

Anne Henning

From: Anne Henning
Sent: Thursday, October 17, 2019 4:55 PM
To: Sandy Burchell
Subject: Angel Garza property north of Olympia

Hi Sandy,

Can you help me find parcel numbers and descriptions for the property north of Sand Hill Estates #1?

The old parcel number for the whole piece is [1529030682656](#) but that doesn't link to anything any more.

If this is difficult, I will just wait until they submit the plat certificate, since that should have the location information on it.

Thanks,

Anne Henning

Community Development Director

City of Othello

ahenning@othellowa.gov

509-331-2710



Anne Henning

From: Sandy Burchell <sandyb@co.adams.wa.us>
Sent: Monday, October 21, 2019 9:00 AM
To: Anne Henning
Attachments: 2019_10_21_08_58_01.pdf

Parcel number 1529030682656 was deleted and became parcel numbers 1529030682658, 1529030682659, 1529030682660 and 1529030682661. I have attached a copy of the survey with the parcel numbers on it.

R.O.S. = RECORD OF SURVEY

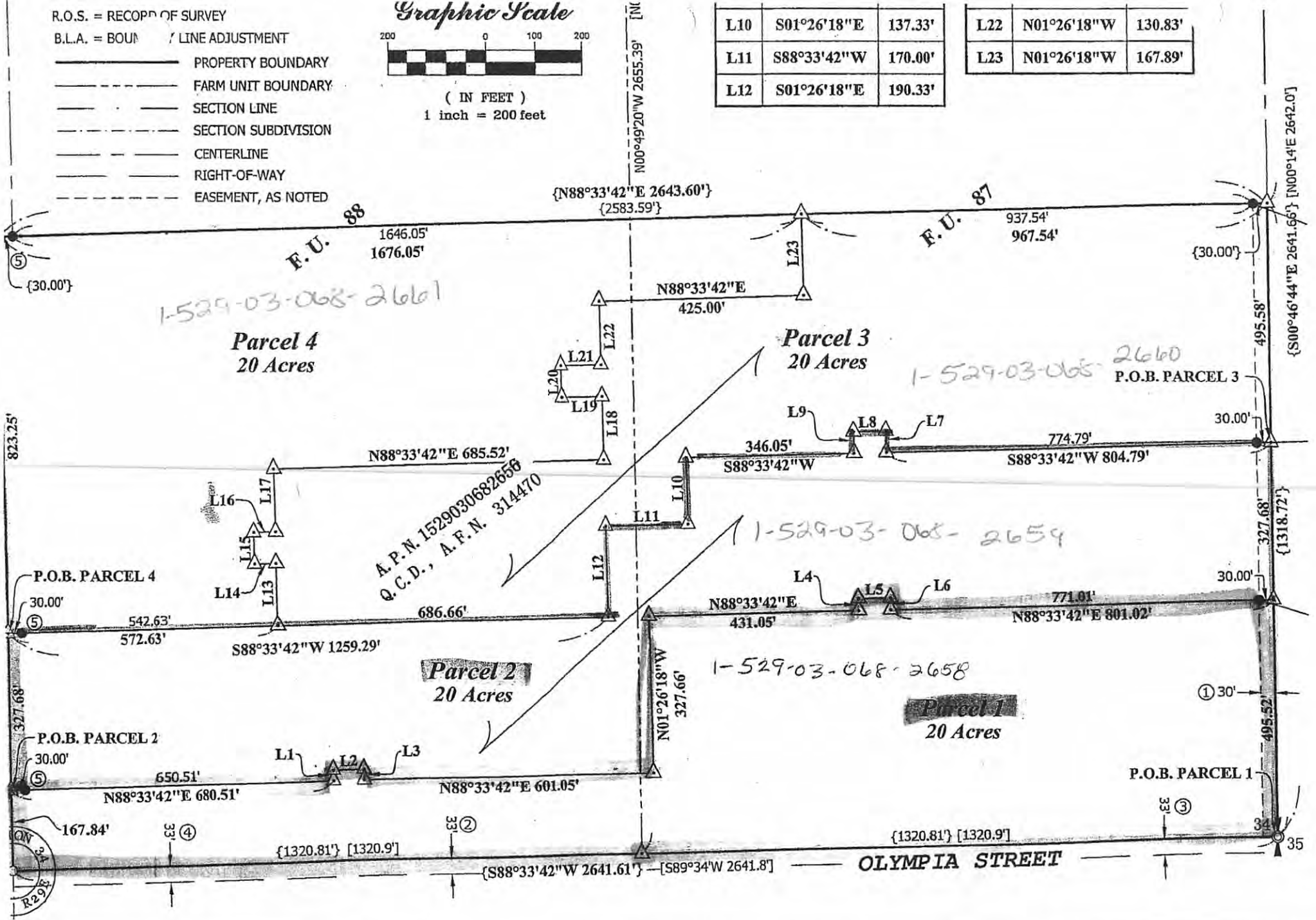
B.L.A. = BOUNDARY LINE ADJUSTMENT

- PROPERTY BOUNDARY
- FARM UNIT BOUNDARY
- SECTION LINE
- SECTION SUBDIVISION
- CENTERLINE
- RIGHT-OF-WAY
- EASEMENT, AS NOTED



L10	S01°26'18"E	137.33'
L11	S88°33'42"W	170.00'
L12	S01°26'18"E	190.33'

L22	N01°26'18"W	130.83'
L23	N01°26'18"W	167.89'



1-529-03-068-2661

Parcel 4
20 Acres

Parcel 3
20 Acres

1-529-03-068-2660
P.O.B. PARCEL 3

A.P.N. 1529030682658
Q.C.D., A.F.N. 314470

1-529-03-068-2659

Parcel 2
20 Acres

1-529-03-068-2658

Parcel 1
20 Acres

1-529-03-068-2656 was deleted and became the parcels above

77. #2



[SIMPLE SEARCH](#) [SALES SEARCH](#) [REETSIFTER](#) [COUNTY HOME PAGE](#) [CONTACT](#) [DISCLAIMER](#) [HELP](#)

SHERRI L BREWER
Adams County Assessor 210 W Broadway Ave Ritzville, WA 99169

[Assessor](#) [Treasurer](#) [Appraisal](#) [MapSifter](#)

Parcel

Parcel#: 1529030682658 Owner Name: PALOS VERDES LLC
 DOR Code: 81 - Resource - Agriculture Address1: C/O GARZA, ANGEL & YOLANDA
 Situs: Address2: P O BOX 484
 Map Number: 1529-03-00-220180-000-265580 City, State: OTHELLO WA
 Status: Zip: 99344
 Description: TAX #2658 LYING IN PTN OF FU'S 87 & 88, BLK 45, OTHELLO TRACTS LESS SAND HILL ESTATES #1 MAJOR PLAT
 Comment:

2019 Market Value		2019 Taxable Value		2019 Assessment Data	
Land:	\$48,700	Land:	\$48,700	District:	11 - OTHELLO INCORPORATED
Improvements:	\$0	Improvements:	\$0	Current Use/DFL:	No
Permanent Crop:	\$0	Permanent Crop:	\$0		
Total	\$48,700	Total	\$48,700	Total Acres:	9.24000

Ownership

Owner's Name	Ownership %
PALOS VERDES LLC	100 %

Sales History

No Sales History

Building Permits

No Building Permits Available

Historical Valuation Info

Year	Billed Owner	Land	Impr.	PermCrop Value	Total	Exempt	Taxable
2019	PALOS VERDES LLC	\$48,700	\$0	\$0	\$48,700	\$0	\$48,700
2018	PALOS VERDES LLC	\$49,300	\$0	\$0	\$49,300	\$0	\$49,300
2017	PALOS VERDES LLC	\$96,100	\$0	\$0	\$96,100	\$0	\$96,100

[View Taxes](#)

Parcel Comments

No Comments Available

Property Images

No images found.

EXHIBIT 6



ADAMS COUNTY WASHINGTON



TAXSIFTER

[SIMPLE SEARCH](#) [SALES SEARCH](#) [REETSIFTER](#) [COUNTY HOME PAGE](#) [CONTACT](#) [DISCLAIMER](#) [HELP](#)

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Adams County Assessor 210 W Broadway Ave Ritzville, WA 99169

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Parcel

Parcel#: 1529030682659 Owner Name: PALOS VERDES LLC
 DOR Code: 81 - Resource - Agriculture Address1: C/O GARZA, ANGEL & YOLANDA
 Situs: Address2: P O BOX 484
 Map Number: 1529-03-00-220180-000-26590 City, State: OTHELLO WA
 Status: Zip: 99344

Description: TAX #2659 LYING IN PTN OF FU'S 87 & 88, BLK 45, OTHELLO TRACT THOSE PORTIONS OF FARM UNITS 87 AND 88, IRRIGATION BLOCK 45, COLUMBIA BASIN PROJECT, ACCORDING TO THE PLAT THEREOF, LYING IN THE NE 1/4 OF SEC 34, TWP 16 NORTH, RGE 29 E, W.M., ADAMS COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SW CORNER OF SAID FU 88, BEING THE CENTER QUARTER CORNER OF SAID SEC 34, MARKED BY A 2 INCH BRASS CAP IN CASE STAMPED "LS 28239", FROM WHICH, E1/4 OF SAID SEC 34, MARKED BY A U.S.B.R. BRASS CAP IN CASE BEARS N88°33'42"E, 2641.61 FEET; THENCE N 00°51'55" W, ALONG THE W BOUNDARY OF SAID FU 88, 495.52 FEET TO THE POB; THENCE N 88°33'42" E, 542.63 FEET; THENCE N 01°26'18" W, 130.83 FEET; THENCE S 88°33'42" W, 45.01 FEET; THENCE N 01°26'18" W, 66.00 FEET; THENCE N 88°33'42"E; 46.15 FEET; THENCE N 01°26'18" W; 130.83 FEET; THENCE N 88°33'42" E, 685.52 FEET; THENCE N 01°26'18" W, 130.83 FEET; THENCE S 88°33'42" W, 85.00 FEET; THENCE N 01°26'18" W, 66.00 FEET; THENCE N 88°33'42" E, 85.00 FEET; THENCE N 01°26'18" W, 130.83 FEET; THENCE N 88°33'42" E, 425.00 FEET; THENCE N 01°26'18" W, 167.89 FEET; THENCE S 88°33'42" W, 1676.05 FEET TO THE WESTERLY BOUNDARY OF SAID FU 88; THENCE SOUTH 00°51'55" EAST, 823.25 FEET TO THE POB.

Comment:

2019 Market Value		2019 Taxable Value		2019 Assessment Data	
Land:	\$100,900	Land:	\$100,900	District:	11 - OTHELLO INCORPORATED
Improvements:	\$0	Improvements:	\$0	Current Use/DFL:	No
Permanent Crop:	\$0	Permanent Crop:	\$0		
Total	\$100,900	Total	\$100,900	Total Acres:	19.28000

Ownership

Owner's Name	Ownership %
PALOS VERDES LLC	100 %

Sales History

No Sales History

Building Permits

No Building Permits Available

Historical Valuation Info

Year	Billed Owner	Land	Impr.	PermCrop Value	Total	Exempt	Taxable
2019	PALOS VERDES LLC	\$100,900	\$0		\$0 \$100,900	\$0	\$100,900
2018	PALOS VERDES LLC	\$100,900	\$0		\$0 \$100,900	\$0	\$100,900
2017	PALOS VERDES LLC	\$96,100	\$0		\$0 \$96,100	\$0	\$96,100

EXHIBIT 6



The City of Othello

500 East Main Street OTHELLO, WASHINGTON 99344 Telephone (509) 488-5686
Fax (509) 488-0102

October 28, 2019

Scott McArthur
H2 Survey
7600 N. Mineral Drive, Suite 900
Coeur d'Alene, ID 83815

Re: Sand Hill Estates #2 Major Plat – Notice of Completeness

Dear Scott:

As the authorized representative for this project, all correspondence will be directed to you.

With the addition of the trip generation letter submitted late Friday, we can now determine this application complete for further review as of the date of this letter. As previously discussed, we are accepting the trip generation letter for now with the understanding that a full Traffic Impact Analysis for the entire development will be submitted as soon as possible. This Notice of Completeness does not preclude the City from requesting additional information during the review process.

