI 306R.

4.6 Concrete shall be maintained in a moist condition for a minimum of five days after placement or sealed with a curing compound applied in two coats at right angles per 9-23.1 & 9-23.2. Follow manufacturer's application instructions and do not exceed recommended coverage.

4.7 Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharge concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2 inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

5. ANCHOR BOLTS IN CONCRETE

5.1 Use galvanized threaded parts, bolts, nuts, and washers where exposed to weather per 9-00.7.

5.2 Material specifications shall be as follows per 9-06.5(4), unless noted otherwise:
 Anchor Bolts: ASTM F1554, Grade 36; or as indicated per plan
 Threaded rod: ASTM A36
 Nuts: ASTM A563
 Washers: ASTM F436

5.3 Provide anchor bolt configuration as shown including diameter, spacing, projection, embedment, and end configuration. Anchor bolts shall be placed per 6-02.3(16).

6. REINFORCING STEEL IN CONCRETE

6.1 All reinforcing steel shall conform to 9-07 and shall be free from loose rust and other coatings that would inhibit reinforcing bond PER 6-02.3(24)b.

6.2 Bar detailing and support of reinforcing bars in forms shall conform to the CRSI Manual Of Standard Practice, unless shown otherwise on the plans.

6.3 Reinforcing steel shall not be bent or displaced for the convenience of other trades unless approved by the Engineer.

6.4 Fabrication and placement of reinforcing in concrete shall conform to 9-07.1(2). Lap all reinforcing bars at all splices, corners, and intersecting walls per table below, unless noted otherwise:

	CONCRETE STRENGTH (psi)	
	TOP	OTHER
	4,000	
#4 (#13)	25	19
#5 (#16)	31	24

Use "TOP" reinforcing values for horizontal bars with more than 12" of concrete below them in the casting position. Lap lengths, in inches, are based on normal weight concrete and a minimum 2 D_s spacing and 1 D_s cover, per ACI 318-14. The sizes shown (#x) are the corresponding metric bar sizes. Wire all the lap splices.

6.5 Minimum cover over reinforcement per 6-02.3(24)c, unless noted otherwise:

Concrete placed on earth: 3 inches
 Concrete exposed to earth or weather: 2 inches
 Other conditions, u.n.c.: 1 1/2 inches

6.6 Reinforcing bars, bolts, anchors, dowels, & metal inserts shall be securely tied in position prior to concrete placement per 6-02.3(24)c. Reinforcing shall be supported on chairs or slab bolsters (with distribution plates if required) or concrete dobies prior to concrete placement. Support spacing shall not exceed 10 feet in each direction.

GENERAL NOTES

7. GENERAL CONDITIONS

7.1 All materials and construction shall conform to the drawings, these notes, and any specifications for this project.

7.2 During the construction period, the Contractor shall be responsible for the safety of the construction project, including all excavation procedures. The Contractor shall provide adequate lagging, shoring, underpinning, bracing, guys and protection of adjacent property, structures, streets, and utilities in accordance with all national, state, and local safety ordinances.

7.3 DO NOT SCALE DRAWINGS.

7.4 All information shown on the drawings relative to existing conditions is given as the best present knowledge, but without guarantee of accuracy. Where actual conditions conflict with the drawings they shall be reported to the Engineer so that the proper revisions may be made. Construction modifications shall not be made without written approval of the Engineer.

7.5 Good standards and workmanship shall be employed throughout the entire project. See the specifications for detailed material and methods. In case of conflict between these structural drawings and the specifications, the most specific will govern.

7.6 No deviations from the contract documents shall be made without written consent of the engineer. If deviations from the plans are made without notification to and approval from the engineer, the General Contractor shall release Jones Engineers, Inc. from any and all claims that are in any way related to this project. The General Contractor shall further agree to defend, hold harmless and indemnify Jones Engineers, Inc. from any and all claims by any third persons that are in any way related to the project.

8. PROJECT COORDINATION

8.1 The Contractor is responsible for coordinating the work of all trades and shall check all dimensions. The Contractor shall ensure that subcontractors and fabricators receive all applicable design information including geotechnical reports, drawings, notes, and specifications. Any discrepancies shall be called to the attention of the Engineer and be resolved before proceeding with the work.

8.2 Civil drawings shall be used to define detail configurations for items to be embedded in concrete or otherwise incorporated in the structural work.