Now that the application has been determined to be complete, the next steps in the process are to post two notice boards onsite, mail notice to property owners within 300', notify relevant agencies and departments, and publish notice in the newspaper and at City Hall. The applicant is responsible for posting the notice boards, one at each end of the development, (7th Avenue and 14th Avenue). Due to newspaper publication dates and deadlines, I have set the comment period to close Nov. 13, which means the notice board must be posted by Oct. 29. An affidavit of posting is required at least seven days before the end of the comment period. The public hearing is scheduled for Dec. 10 at 10:00 AM.

If you have any questions, feel free to contact me at ahenning@othellowa.gov or 509-331-2710.

Cordially,

Anne Henning
Community Development Director

Note: 2 copies of the Laminated Notice of Application for Notice Board Posting & the Affidavit of Posting are available at City Hall for pick up

cc: Angel Garza, PO Box 464, Othello, WA 98837 (via email)



- A. Irrigation water is provided by the City and will be billed to each property, whether that property chooses to use it or not.
- B. An approved backflow prevention device must be properly permitted and installed in the domestic water line prior to connection to or installation of any irrigation system, whether the irrigation system uses potable or non-potable water.

Section 14: Olympia Street Improvement. The City and the Developer have agreed that the Developer will construct Olympia Street to the Collector standard. Olympia currently exists as a half street with curb on the south side and sidewalk abutting some portions. The City will reimburse the developer for the cost to improve the existing 19' street width, including the costs to mill and remove the existing asphalt and repave, as shown in Exhibit "B", including the cost of base rock if determined to be necessary. Sidewalks will not be changed on the south side of Olympia, and the existing curb will remain. In addition, the Developer will improve stormwater collection on the south side of the existing street and install pedestrian ramps on the south side of the existing street. The City will reimburse the cost of 4 catch basins and 4 pedestrian ramps as shown in Exhibit "B".

Section 15: 7th Avenue Improvement. The City and the Developer have agreed to delay street surface and stormwater improvements to 7th Avenue. All other standard improvements shall be completed by the developer as plat improvements, including but not limited to non-potable water line installation and curb, gutter, and sidewalk on the east (project) side. 7th Avenue currently exists as an annexed county road and has agriculture on the west side. Future development of this street is expected to be to an Arterial standard. The developer will construct the sidewalk and curb abutting the plat (east side of 7th Avenue) but will delay asphalt so that 7th Avenue can be constructed in one large project rather than multiple small projects. The end result will be a better street with fewer joins that can allow water intrusion. The developer shall construct and pave 7th Avenue abutting the plat by October 1, 2022, or before platting of the developer's remaining property to the north fronting 7th Avenue, whichever comes first. The obligation to complete the construction of 7th Avenue shall be guaranteed by a covenant attached to the developer's remaining property to the north of the current project.

Section 16: 14th Avenue Improvement. The City and the Developer have agreed to delay street surface and stormwater improvements to 14th Avenue. All other standard improvements shall be completed by the developer as plat improvements, including but not limited to non-potable water line installation and curb, gutter, and sidewalk on the west (project) side. 14th Avenue currently exists as an annexed county road and has a canal on the east side. Future development of this street is expected to be to a modified Arterial standard, without on-street parking, northbound right turn lane, or sidewalk on the east side. The developer will construct the sidewalk and curb abutting the plat (west side of 14th Avenue) but will delay asphalt so that 14th Avenue can be constructed in one large project rather than multiple small projects. The end result will be a better street with fewer joins that can allow water intrusion. The developer shall construct and pave 14th Avenue abutting the plat by October 1, 2022, or before platting of the developer's remaining property to the north fronting 14th Avenue, whichever comes first. The obligation to complete the construction of 14th Avenue shall be guaranteed by a covenant attached to the developer's remaining property to the north of the current project.

Section 17: Stormwater Pond. Upon acceptance of the improvements, the City will be responsible for utilities, including stormwater, only within street right-of-way. The City will not be responsible for maintaining, protecting, or liability of the temporary stormwater retention pond.

PRELIMINARY SAND HILL ESTATES #2 MAJOR PLAT

A PARCEL OF LAND LOCATED IN A PORTION OF FARM UNITS 87 AND 88, IRRIGATION BLOCK 45, COLUMBIA BASIN PROJECT, LYING IN THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, ADAMS COUNTY, WASHINGTON

LEGAL DESCRIPTION

A PARCEL OF LAND LOCATED IN THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, ADAMS COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED

AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, FROM WHICH THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SAID SECTION 34, BEARS NORTH 88°33'42" EAST, A DISTANCE OF 2641.61 FEET, AS SHOWN ON THE RECORD OF SURVEY, RECORDED IN VOLUME "S" OF SURVEYS, PAGE 1215;

THENCE NORTH 00°51'55" WEST ALONG THE WEST LINE OF THE NORTHEAST QUARTER OF SAID

SECTION 34, A DISTANCE OF 166.01 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING NORTH 00°51'55" WEST ALONG THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34, A DISTANCE OF 288.01 FEET;

THENCE LEAVING THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34, NORTH 88°33'42" EAST, A DISTANCE OF 2642.29 FEET TO THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34;

THENCE SOUTH 00°46'44" EAST ALONG THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34, A DISTANCE OF 288.02 FEET TO THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SAID SECTION 34;

THENCE SOUTH 88°33'42" WEST ALONG THE NORTH LINE OF SAND HILL ESTATES #1 MAJOR SUBDIVISION, AS RECORDED IN VOLUME 3, PAGE 243, RECORDS OF ADAMS COUNTY, WASHINGTON, A DISTANCE OF 2641.86 FEET TO THE POINT OF BEGINNING;

CONTAINING 760,918.31 SQUARE FEET OR 17.468 ACRES, MORE OR LESS.

SUBJECT TO:

EXISTING RIGHTS-OF-WAY AND EASEMENTS OF RECORD AND OR APPEARING ON SAID ABOVE DESCRIBED PARCEL.

DEDICATING 40.00 FEET FOR THE EAST SIDE OF 7TH AVENUE, AS SHOWN HEREON.

DEDICATING 38.00 FEET FOR THE WEST SIDE OF 14TH AVENUE, AS SHOWN HEREON.

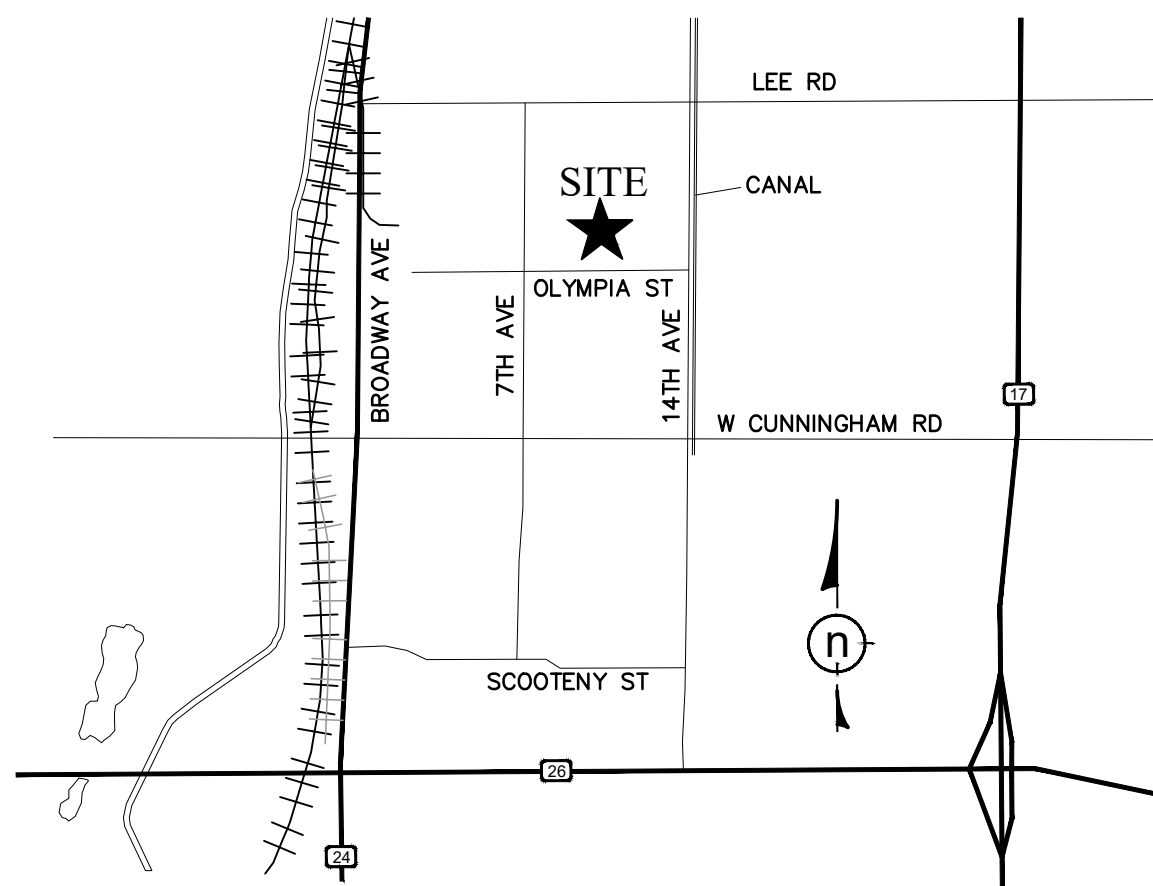
DEDICATING 66.00 FEET FOR 9TH AVENUE, 11TH AVENUE AND 13TH AVENUE, AS SHOWN HEREON.

DEDICATION

THE OWNER OF THE LAND DESCRIBED HEREIN IN FEE SIMPLE IS _____ THE OWNER DECLARES THIS PLAT AND DEDICATES TO THE PUBLIC FOREVER, ALL STREETS, ROADS, ALLEYS, EASEMENTS OR WHATEVER PUBLIC PROPERTY THERE IS SHOWN THEREON FOR ANY AND ALL PUBLIC PURPOSES NOT INCONSISTENT WITH THE USES SHOWN ON THIS PLAT.

DATED _____

ANGEL GARZA (PRESIDENT)



VICINITY MAP
NTS

ACKNOWLEDGEMENT

STATE OF WASHINGTON)
)SS.
COUNTY OF ADAMS)

I CERTIFY THAT I KNOW OR HAVE SATISFACTORY EVIDENCE THAT _____ SIGNED THIS INSTRUMENT AND ACKNOWLEDGED IT TO BE HIS VOLUNTARY ACT FOR THE USES AND PURPOSES MENTIONED IN THE INSTRUMENT.

DATED _____

NOTARY PUBLIC

NAME _____

NOTARY PUBLIC

MY APPOINTMENT EXPIRES: _____

SURVEYOR'S CERTIFICATION AND DECLARATION

I HEREBY CERTIFY THAT THIS PLAT IS A TRUE AND CORRECT REPRESENTATION OF THE LANDS ACTUALLY SURVEYED.

I HEREBY DECLARE THAT THE PLAT OF SAND HILL ESTATES #2 MAJOR PLAT IS BASED ON ACTUAL SURVEY AND SUBDIVISION OF A PORTION OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, W.M., THAT THE DISTANCES AND COURSES AND ANGLES ARE SHOWN THEREON CORRECTLY TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF; AND THAT PROPER MONUMENTS HAVE BEEN SET AND LOT CORNERS ARE STAKED ON THE GROUND.



OWNER INFORMATION

SAND HILL ESTATES, LLC
ANGEL AND YOLANDA GARZA
P.O. BOX 464
OTHELLO, WASHINGTON 99344

SURVEYOR'S NOTES

1. PROPOSED LOTS WILL BE SERVED BY THE CITY OF OTHELLO SEWER AND WATER.

CITY ENGINEER CERTIFICATION

EXAMINED AND APPROVED BY THE OTHELLO PUBLIC WORKS DEPARTMENT ON _____, 20____.

CITY ENGINEER

CITY COUNCIL CERTIFICATION

EXAMINED AND APPROVED BY THE OTHELLO CITY COUNCIL ON _____, 20____.