9. TESTING AND INSPECTION

9.1 In addition to the inspections made by the Building Official per IBC Section 110, all special inspection and testing shall comply with IBC Sections 1704, 1705 and other applicable building code sections. Special inspections are required for the following work:

TESTS & SPECIAL INSPECTIONS	
Concrete	Placement, Slump, Air Content, And Cylinders For Compressive Strength Tests Per IBC 1705.3
Inserts & Embedded Items	Placement, Cover, Site And Number As Per Plans.
Reinforcing	Cover, Site, Number, Laps And Placement.

9.2 Special inspectors and testing laboratories shall be provided by the Contractor. The Contractor shall coordinate special inspections as well as standard building inspections with the construction schedule and is responsible for facilitating access to areas to be inspected. Special inspectors and testing laboratories shall be certified by the Washington Association of Building Officials (WABO) and approved by the Building Official.

9.3 The special inspector shall observe the work for conformance with the design drawings and specifications and furnish inspection reports to the Building Official and the Engineer. All discrepancies shall be brought to the immediate attention of the Contractor, Engineer, and the Building Official. The special inspector shall submit a final signed report stating whether the inspected work was in conformance with the design drawings and specifications and the applicable provisions of the building code.

10. EXCAVATION AND FILL

10.1 All footings shall bear on undisturbed ground or structural fill and shall be a minimum of 18 inches below grade unless noted otherwise on the drawings. The soil bearing capacity shall be at least 2500 psf as tested by a qualified geotechnical engineer. The contractor shall allow for the geotechnical professional to do the testing.

10.2 Footings shall not be located over subsurface utility lines, tanks, large organic deposits, or other obstructions. If footing excavations reveal subsurface objects, the area shall be over excavated, the objects shall be removed, and the excavation backfilled as noted below.

10.3 Foundation excavations shall be examined and approved by the Engineer or a testing laboratory approved by the Owner, and the Building Official prior to the placement of any reinforcing steel or concrete.

10.4 Unless noted otherwise, the material for filling and backfill shall consist of Gravel Backfill for Foundations per 9-03.12(1)A and shall be free of organic matter, trash, lumber, or other debris and shall be compacted to 95% MDD per 2-03.3(14)C, Method C. Each lift shall be tested for compliance with compaction requirements by an approved laboratory.

10.5 Drainage backfill shall be compacted per notes above in lifts not to exceed 4 inches for hand-operated equipment. Each lift shall be tested for compliance with compaction requirements by an approved laboratory. Hand tampers shall weigh at least 50 lbs each and shall have a face area not in excess of 64 square inches. Hand tamper may be operated either manually or mechanically and shall be used only where larger power driven compaction equipment cannot be used.

10.6 Do not operate heavy equipment adjacent to the wall within a distance equal to the height of the wall during backfill and compaction. Hand tampers for compaction shall be per notes above.

11. PRODUCT SUBSTITUTION PROCEDURES

11.1 Proposed substitutions for the specified products and materials must be submitted to the Owner and the Engineer for review prior to fabrication or construction. Provide complete documentation that shows equivalency with the specified product or material. Substitutions indicated or implied on shop drawings or product data submittals will not be considered.

11.2 Substitutions are strictly subject to the approval of the Owner and the Engineer. If approved, the Contractor shall bear the cost of any redesign required by the alternate product or material.

12. SUBMITTAL PROCEDURES

12.1 Shop drawings, erection drawings, design-build drawings, product data, and supporting calculations shall be submitted to the Engineer for review as noted below.

12.2 Submit one set of prints and one set of reproducible drawings, or four sets of prints maximum, to the Engineer prior to fabrication or construction. Allow 5 business days for review. All submittals shall include the name, address, and phone number of the manufacturer, fabricator, supplier, and the design engineer, as applicable.

12.3 The Contractor shall review and approve all submittals before release to the Engineer. Reference plans and details as applicable. Deviations from design drawings shall be clearly marked as such. Send one record set of the revised submittal where corrections are noted but resubmittal is not required.

12.4 If the fabricator's drawings are the sole design, differ in design, or add to the design of the structural drawings, they shall be stamped by a Civil Engineer registered in the State of Washington responsible for said design. Calculations submitted are for information only and will not be stamped or returned except at the option of the Engineer.

12.5 Review is only for general conformance with the design concept of the project and general compliance with the information included in the Contract Documents. Any markings or comments are subject to the requirements of the design drawings and specifications. Contractor is responsible for correlating and confirming dimensions, choice of fabrication processes and techniques of construction, coordination of his work with other trades, and performing the work in a safe and satisfactory manner.

12.6 The submittals required for review included, but are not limited to:

Concrete Mix Design	WSDOT Form 350-040 per 6-02.3(2)A
Pedestrian Bridge	6-03.3
Sheet Piles	6-05.2
Concrete Abutment & Footing	Type 2E Working Drawings per 6-11.3(1)
Keystone Wall & Geosynthetic Grid	Type 2 Working Drawings per 6-14.3(2)
Pre-cast Concrete Culvert	Type 2 Working Drawings per 7-02.3(6)
Reinforcing Steel	Manu. Cert. of Compliance per 9-07.1(1)
Non-shrink Grout Mix Design	9-20.3(2)
Elastomeric Pads	9-31.1



S04

Date	No	Revision	By
05/04/18	3	BID SUBMITTAL - COB COMMENTS	AT
09/22/17	2	BID SUBMITTAL	AT
06/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	RL
DESIGNED/DRAWN	RL / D.N.
INSPECTOR	

DIRECTOR PUBLIC WORKS	T.A.C.
CITY ENGINEER	C.M.A.S.
ASSISTANT DIRECTOR	E.C.L.

CITY OF BELLINGHAM, WASHINGTON
 PUBLIC WORKS DEPARTMENT
 ENGINEERING DIVISION

SCALE	
Horiz.	1" = N/A
Vert.	1" = N/A

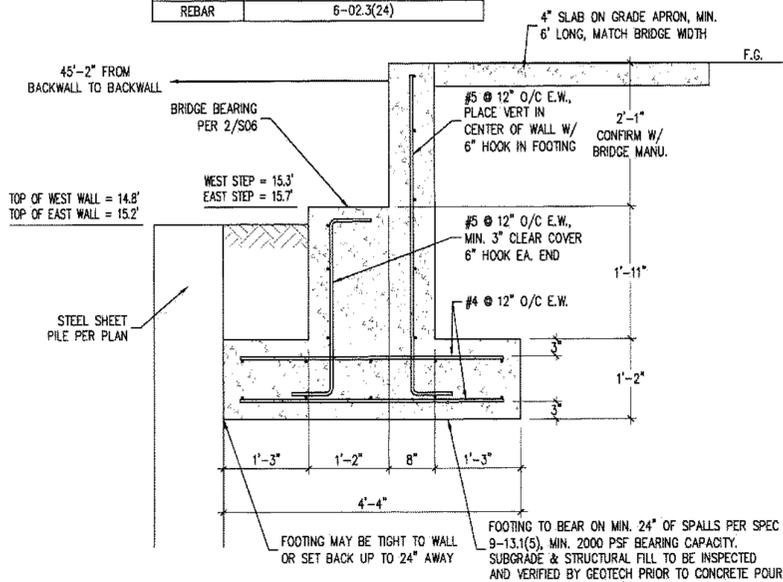
DATUM	
	NAD 83/98
	NAVD88

Job. No.	
Date	05/04/2018
Field Bk.	

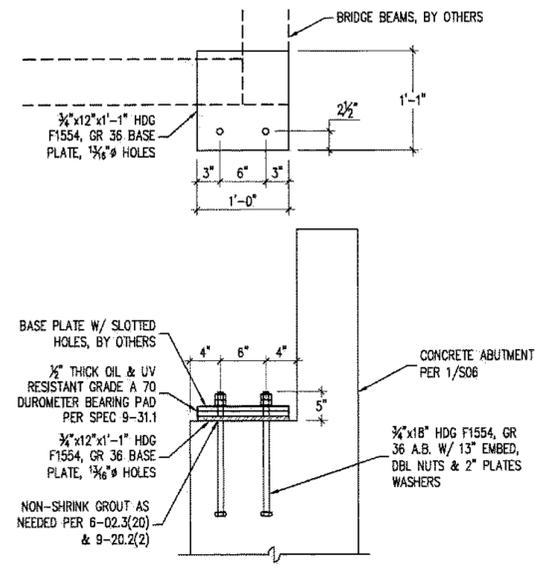
LITTLE SQUALICUM ESTUARY
 HEADWALL NOTES