CITY ADMINISTRATOR

ATTEST:

CITY CLERK

TREASURERS CERTIFICATION

THIS IS TO CERTIFY THAT ALL TAXES AND ASSESSMENTS WHICH ARE NOW DUE AND PAYABLE ACCORDING TO THE RECORDS OF ADAMS COUNTY HAVE BEEN FULLY PAID.

ADAMS COUNTY TREASURER

DATE _____

AUDITORS CERTIFICATION

FILED FOR RECORD AT THE REQUEST OF THE CITY OF OTHELLO THIS _____ DAY OF _____, 20____ AT _____ M., AND RECORDED IN VOLUME _____ OF PLATS, ON PAGE _____, RECORDS OF ADAMS COUNTY, WASHINGTON.

ADAMS COUNTY AUDITOR

BY DEPUTY AUDITOR



7600 N. MINERAL DRIVE, SUITE 900 • COEUR D'ALENE, ID 83815
PHONE: (208) 772-6600 • FAX: (208) 772-6619
WWW.H2SURVEY.COM

PROJECT NUMBER: 2019-039
DATE: OCTOBER, 2019

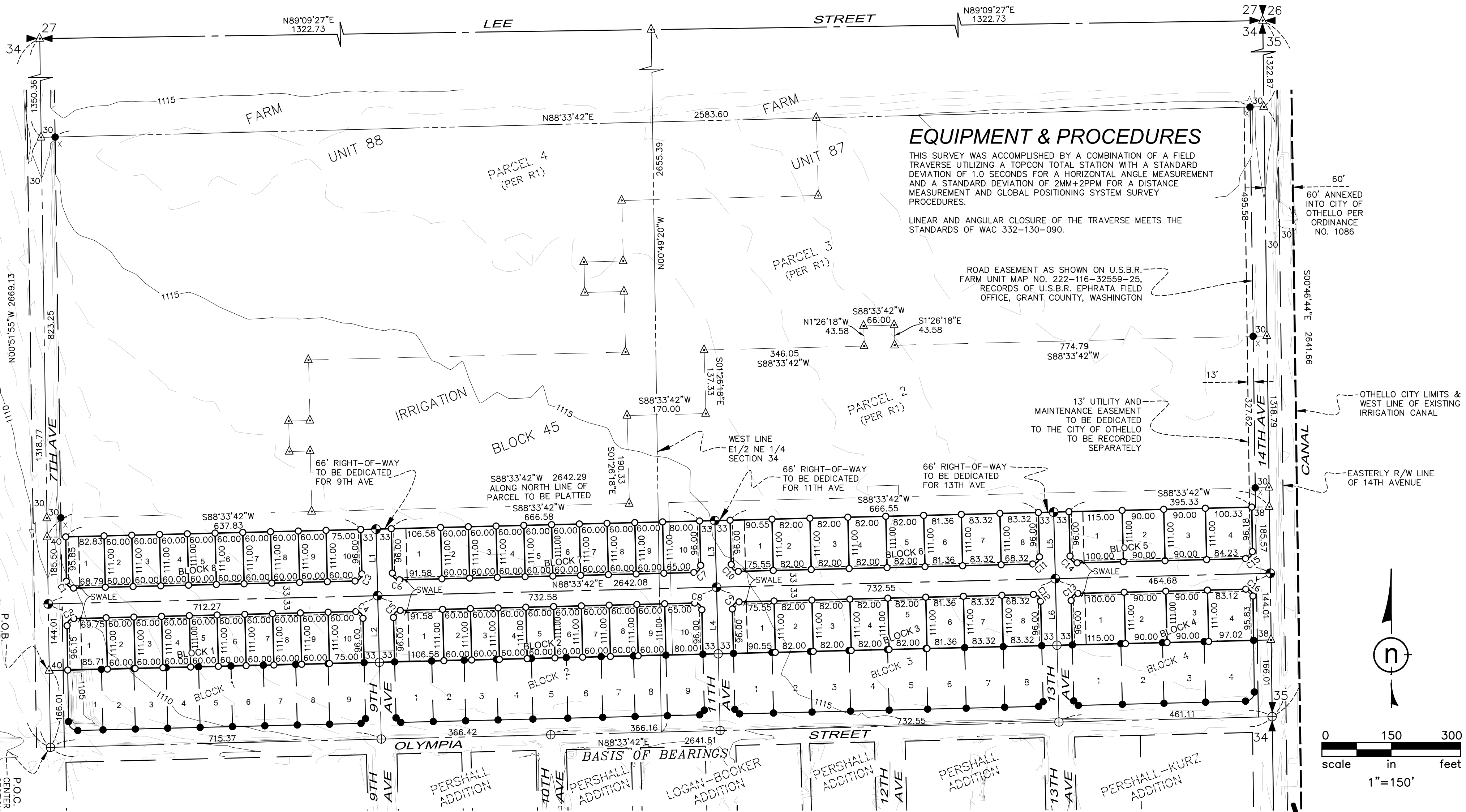
Sheet 1 of 4

PRELIMINARY SAND HILL ESTATES #2 MAJOR PLAT

A PARCEL OF LAND LOCATED IN A PORTION OF FARM UNITS 87 AND 88, IRRIGATION BLOCK 45, COLUMBIA BASIN PROJECT, LYING IN THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, ADAMS COUNTY, WASHINGTON

BASIS OF BEARINGS

THE SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, BEARS N88°33'42"E AS PER RECORD OF SURVEY RECORDED IN VOLUME "S" OF SURVEYS, AT PAGE 1215, RECORDS OF ADAMS COUNTY, WASHINGTON.



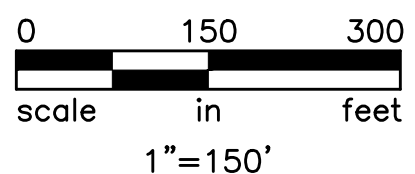
EQUIPMENT & PROCEDURES

THIS SURVEY WAS ACCOMPLISHED BY A COMBINATION OF A FIELD TRAVERSE UTILIZING A TOPCON TOTAL STATION WITH A STANDARD DEVIATION OF 1.0 SECONDS FOR A HORIZONTAL ANGLE MEASUREMENT AND A STANDARD DEVIATION OF 2MM+2PPM FOR A DISTANCE MEASUREMENT AND GLOBAL POSITIONING SYSTEM SURVEY PROCEDURES.

LINEAR AND ANGULAR CLOSURE OF THE TRAVERSE MEETS THE STANDARDS OF WAC 332-130-090.

ROAD EASEMENT AS SHOWN ON U.S.B.R. FARM UNIT MAP NO. 222-116-32559-25, RECORDS OF U.S.B.R. EPHRATA FIELD OFFICE, GRANT COUNTY, WASHINGTON

13' UTILITY AND MAINTENANCE EASEMENT TO BE DEDICATED TO THE CITY OF OTHELLO TO BE RECORDED SEPARATELY

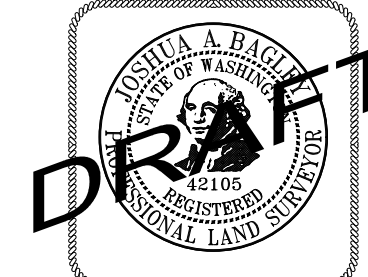


SURVEY REFERENCES

- R1 = RECORD OF SURVEY, VOLUME "S" OF SURVEYS, PAGE 1215, RECORDS OF ADAMS COUNTY, WASHINGTON
- R2 = PLAT OF PERSHALL ADDITION, A.F.N. 141203, RECORDS OF ADAMS COUNTY, WASHINGTON
- R3 = PLAT OF PERSHALL-KURZ ADDITION, A.F.N. 94901, RECORDS OF ADAMS COUNTY, WASHINGTON
- R4 = RECORD OF SURVEY, VOLUME "S" OF SURVEYS, PAGE 365, RECORDS OF ADAMS COUNTY, WASHINGTON
- R5 = MIGRANT PRE-SCHOOL SHORT PLAT, VOLUME 1, PAGE 344, A.F.N. 295297, RECORDS OF ADAMS COUNTY, WASHINGTON.
- R6 = FINAL FARM UNIT PLAT OF IRRIGATION BLOCK 45, DATED 9/25/1962.
- R7 = OTHELLO MUNICIPAL CODE 16.29.120
- R8 = PLAT OF SAND HILL ESTATES #1 MAJOR PLAT, VOLUME 3, PAGE 243, A.F.N. 318253, RECORDS OF ADAMS COUNTY, WASHINGTON.

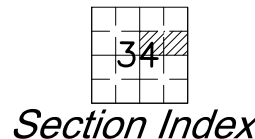
LEGEND

- = SET 5/8" X 30" REBAR WITH PLASTIC CAP MARKED "H2 PLS 42105"
- △ = CALCULATED POINT (NOTHING FOUND OR SET)
- ⊕ = SET 5/8"x30" REBAR WITH 2"ALUMINUM CAP MARKED "H2 PLS 42105"
- ⊕ = FOUND 5/8"x30" REBAR WITH 2"ALUMINUM CAP MARKED "H2 PLS 42105"
- ⊗ = FOUND 5/8" REBAR & CAP MARKED "PLS 46321"
- = FOUND 5/8" X 30" REBAR WITH PLASTIC CAP MARKED "H2 PLS 42105"
- = PROPOSED LOT LINES
- - - = EASEMENT LINE
- = CENTER LINE
- = ADJOINER LINE
- = SECTION LINE
- = 1/4 SECTION LINE
- = 1/16 SECTION LINE
- = CITY LIMITS



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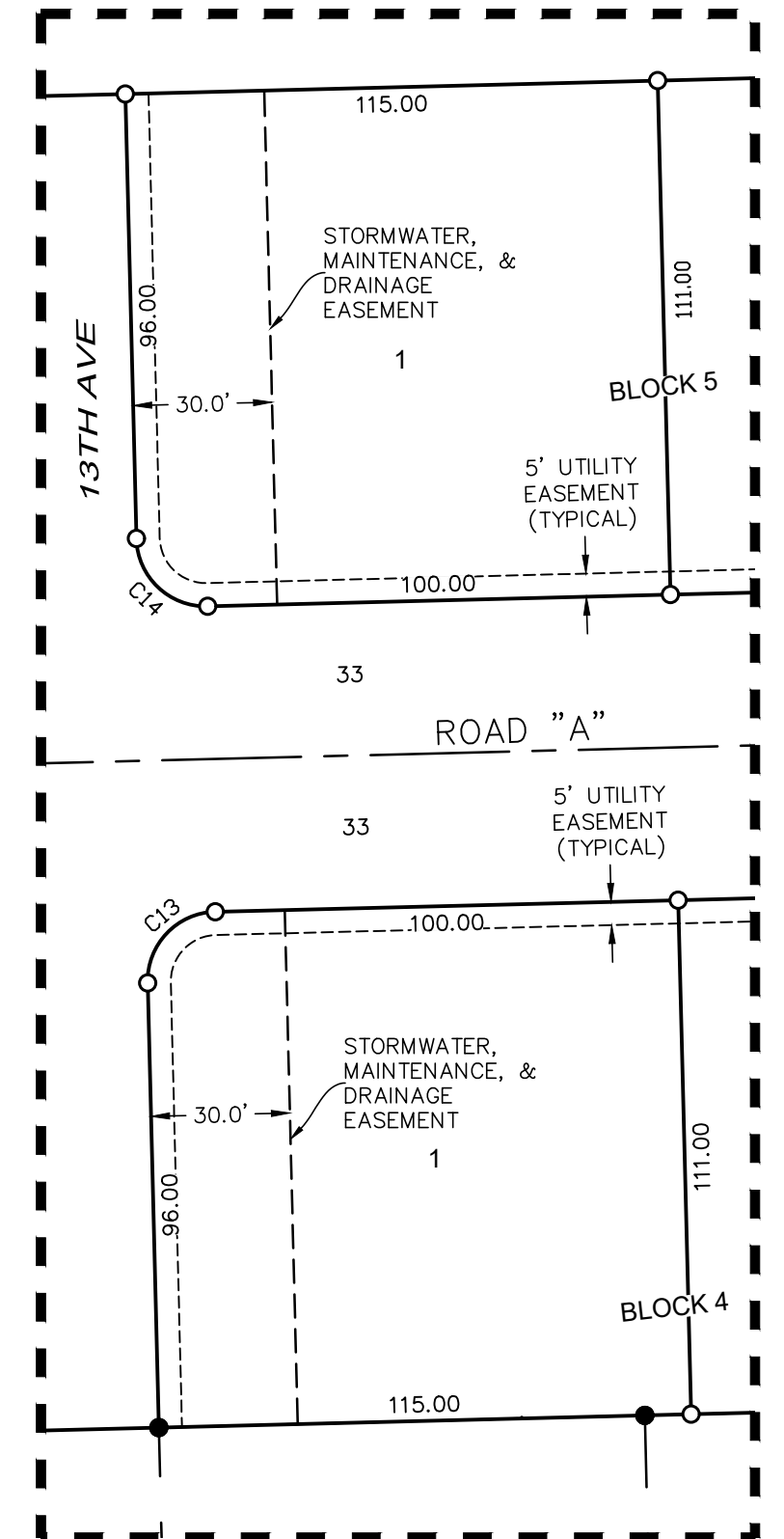
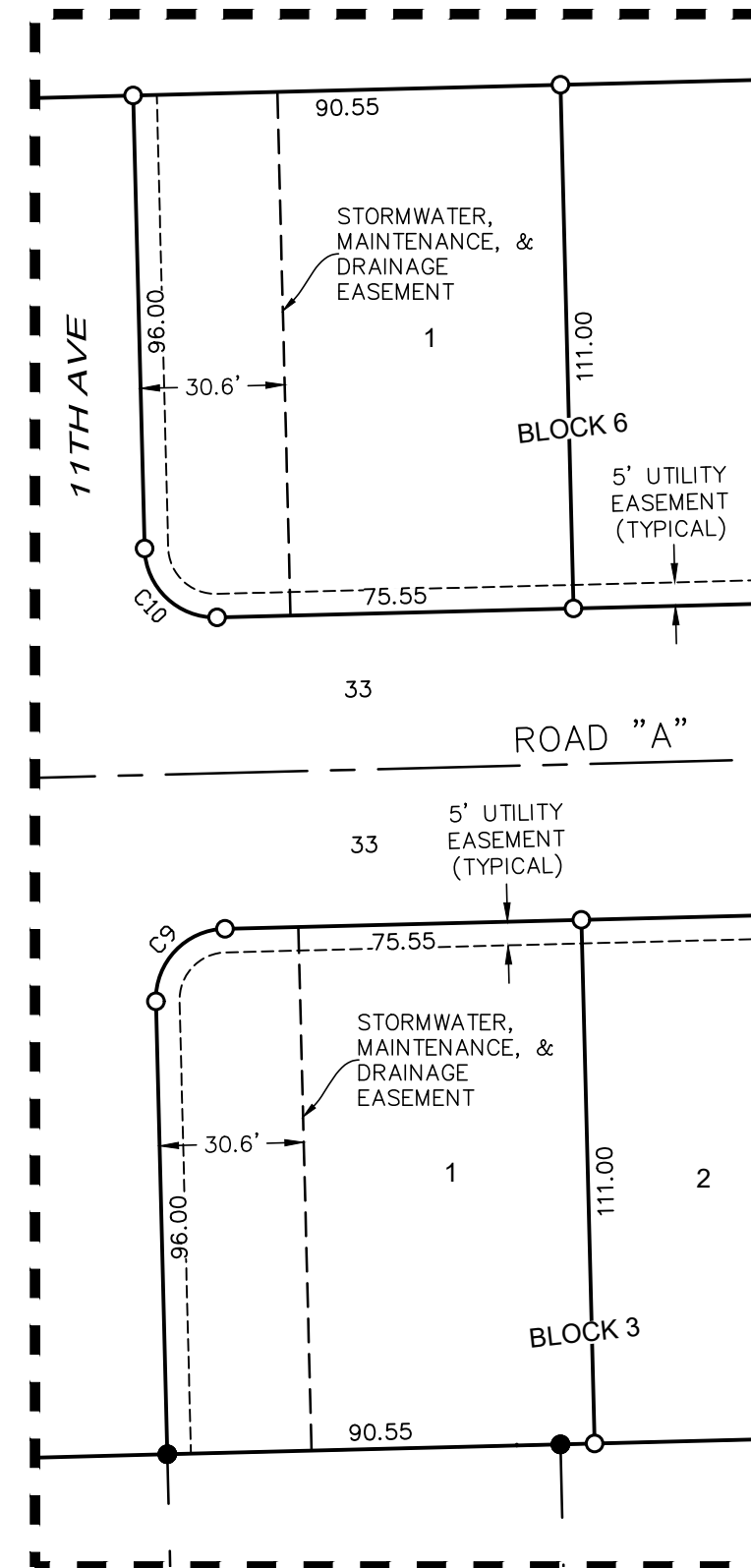
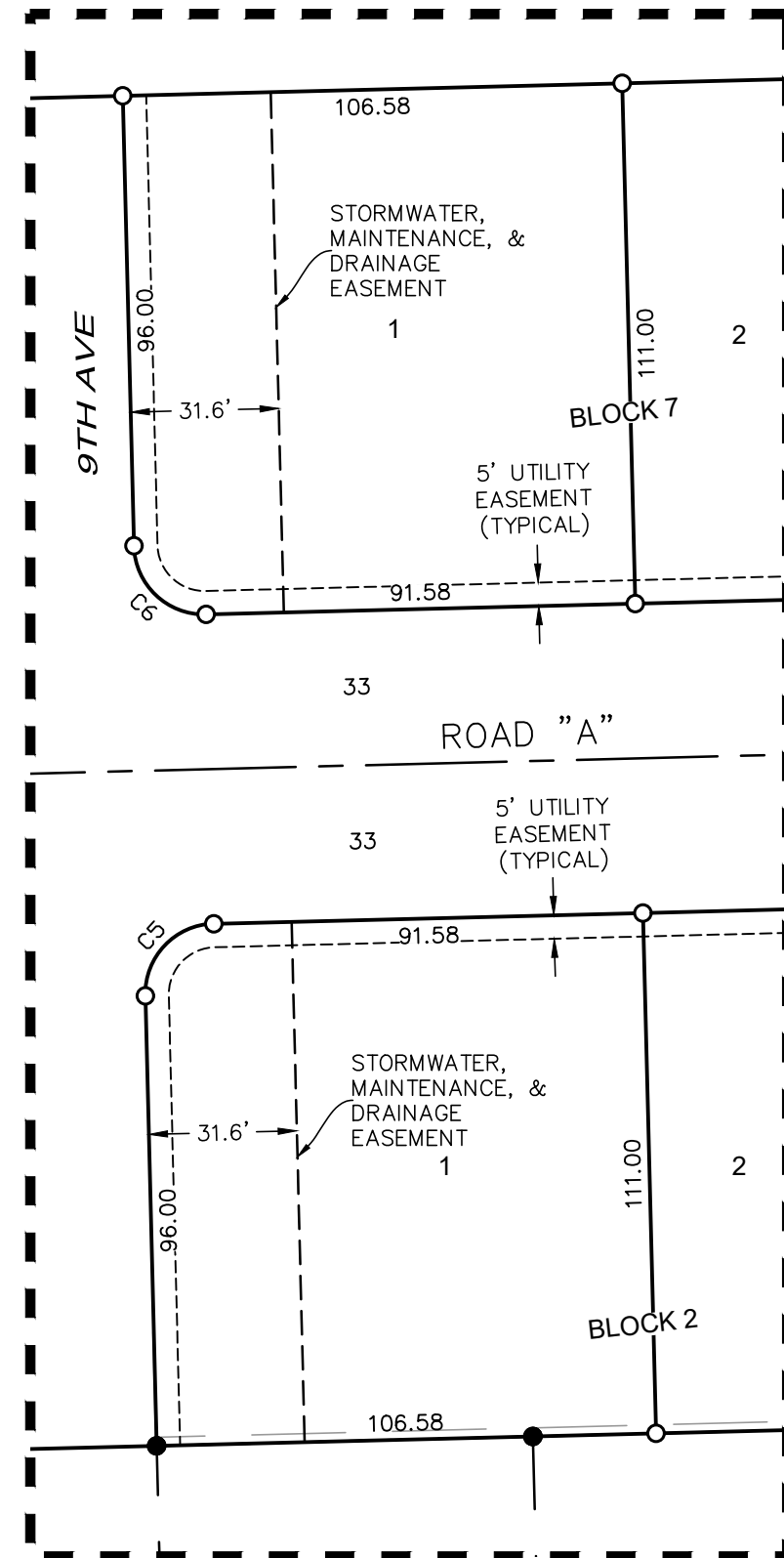
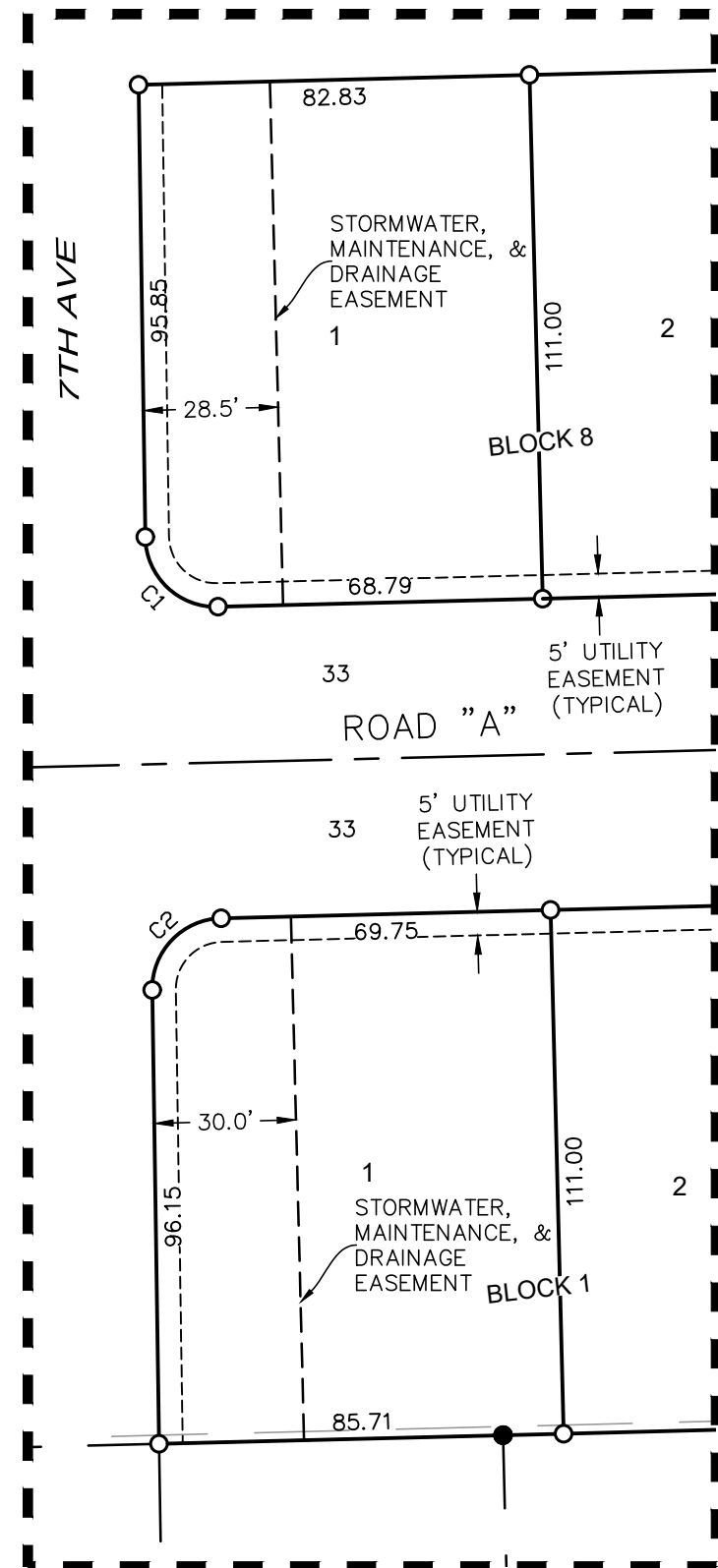
PROJECT NUMBER: 2019-039
DATE: OCTOBER, 2019