SHEET	24	OF	26
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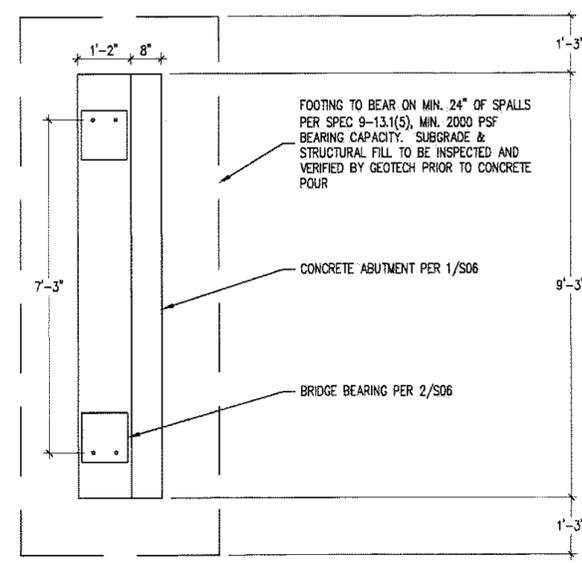
CONCRETE SPECIFICATIONS	
F'c	4000 PSI @ 28 DAYS [4000 CLASS PER 6-02.3(1)]
MIX DESIGN	6-02.3(2)A
BATCH PLANT	6-02.3(4)
SLUMP	4.5" PER 6-02.3(4)C
TEMPERATURE	6-02.3(4)D
TEST METHOD	6-02.3(5)D
SAMPLES FOR TESTING	6-02.3(5)G 6-02.3(5)H
PLACEMENT	6-02.3(6)
CURING	6-02.3(11)
ANCHOR BOLTS	6-02.3(18)
BRIDGE BEARING	6-02.3(19)
GROUT	6-02.3(20)
REBAR	6-02.3(24)



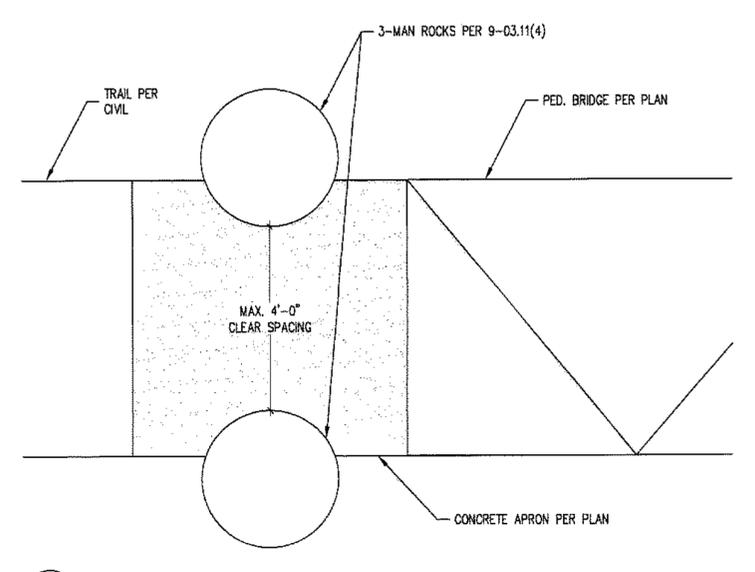
1 BRIDGE ABUTMENT
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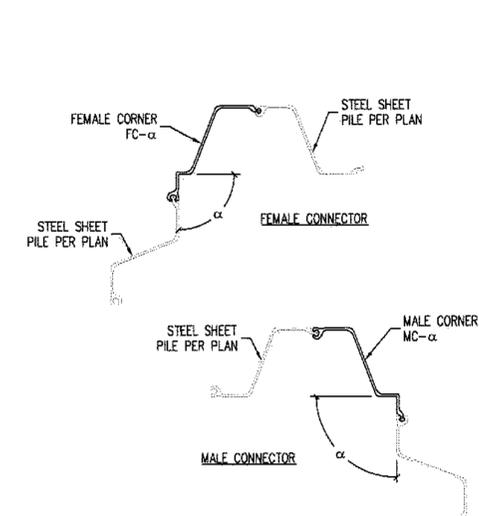
2 ABUTMENT BEARING PLATES
S06 SCALE: 1" = 1'-0"



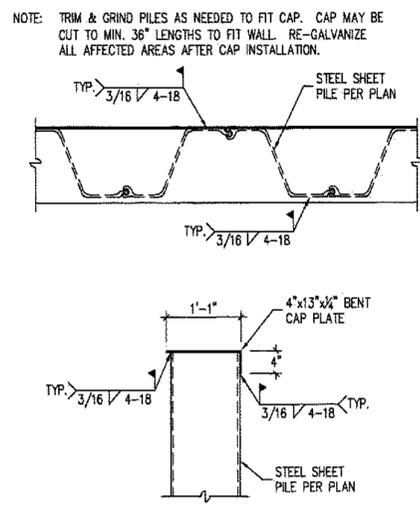
3 ABUTMENT PLAN VIEW
S06 SCALE: 1/2" = 1'-0"



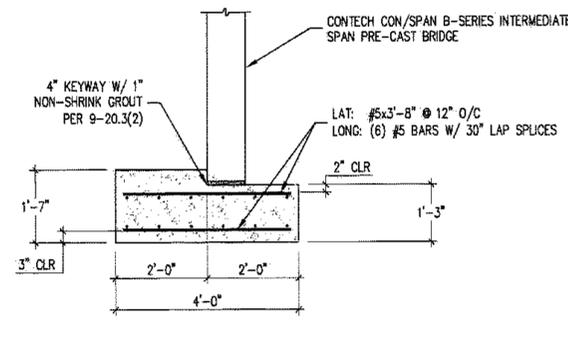
4 BOLLARD DETAIL
S06 SCALE: 1/2" = 1'-0"



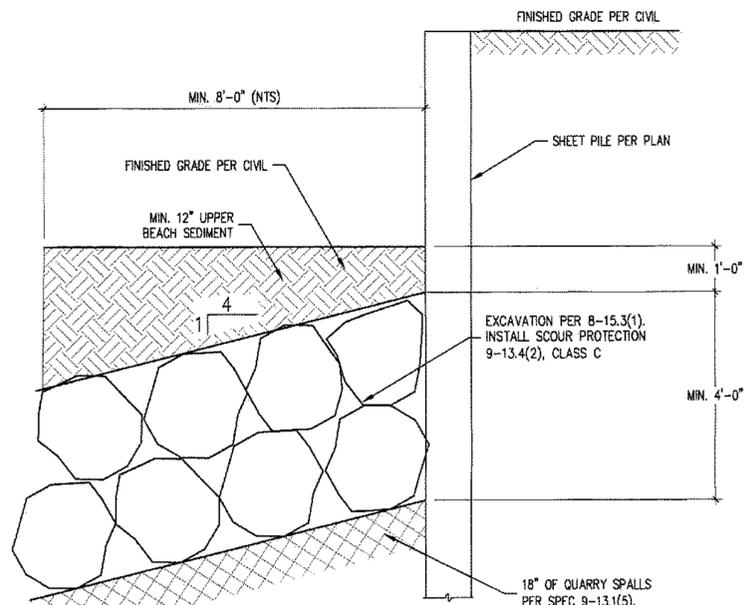
5 SHEET PILE CORNERS - PZ27 PILES
S06 SCALE: 3/4" = 1'-0"



6 SHEET PILE CAPS
S06 SCALE: 3/4" = 1'-0"



7 FOOTING DETAIL FOR CONTECH BRIDGE
S06 SCALE: 1/2" = 1'-0"



8 ARMOR STONE DETAIL
S06 SCALE: 1/2" = 1'-0"

811 Call 811
two business days
before you dig



S06

Date	No	Revision	By
05/04/18	3	BID SUBMITTAL - CDB COMMENTS	AT
06/22/17	2	BID SUBMITTAL	AT
06/26/17	1	DRAFT DESIGN	AT

PROJECT ENGINEER	RL
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CITY OF BELLINGHAM, WASHINGTON
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION

SCALE	Horiz. 1" = N/A	Vert. 1" = N/A
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DATUM	NAD 83/98 NAVD88
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Job. No.	
Date	05/04/2018
Field Bk.	

LITTLE SQUALICUM ESTUARY
SHEET PILE & ABUTMENT DETAILS

SHEET	26	OF	26
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