PRELIMINARY SAND HILL ESTATES #2 MAJOR PLAT

A PARCEL OF LAND LOCATED IN A PORTION OF FARM UNITS 87 AND 88, IRRIGATION BLOCK 45, COLUMBIA BASIN PROJECT, LYING IN THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 16 NORTH, RANGE 29 EAST, WILLAMETTE MERIDIAN, ADAMS COUNTY, WASHINGTON

SWALE DETAILS

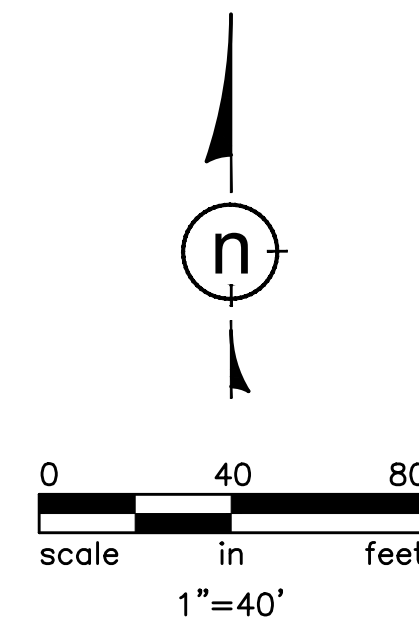


Curve Table

CURVE	ARC DISTANCE	RADIUS	CENTRAL ANGLE	CHORD BEARING	CHORD DISTANCE
C1	23.712	15.000	90°34'23"	S46°09'07"E	21.32
C2	23.412	15.000	89°25'37"	S43°50'53"W	21.11
C3	23.562	15.000	90°00'00"	N43°33'42"E	21.21
C4	23.562	15.000	90°00'00"	N46°26'18"W	21.21
C5	23.562	15.000	90°00'00"	S43°33'42"W	21.21
C6	23.562	15.000	90°00'00"	S46°26'18"E	21.21
C7	23.562	15.000	90°00'00"	N43°33'42"E	21.21
C8	23.562	15.000	90°00'00"	N46°26'18"W	21.21
C9	23.562	15.000	90°00'00"	S43°33'42"W	21.21
C10	23.562	15.000	90°00'00"	S46°26'18"E	21.21
C11	23.562	15.000	90°00'00"	N43°33'42"E	21.21
C12	23.562	15.000	90°00'00"	N46°26'18"W	21.21
C13	23.562	15.000	90°00'00"	S43°33'42"W	21.21
C14	23.562	15.000	90°00'00"	S46°26'18"E	21.21
C15	23.389	15.000	89°20'26"	N43°53'29"E	21.09
C16	23.735	15.000	90°39'34"	N46°06'31"W	21.33

Line Table

LINE	BEARING	DISTANCE
L1	S01°26'18"E	144.000
L2	S01°26'18"E	144.000
L3	N01°26'18"W	144.000
L4	N01°26'18"W	144.000
L5	S01°26'18"E	144.000
L6	S01°26'18"E	144.000



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 PHONE: (208) 772-6600 • FAX: (208) 772-6619
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PROJECT NUMBER: 2019-039
 DATE: OCTOBER, 2019



Section Index

GENERAL PROJECT NOTES

- PROJECT SUMMARY:** THIS PLAN SET SHALL BE INCLUSIVE OF THE NECESSARY CONSTRUCTION INFORMATION REQUIRED TO DEVELOP THE PROPOSED SAND HILL ESTATES - PHASE II - SUBDIVISION IMPROVEMENTS IN THE CITY OF OTHELLO, WASHINGTON. AN APPROVED COPY OF THIS IMPROVEMENT PLAN SET SHALL REMAIN ON THE PROJECT SITE AT ALL TIMES. ALL MODIFICATIONS TO THIS PLAN SHALL BE APPROVED BY THE CITY OF OTHELLO, AND THE ENGINEER OF RECORD.
- PROJECT LIMITS:** THE LIMITS OF THIS PROJECT ARE IDENTIFIED ON SHEET C2.0. UNDER THE TEMPORARY EROSION CONTROL PLAN, THE BOUNDARY OF THIS PROPERTY WAS DEFINED THROUGH A RECORD OF SURVEY - SEGREGATION, PREPARED BY COLUMBIA NW ENGINEERING, AND RECORDED AT VOLUME S, PAGE 1215, RECORDS OF ADAMS COUNTY, WASHINGTON.
- STANDARDS OF CONSTRUCTION:** ALL WORK SHALL CONFORM TO THE CITY OF OTHELLO PUBLIC WORKS STANDARDS, DATED FEBRUARY 2017 AND THE WASHINGTON STATE DEPARTMENT OF ECOLOGY'S STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON, DATED SEPTEMBER 2004. A CLEAN COPY OF BOTH PUBLICATIONS SHALL REMAIN ONSITE FOR THE CONSTRUCTION PROCESS, AS A SOURCE OF REFERENCE. THE CONTRACTOR SHALL ASSUME ALL LIABILITY FOR THE CONSTRUCTION OF THIS PROJECT, AND THE OVERSIGHT OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN APPROVED BY THE CITY OF OTHELLO.

THE FOLLOWING SECTIONS OF THE CITY OF OTHELLO PUBLIC WORKS STANDARDS ARE BEING LISTED FOR CONTRACTOR REFERENCE, AND THE CONTENTS WITHIN THE BELOW SECTIONS ARE HEREBY A PART OF THIS PROJECT:

- SECTION 2 - PERMITS
- SECTION 3 - INSURANCE, LIABILITY, BOND, AND WARRANTEE
- SECTION 4 - INSPECTION, TESTING, WARRANTEE, AND ACCEPTANCE
- SECTION 5 - STREETS, SIDEWALKS, AND ALLEYS
- SECTION 6 - WATER SYSTEM STANDARDS
- SECTION 7 - SANITARY SEWER STANDARDS
- SECTION 8 - STORM WATER STANDARDS
- SECTION 9 - NONPOTABLE WATER STANDARDS

4. **UTILITIES:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE AREA 'ONE-CALL' SERVICE TO PROPERLY IDENTIFY THE LOCATION OF ALL SUBSURFACE UTILITIES, AND SHALL BE RESPONSIBLE FOR ACCURATELY ACCOUNTING FOR ALL OVERHEAD UTILITIES THAT MAY BE AFFECTED BY THE DEVELOPMENT OF THIS PROJECT. THE CONTRACTOR SHALL NOTIFY THE AREA ONE CALL (8-1-1) UTILITY LOCATING SERVICE AT LEAST 48-HOURS PRIOR TO ANY EXCAVATION, AND THEREAFTER AS NEEDED TO PROTECT THE UTILITIES. ALL COSTS ASSOCIATED WITH REPAIRS TO DISTURBED UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NO ATTEMPT WAS MADE TO SHOW ALL SUBSURFACE UTILITIES ON THIS PLAN, OTHER THAN THOSE LOCATED FOR THE TOPOGRAPHIC SURVEY PERFORMED BY h2. h2 ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THIS INFORMATION OR ANY UNKNOWN UTILITY CONFLICTS.

THE CONTRACTOR SHALL WORK WITH THE DRY UTILITY PROVIDERS TO EXTEND ALL DRY UTILITIES (POWER, PHONE, GAS, INTERNET, ETC.) TO THE PROPOSED LOTS IN THE PUBLIC RIGHT OF WAY AND OR PROVIDED EASEMENTS. THIS PLAN DOES NOT INCLUDE DRY UTILITY DESIGN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DECOMMISSIONING ANY POLE, PEDESTAL, GUY WIRE, LINE, ETC. THAT IS TO BE ABANDONED OR ALTERED DURING CONSTRUCTION OF THIS PLAN.

5. **STOCKPILED MATERIALS:** THE FINAL LOCATION OF ANY STOCKPILED MATERIALS WILL BE FIELD LOCATED BY THE CONTRACTOR IN A SECURED LOCATION THAT WILL NOT ALLOW ANY POTENTIAL SEDIMENTATION TO INTERFERE WITH WATERS OF THE UNITED STATES OR STORMWATER CONVEYANCE, COLLECTION, OR TREATMENT IMPROVEMENTS. THE CONTRACTOR SHALL SECURE ALL STOCKPILES WITH TARPS, SILT FENCING, AND OR TEMPORARY SEEDING IF LEFT UNDISTURBED FOR MORE THAN 72 CONSECUTIVE HOURS. THE CONTRACTOR SHALL HEREBY BE RESPONSIBLE FOR REPAIRING ANY DITCHLINE, CULVERT, OR OTHER DRAINAGE FEATURE/APPERTENANCE AFFECTED BY THE EROSION OF STOCKPILED MATERIALS.

6. **GROUND WATER:** NO GROUND WATER ISSUES HAVE BEEN IDENTIFIED ON THIS PARCEL. CONTRACTOR TO INFORM ENGINEER IF THIS CONDITION CHANGES.

7. **ENCROACHMENTS:** NO PRIVATE PROPERTY ENCROACHMENTS ARE KNOWN AT THIS TIME. IF A THREAT TO PUBLIC SAFETY IS EMINENT, THE CONTRACTOR SHALL NOTIFY THE CITY OF OTHELLO IMMEDIATELY.

8. **WASTE DISPOSAL:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL WASTE MATERIAL FROM THIS PROJECT AT A STATE APPROVED OFFSITE LOCATION, INCLUDING, BUT NOT LIMITED TO GENERAL DAY-TO-DAY WASTE, EXCESS ORGANIC SOILS, CLEARED VEGETATION, AND CONSTRUCTION WASTE MATERIALS.

9. **SECURITY:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING THE PROJECT SITE DURING CONSTRUCTION. ALL DAMAGES TO EQUIPMENT, TOOLS, UTILITIES, ETC. ON THE CONSTRUCTION SITE SHALL BE REPAIRED AT THE EXPENSE OF THE CONTRACTOR.

10. **INSPECTIONS:** h2 SHALL PERFORM NECESSARY PROJECT INSPECTIONS REQUIRED BY THE CITY OF OTHELLO, AT THE DIRECTION AND NOTIFICATION OF THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD AT LEAST 48 HOURS PRIOR TO REQUESTING AN INSPECTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISUALLY INSPECTING THE ENTIRE PROJECT SITE ON A DAILY BASIS, AND DOCUMENTING ALL FINDINGS NEATLY/LEGIBLY IN A PROJECT DIARY THAT SHALL BE SUBMITTED TO THE ENGINEER UPON COMPLETION OF CONSTRUCTION AND PROJECT ACCEPTANCE. FAILURE TO DO SO MAY RESULT IN DELAYED PAYMENTS OR ADDITIONAL WORK TO BE PERFORMED BY THE CONTRACTOR, AT THE CONTRACTOR'S SOLE EXPENSE. THE CONTRACTOR SHALL PERFORM ALL STORMWATER/RUNOFF TESTING, AND UTILITY PIPE TESTING IN THE PRESENCE OF AN UNBIASED 3RD PARTY REPRESENTATIVE VERSED IN INSPECTIONS FOR ENGINEER VERIFICATION. h2 ASSUMES NO LIABILITY FOR PROJECT RUNOFF OR SERVICES (CONTRACTOR TO ASSUME ALL RESPONSIBILITY) IF TESTING IS NOT PERFORMED IN PRESENCE OF SAID 3RD PARTY.

11. **BID ITEMS:** ALL QUANTITIES PROVIDED ON THIS PLAN, THROUGH TELEPHONE CORRESPONDENCE, TEXT, EMAIL, IN PERSON COMMUNICATION, BOTH PRE & POST PLAN APPROVAL, SHALL BE CONSIDERED TO BE AN ESTIMATE UNTIL VERIFIED BY THE CONTRACTOR. ALL ITEMS NOT REPRESENTED BY ANY SUBMITTED QUANTITY BID ITEMS, BUT STILL REQUIRED FOR THE COMPLETION OF THIS PROJECT, SHALL BE CONSIDERED AN INCIDENTAL BID ITEM THAT THE CONTRACTOR WILL BE RESPONSIBLE FOR. IF THE CONTRACTOR ASSUMES, OR FINDS A DISCREPANCY IN THE PLAN QUANTITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ENGINEER OF RECORD WITHIN 48-HOURS OF INITIAL CONCERN AND REQUEST CLARIFICATION, OR A QUANTITY ALLOWANCE INCREASE (IN WRITING), NO SOILS TESTING OR INSPECTIONS HAVE BEEN PERFORMED TO DATE. THEREFORE h2 ASSUMES NO LIABILITY FOR THE SUBSURFACE FINDINGS OR THE CONDITIONS OF THE EXISTING/PROPOSED ROAD BED. THE CONTRACTOR SHALL INCLUDE NECESSARY FUNDING FOR ALL MATERIALS TESTING AND COMPACTION REPORTING IN THEIR CONSTRUCTION BID.

12. **COMPACTION REQUIREMENTS:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COMPACTION TESTING. IN PLACE COMPACTION TESTING AND VISUAL COMPACTION TESTING SHALL BE PERFORMED BY A QUALIFIED THIRD PARTY TESTING CONTRACTOR/FIRM. ALL COMPACTION TESTING SHALL MEET THE MINIMUM REQUIREMENTS OF THE CITY OF OTHELLO, OR THE FOLLOWING ENGINEER OF RECORD COMPACTION REQUIREMENT IF NOT SPECIFIED BY THE CITY OF OTHELLO:

- ALL SUBGRADE, BASE MATERIALS AND BITUMINOUS SEALING SHALL BE TESTED IN ACCORDANCE WITH ASTM STANDARDS.
- ALL EXCAVATED OR PLACED (12" LOOSE LIFTS) SUBGRADE MATERIAL SHALL BE ORGANIC FREE, SUITABLE MATERIAL AND SHALL BE COMPACTED TO AT LEAST 95% OF THE MODIFIED PROCTOR.
- PLACED BALLAST MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH INDUSTRY ACCEPTED STANDARDS.
- ROAD BASE MATERIAL MUST BE COMPACTED TO 95% OF MODIFIED PROCTOR IN ACCORDANCE WITH ASTM STANDARDS.
- THE ROAD SURFACE ASPHALT SHALL BE COMPACTED TO 98% OF THE THEORETICAL RICE DENSITY. TESTING AND ASPHALT PLACEMENT DEPTHS SHALL BE DETERMINED BY THE ASPHALT MIX PROVIDER AND OR CONTRACTOR TO ACHIEVE THE PLAN ASPHALT DEPTH. EACH LAYER SHALL BE TESTED ACCORDINGLY.

ALL MATERIALS NOT MEETING THE ABOVE NOTED CITY AND/OR ENGINEER SPECIFICATIONS WILL BE REMOVED AND REPLACED BY THE CONTRACTOR, AT THE CONTRACTOR'S SOLE EXPENSE, UNTIL SPECIFIED REQUIREMENTS ARE ACHIEVED. A COPY OF THE COMPACTION TESTING RESULTS SHALL BE PROVIDED TO THE ENGINEER OF RECORD WITHIN 24-HOURS OF THE COMPLETION OF TESTING, UNLESS OTHERWISE APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SUBGRADE MATERIAL USED TO CONSTRUCT THIS PROJECT.

13. **EROSION CONTROL:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY EROSION CONTROL AND STORMWATER MANAGEMENT DURING CONSTRUCTION. THE CONTRACTOR SHOULD REQUEST ASSISTANCE FROM THE ENGINEER OF RECORD IF A DIFFICULT STORMWATER MANAGEMENT OR EROSION CONTROL ISSUE PRESENTS ITSELF DURING CONSTRUCTION. ALL PERMANENT EROSION CONTROL AND STORMWATER MANAGEMENT SHALL BE INSTALLED AND APPROVED BY THE DEVELOPER. h2'S PROVIDED SEEDING RECOMMENDATIONS ARE ONLY MEANT TO ACT AS A GUIDELINE FOR FINAL LANDSCAPING AND EROSION CONTROL. THE TEMPORARY EROSION AND SEDIMENT CONTROL PLAN (T.E.S.C.) IS PROVIDED ON SHEET C2.0. THIS T.E.S.C. PLAN IS MEANT TO STABILIZE THE SITE. THE CONTRACTOR SHALL INSPECT AND/OR REPAIR PROPOSED BEST MANAGEMENT PRACTICES DAILY, AND KEEP RECORD OF SUCH REPAIRS.

14. **SEEDING/LANDSCAPING:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR PLACING A NOXIOUS WEED FREE, FERTILIZED DRYLAND HYDROSEED MIXTURE ON THE DISTURBED AREAS OF THE PROJECT UPON FINAL GRADING. THIS SEED SHALL MEET THE SPECIFICATIONS AND STANDARDS OF THE FEDERAL SEED ACT AND WASHINGTON STATE SEED LAWS. THE DEVELOPER SHALL BE RESPONSIBLE FOR ALL ADDITIONAL SITE LANDSCAPING AFTER THE PROJECT IS COMPLETE. THE DEVELOPER SHOULD CONSULT A LANDSCAPER IF AN ALTERNATIVE SEED MIXTURE, OR MORE AESTHETICALLY PLEASING LANDSCAPE AREA IS DESIRED. h2 DOES NOT EMPLOYEE, NOR DO THEY ACCEPT RESPONSIBILITY FOR ANY SEED, PLANTINGS, OR ANY LANDSCAPE NOTES FOR THIS PROJECT THAT ARE PROVIDED AT THE REQUEST OF THE CLIENT.

15. **GEOTECHNICAL:** A GEOTECHNICAL ANALYSIS WAS NOT PERFORMED ON THIS SITE. ONE IS RECOMMENDED BY h2 PRIOR TO CONSTRUCTION, BUT IS NOT REQUIRED BY THE CITY OF OTHELLO.

16. **WATER, DOMESTIC AND IRRIGATION WATER** SHALL BE PROVIDED BY THE CITY OF OTHELLO. WATER VALVES ARE SHOWN ON THIS PLAN IN ACCORDANCE WITH CITY SPACING REQUIREMENTS FOR BOTH POTABLE (DOMESTIC WATER) AND NON-POTABLE (IRRIGATION) MAIN LINES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF EACH VALVE AS REQUIRED FOR CONSTRUCTION.

17. **CONSTRUCTION WATER:** THE CONTRACTOR SHALL USE A PUMP TRUCK OR PORTABLE TANK/PUMP TO PROVIDE CONSTRUCTION WATER ON THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING A WATER SOURCE OR SECURING A METER/PERMIT FROM THE CITY TO OBTAIN CONSTRUCTION WATER FROM THE MANY NEARBY FIRE HYDRANTS.

18. **SANITARY SEWER:** SANITARY SEWER SERVICE SHALL BE PROVIDED BY THE CITY OF OTHELLO.

19. **CONSTRUCTION SANITARY SEWER SERVICES:** THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A PORTABLE RESTROOM FROM A LICENSED SERVICE PROVIDER. THE SERVICE PROVIDER SHALL ALSO MAINTAIN THE PORTABLE RESTROOM REGULARLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THIS PORTABLE UNIT, INCLUDING ALL DAMAGES RESULTING FROM THIS UNIT BEING ONSITE.

20. **LIGHTING:** PERMANENT LIGHTING SHALL BE VIA AVISTA'S APPROVED STREET LIGHT LAYOUT.

21. **CONSTRUCTION SCHEDULE:** WEATHER PERMITTING, SITE WORK WILL COMMENCE IN MARCH 2020, AND END IN SEPTEMBER 2020.

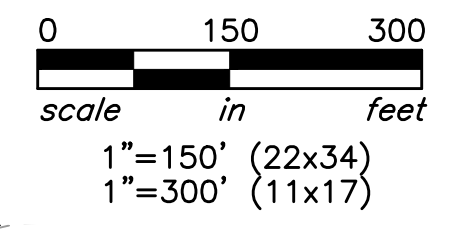
22. **GRADING:** THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL DEPARTMENT OF ECOLOGY AND EPA NOI PERMITS.

LEGEND

- △ = Calculated Point (nothing found or set)
- = Found Iron Pipe
- = Found 5/8" rebar with yellow plastic cap
- = Found aluminum cap
- MAW ⊙ = Found mag nail
- = Boundary Line
- - - = Adjacent Property Line
- - - = Easement (as noted)
- - - = Right-of-Way Line
- - - = Existing fence Line
- = Existing contour (1' Interval)
- = Proposed contour (1' Interval)
- UT --- = Existing communication line
- = Existing gas line
- OE --- = Existing overhead electrical line
- UE --- = Existing underground electrical line
- SD --- = Proposed 12" SDR35 storm sewer line
- W --- = Existing water line (as noted)
- W --- = Proposed water line (as noted)
- W6 --- = Proposed 6" C900 PVC water line
- W8 --- = Proposed 8" C900 PVC water line
- W12 --- = Proposed 12" C900 PVC water line
- W --- = Proposed 6" C900 PVC non-potable water line
- SS --- = Existing sanitary sewer line (as noted)
- SS4 --- = Proposed 4" SDR35 sanitary sewer service
- SS8 --- = Proposed 8" SDR35 sanitary sewer main
- SSB --- = Proposed Stop Bar per MUTCD requirements
- = Proposed crosswalk per MUTCD requirements
- ⊙ = Proposed sanitary sewer manhole
- ⊙ = Existing sanitary sewer manhole
- ⊙ = Proposed stormwater manhole
- WV ⊙ = Water Valve
- WS ⊙ = WATER SERVICE STUB
- WM ⊙ = Water Meter
- ⊙ FH = Fire Hydrant
- MB ⊙ = Mailbox
- DW ⊙ = Drywell
- CB ⊙ = Catch basin
- ⊙ = Street light
- ⊙ = Power Pole
- ⊙ = Utility Pole
- ⊙ = Guy Wire
- ⊙ = Telephone Riser
- ⊙ = Gas Meter
- ⊙ = Street sign (as noted)
- ⊙ = Existing Concrete
- ⊙ = Proposed Concrete
- ⊙ = Temporary retention pond

ALIGNMENT BEARINGS

OLYMPIA	=	N 80° 02' 00" E
DESDEMONA	=	N 01° 28' 18" W
ROAD 'A'	=	N 88° 33' 42" E
7TH AVENUE	=	N 00° 51' 55" W
9TH AVENUE	=	N 01° 28' 18" W
11TH AVENUE	=	N 01° 28' 18" W
13TH AVENUE	=	N 01° 28' 18" W
14TH AVENUE	=	N 00° 46' 44" W



CONTACT INFORMATION

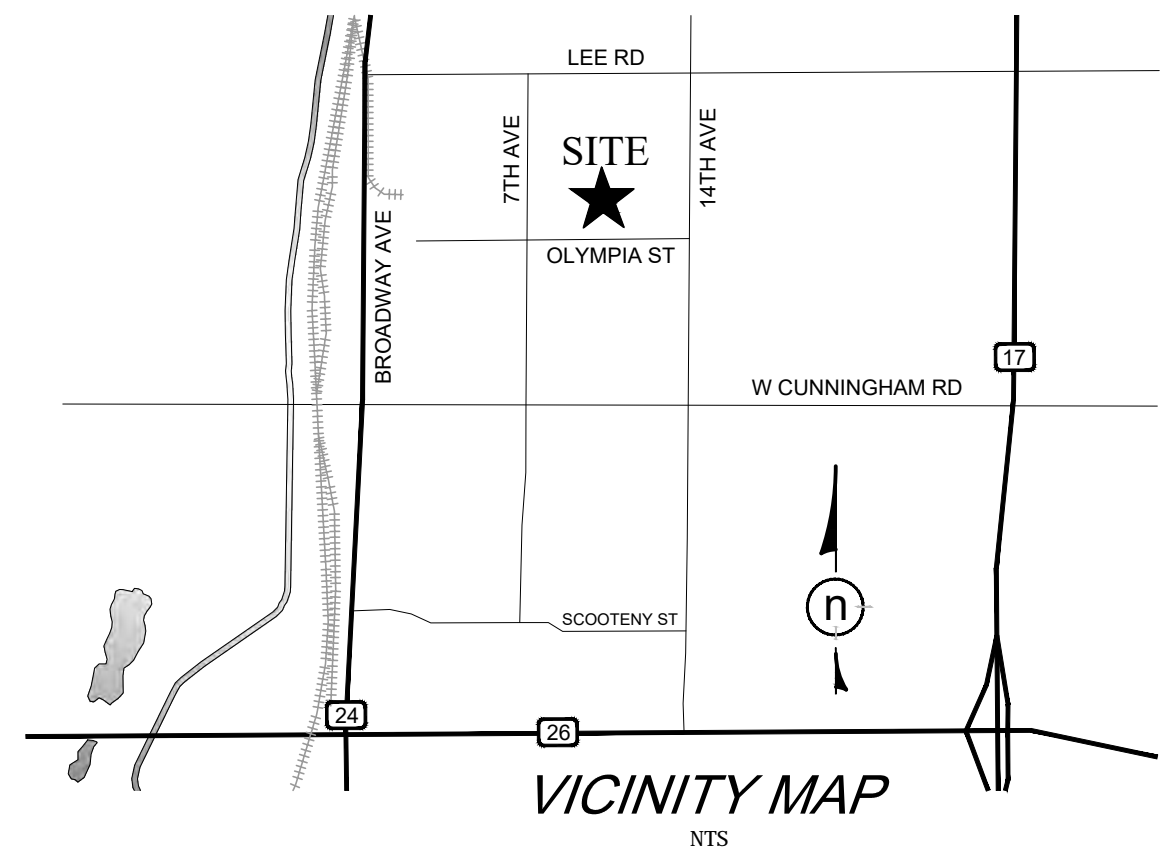
PROJECT ENGINEER: h2 SURVEYING & ENGINEERING LLC
SCOTT McARTHUR, PE
PO BOX 2916
HAYDEN, IDAHO 83835
TEL: 208.964.0481

PROJECT DEVELOPER: SAND HILL ESTATES LLC
ANGEL GARZA
PO BOX 464
OTHELLO, WASHINGTON 99344
TEL: 509.989.0555

REVIEWING AGENCY: CITY OF OTHELLO
SHAWN O'BRIEN
CITY ENGINEER
500 EAST MAIN STREET
OTHELLO, WASHINGTON 99344
TEL: 509.488.5686 (EXT. 103)

SHEET INDEX

- C1.0 PROJECT OVERVIEW & NOTES
- C2.0 TEMPORARY EROSION & SEDIMENT CONTROL (TESC) PLAN
- C2.1 TEMPORARY EROSION & SEDIMENT CONTROL (TESC) PLAN
- C3.0 PLAN & PROFILE - OLYMPIA STREET - STA 50+00 TO STA 56+50
- C3.1 PLAN & PROFILE - DESDEMONA AVENUE - STA 60+00 TO STA 64+25
- C3.2 PLAN & PROFILE - ROAD 'A' - STA 10+00 TO STA 19+50
- C3.3 PLAN & PROFILE - ROAD 'A' - STA 19+50 TO STA 29+50
- C3.4 PLAN & PROFILE - ROAD 'A' - STA 29+50 TO 39+50
- C3.5 PLAN & PROFILE - ROAD 'A' - STA 39+50 TO STA 45+50
- C3.6 PLAN & PROFILE - 7TH AVENUE - STA 44+00 TO STA 48+00
- C3.7 PLAN & PROFILE - 9TH AVENUE - STA 64+00 TO STA 68+00
- C3.8 PLAN & PROFILE - 11TH AVENUE - STA 81+00 TO STA 85+00
- C3.9 PLAN & PROFILE - 13TH AVENUE - STA 101+00 TO STA 105+00
- C3.10 PLAN & PROFILE - 14TH AVENUE - STA 123+00 TO 128+00



CITY OF OTHELLO

ADMINISTRATOR

CITY OF OTHELLO

CITY ENGINEER

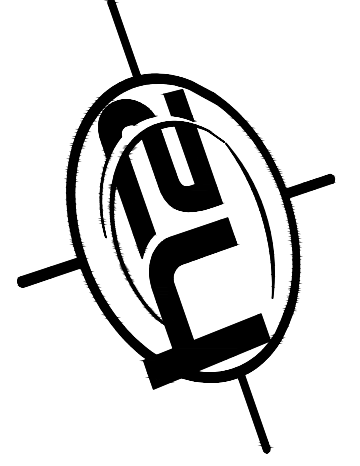
CONTROL

TBM #1: FOUND 5/8" REBAR WITH CAP
MARKED 'CNW ENG PLS 46321'
N: 58866.11
E: 45636.25
EL: 1110.55

TBM #2: FOUND 5/8" REBAR WITH CAP
MARKED 'CNW ENG PLS 46321'
N: 58930.92
E: 48207.79
EL: 1117.92

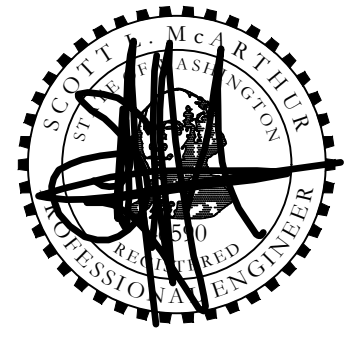
DATUM

HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO



SURVEYORS • ENGINEERS
7600 N. Mineral Dr., Ste. 900
Coeur d'Alene, Idaho 83815
Phone: (208) 772-6600
Fax: (208) 772-6619
www.h2survey.com

SURVEYED	h2	DESIGNED	h2	DRAWN	rmb	CHECKED	shh
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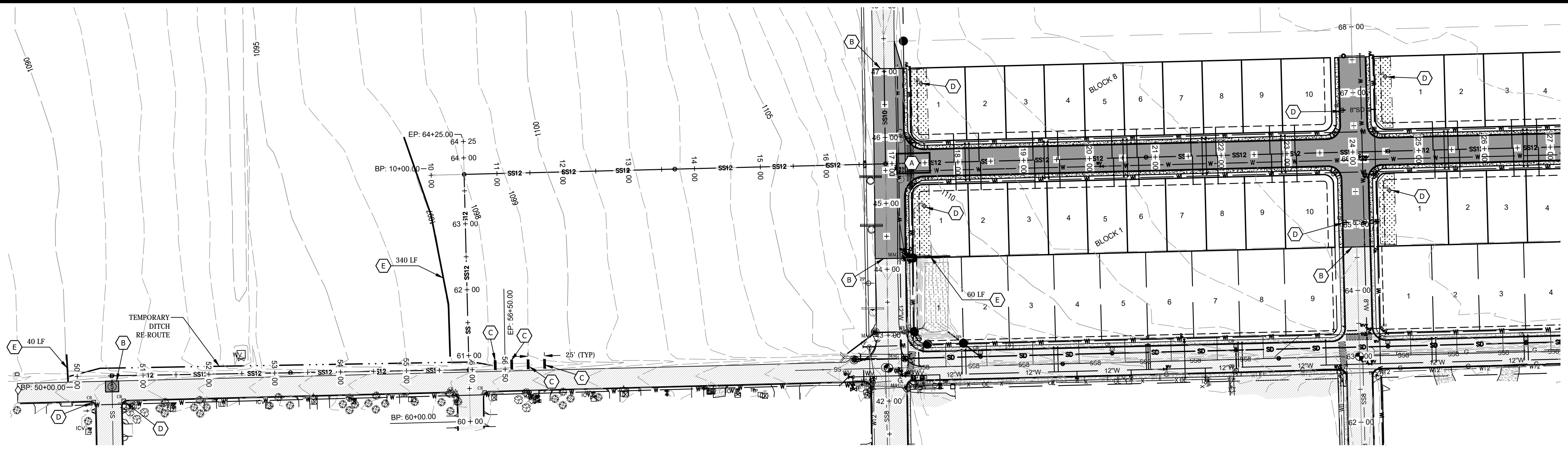
8/30/19

REVISIONS

SAND HILL ESTATES II IMPROVEMENT PLANS CITY OF OTHELLO, WASHINGTON

PROJECT OVERVIEW

SHEET #	C1.0
PROJECT #	2019-039
DATE	8/5/19



EROSION AND SEDIMENTATION CONTROL STANDARD PLAN NOTES

THE FOLLOWING TESC STANDARD PLAN NOTES ORIGINATE FROM THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON. THESE NOTES ARE AN OVERALL SET; USE ONLY WHAT APPLIES TO THE GIVEN PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAILY SITE INSPECTIONS AND FOR IMPLEMENTING ADDITIONAL BEST MANAGEMENT PRACTICES WHEN NECESSARY TO STABILIZE THE SITE DURING THE CONSTRUCTION PROCESS.

1. THE CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS. SEE CONSTRUCTION SEQUENCE ON THIS SHEET.
2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED AND ARE MAINTAINED;
3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED;
4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION (CONTRACTOR TO BE RESPONSIBLE FOR FILING ALL NOTS REQUIRED FOR THIS PROJECT);
5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED;
6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA;
7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE;
8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION;
9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL;
10. INSPECT SEDIMENT CONTROL BMPs WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORMWATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE;
11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA;
12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM." IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FORTH IN THE CONSTRUCTION STORMWATER GENERAL PERMIT, STOCKPILED MATERIALS SHALL BE MANAGED FOR WEED CONTROL BY THE CONTRACTOR;
13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORMWATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE;
14. KEEP ROADS ADJACENT TO INLETS CLEAN;
15. INSPECT INLETS BI-WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS;
16. CONSTRUCT STORMWATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS;
17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS;
18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NONINERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS;
19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE;
20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORMWATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY;
21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPs TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPs. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE;
22. REMOVE TEMPORARY ESC BMPs WITHIN 60 DAYS AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

BEST MANAGEMENT PRACTICES & KEY NOTES

AT A MINIMUM THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPs) SHALL BE IMPLEMENTED ON THIS PROJECT BY THE CONTRACTOR TO PROTECT AND OR PREVENT EROSION AND SEDIMENTATION. ADDITIONAL BMPs SHALL BE IMPLEMENTED BY THE CONTRACTOR AS NEEDED TO STABILIZE SPECIFIC OR EMERGENCY EROSION CONTROL SITUATIONS. THE CONTRACTOR SHALL REFER TO CHAPTER 7 - CONSTRUCTION STORMWATER POLLUTION PREVENTION, STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (SEPTEMBER 2004) FOR INSTALLATION REQUIREMENTS AND DETAILS, AS WELL AS BMP MANAGEMENT REQUIREMENTS.

- (A) BMP C105: STABILIZED CONSTRUCTION ENTRANCE** - THE CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION ENTRANCES OFF OF N. 7TH AVE. AND N. 14TH AVE. AS SHOWN. THE ENTRANCE SHALL BE RELOCATED AS NEEDED TO COMPLETE THE PROPOSED IMPROVEMENTS AND RETAIN CONSTRUCTION DEBRIS WITHIN THE PROJECT SITE.
- BMP C120: TEMPORARY AND PERMANENT SEEDING** - THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY SEEDING (WITH MULCH IF NEEDED), AND THE DEVELOPER WILL BE RESPONSIBLE FOR ALL PERMANENT SEEDING AND LANDSCAPING.
- BMP C125: TOPSOILING** - THE CONTRACTOR SHALL TOPSOIL ALL FINAL GRADED SLOPES, AFTER NATIVE SLOPE MATERIALS ARE TRACKED FOR SEED BEDDING. 4" MINIMUM TOPSOIL REQUIRED. ONSITE FARMING TOPSOIL MAY BE USED IF SAVED BY THE CONTRACTOR.
- BMP C130: SURFACE ROUGHENING** - THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRACKING THE NATIVE MATERIAL AND TOPSOIL PRIOR TO SEED PLACEMENT TO PROVIDE A SEED BED. (NOT SWALE BOTTOMS)
- BMP C140: DUST CONTROL** - CONTRACTOR SHALL CONTROL ALL FUGITIVE DUST FROM PROJECT SITE WITH WATER OR CITY APPROVED METHOD.
- BMP C150: MATERIALS ON HAND** - THE CONTRACTOR LEAD SHALL VERIFY THAT A SUITABLE BACKUP SUPPLY OF EROSION AND SEDIMENT PROTECTION MATERIALS ARE ONSITE, OR READILY AVAILABLE IN THE EVENT THAT THE SITE REQUIRES IMMEDIATE ATTENTION PRIOR TO/AFTER A LARGE RAIN EVENT. THE ENGINEER SUGGESTS THAT THE CONTRACTOR KEEP BACK-UP STRAW BALES ONSITE AND USE AS NEEDED TO UNIVERSALLY STABILIZE ANY INTERMITTENT EROSION CONCERNS THAT ARISE DURING EXCAVATION EFFORTS.
- BMP C151: CONCRETE HANDLING** - THE CONTRACTOR LEAD SHALL BE RESPONSIBLE FOR IDENTIFYING THE CONCRETE WASHOUT LOCATION ONSITE. ALL WASHED OUT MATERIAL SHALL BE SECURED AND REMOVED FROM THE PROJECT SITE, AND DISPOSED OF AT AN APPROVED WASTE FACILITY. AFTER EACH CONCRETE POUR, THE LEAD SHALL VERIFY THAT ALL CONCRETE IS WASHED OUT IN THE DESIGNATED LOCATION, AND THAT NO FUGITIVE DEBRIS IS TRACKED OR DROPPED OUTSIDE OF THE PROJECT LIMITS, AND THAT THERE IS NO DAMAGE TO ANY EXISTING IMPROVEMENTS.
- (B) BMP C152: SAWCUTTING AND SURFACE POLLUTION PREVENTION** - ADDITIONAL MEASURES SHALL BE IMPLEMENTED NEAR THE SAW CUT AREAS TO INSURE THAT THE FINE PARTICLES AND DUST GENERATED BY THIS ACTION ARE COLLECTED AND DISPOSED OF ACCORDINGLY, AND THAT SAID DEBRIS IS NOT LEFT ON THE SURFACE TO CREATE A SLURRY THAT CAN MIGRATE TO THE STORMWATER COLLECTION SYSTEM.
- BMP C160: CONTRACTOR EROSION AND SPILL CONTROL LEAD** - THE CONTRACTOR HAS DESIGNATED:
- NAME: _____ TEL: _____
- AS THE PROJECT LEAD, THIS PERSON SHALL BE RESPONSIBLE FOR ALL BMP MANAGEMENT AND REPAIRS, AS WELL AS ALL NOT FILING AND SWPPP DOCUMENT PREPARATION AND MANAGEMENT.
- (C) BMP C207: CHECK DAMS** - THE CONTRACTOR SHALL INSTALL RIPRAP/ROCK CHECK DAMS IN THE INTERCEPTOR SWALE AS NEEDED TO AVOID THE EROSION OF THE SOILS. THE LEAD SHALL INSPECT THESE DAMS BEFORE AND AFTER ALL MAJOR STORM EVENTS AND CLEAR THEM OF DEBRIS AS NEEDED. IT IS RECOMMENDED THAT THE DAMS ARE INSTALLED PER CHAPTER 7 REQUIREMENTS.
- BMP C209: OUTLET PROTECTION** - THE CONTRACTOR SHALL PROTECT THE DOWNSTREAM SOILS AT THE CULVERT/PIPE OUTLETS. ALL EROSION CONCERNS SHALL BE REPAIRED BY THE CONTRACTOR.
- (D) BMP C220: STORM DRAIN INLET PROTECTION** - THE CONTRACTOR SHALL PROTECT ALL EXISTING AND NEWLY INSTALLED MANHOLES, CATCH BASINS, DRYWELLS, VALVE BOXES ETC.
- BMP C230: STRAW BALE BARRIER** - THE CONTRACTOR SHALL INSTALL STRAW BALES AS NEEDED ON THE UP-STREAM SIDE OF ANY STORMWATER COLLECTION STRUCTURES/UTILITY VAULTS/SUBSURFACE ACCESS VAULTS TO TEMPORARILY DIVERT CONTAMINATED STORMWATER TO THE DESIGNATED LOCATION.
- (E) BMP C233: SILT FENCE** - THE CONTRACTOR SHALL INSTALL THE FENCING AS NEEDED TO CONTROL SEDIMENTATION. THE FENCE SHOWN IS CONSIDERED THE MINIMUM, AND SHOULD BE VERIFIED BY THE CONTRACTOR PRIOR TO INSTALLATION. THE FENCE SHALL BE CLEARED OF ANY DEBRIS AS NEEDED TO KEEP THE FENCE FUNCTIONING PROPERLY.

THE CONTRACTOR LEAD SHALL BE RESPONSIBLE FOR MAINTAINING BMPs ON A DAILY BASIS, INCLUDING DAILY DOCUMENTATION OF BMP INSPECTIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING THE TEMPORARY ESC BMPs WITHIN 30-DAYS OF TESC PLAN ENGINEER NOTICE.

THE CONTRACTOR LEAD SHALL HAVE A COPY OF ALL PERTINENT BMP DETAILS/SPECIFICATIONS ONSITE DURING CONSTRUCTION AT ALL TIMES FOR REFERENCE.

THE CONTRACTOR AND THE LEAD SHALL COORDINATE WITH THE TESC ENGINEER OF RECORD AS NEEDED FOR GUIDANCE ON THIS PROJECT.

CONSTRUCTION SEQUENCE

THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE IMPLEMENTED AS A PART OF THIS PROJECT:

- A. CLEAR AND GRUB AS NEEDED TO INSTALL TEMPORARY ESC BMPs;
 - B. INSTALL TEMPORARY ESC BMPs;
 - C. CLEAR, GRUB, AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
 - D. STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
 - E. CLEAR, GRUB AND GRADE FOR PROPOSED COMBINED SEWER IMPROVEMENTS;
 - F. TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPs, THE PROJECT SITE WHERE SUBSTANTIAL CUT OR FILL SLOPES EXIST AS A RESULT OF NECESSARY SITE GRADING;
 - G. CONSTRUCT COMBINED SEWER IMPROVEMENTS AND ROAD IMPROVEMENTS;
 - H. PROTECT ALL EXISTING AND RECENTLY INSTALLED PERMANENT STORMWATER FACILITIES UTILIZING THE APPROPRIATE BMPs;
 - I. INSTALL PERMANENT ESC CONTROLs, WHEN APPLICABLE, PER THE CITY APPROVED CONSTRUCTION PLAN SET;
 - J. REMOVE THE TEMPORARY ESC CONTROLS WHEN THE THE TEMPORARY ESC ENGINEER AGREES WITH THE FOLLOWING:
 - PERMANENT ESC CONTROLS ARE COMPLETELY INSTALLED;
 - ALL LAND DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED; AND,
 - VEGETATION, WHERE REQUIRED, HAS BEEN ESTABLISHED IN THE AREAS NOTED ON THE APPROVED CONSTRUCTION PLAN SET.
- THE CONTRACTOR SHALL CONTACT THE TESC ENGINEER FOR AN INSPECTION WHEN THE ABOVE CRITERIA HAS BEEN MET.

TEMPORARY EROSION CONTROL SUMMARY

THE PURPOSE OF THIS PLAN SHALL BE TO IDENTIFY THE TEMPORARY EROSION AND SEDIMENT CONTROL (T.E.S.C.) FEATURE REQUIREMENTS TO CONSTRUCT THE PROPOSED IMPROVEMENTS NECESSARY FOR PHASE II OF THIS PROPOSED RESIDENTIAL DEVELOPMENT IN THE CITY OF OTHELLO. THIS PLAN IS SUPPORTED BY THE CONSTRUCTION STORMWATER POLLUTION PREVENTION REQUIREMENTS NOTED IN CHAPTER 7 OF THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (SEPTEMBER 2004 ED.).

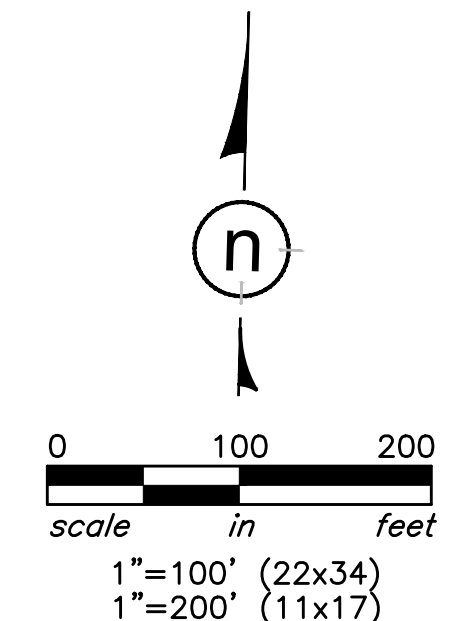
FURTHER, THE CONTRACTOR SHALL SECURE THE SITE DURING CONSTRUCTION SHOULD ADDITIONAL ISSUES ARISE THAT ARE NOT IDENTIFIED IN THIS PLAN.

EXISTING SITE CONDITIONS

THE SOUTH SIDE OF THE OLYMPIA STREET IMPROVEMENTS ARE COMPLETE, WITH CURB AND SIDEWALK IN PLACE. THE ASPHALTS SURFACE WILL BE REPLACED BY THE CITY. AN EXISTING CONCRETE STORMWATER CONVEYANCE BOX CULVERT IS LOCATED BELOW 7TH AVENUE COLLECTING THE STORMWATER FROM THE ADJACENT FARMERS FIELD. THE PROPOSED RESIDENTIAL DEVELOPMENT LAND IS CURRENTLY VACANT FARM LAND. UTILITIES EXIST THROUGHOUT THE PROJECT SITE. THE CONTRACTOR WILL VERIFY THE LOCATION AND RELOCATION REQUIREMENTS WITH THE UTILITY PROVIDERS.

SOIL INFORMATION

THE USDA/NRCS SOIL RESOURCE REPORT IDENTIFIES THIS AREA AS BEING COMPRISED PRIMARILY OF "NEPPEL VERY FINE SANDY LOAM". ALL SITE SOILS ARE FURTHER DESCRIBED AS WELL DRAINED.



CONTACT INFORMATION

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TEL: 208.964.0481

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ANGEL GARZA
PO BOX 464
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TEL: 509.989.0555

REVIEWING AGENCY: CITY OF OTHELLO
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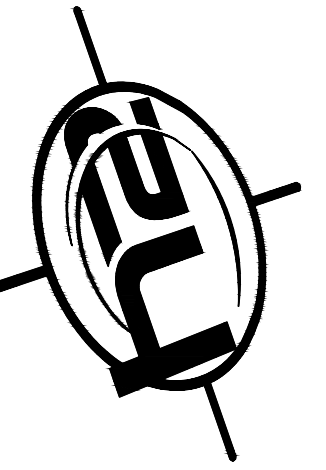
CONTROL

TBM #1: FOUND 5/8" REBAR WITH CAP
MARKED 'CNW ENG PLS 46321'
N: 58866.11
E: 45626.25
EL: 1110.55

TBM #2: FOUND 5/8" REBAR WITH CAP
MARKED 'CNW ENG PLS 46321'
N: 58930.92
E: 48207.79
EL: 1117.92

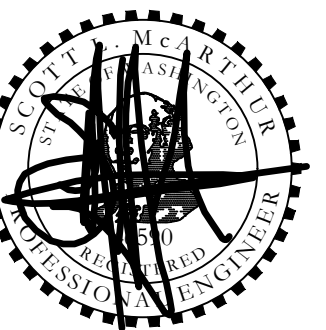
DATUM

HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO



SURVEYORS • ENGINEERS
7600 N. Mineral Dr., Ste. 900
Coeur d'Alene, Idaho 83815
Phone: (208) 772-6600
Fax: (208) 772-6619
www.h2survey.com

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8/30/19

REVISIONS

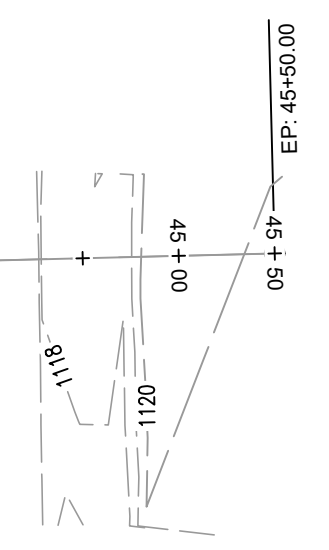
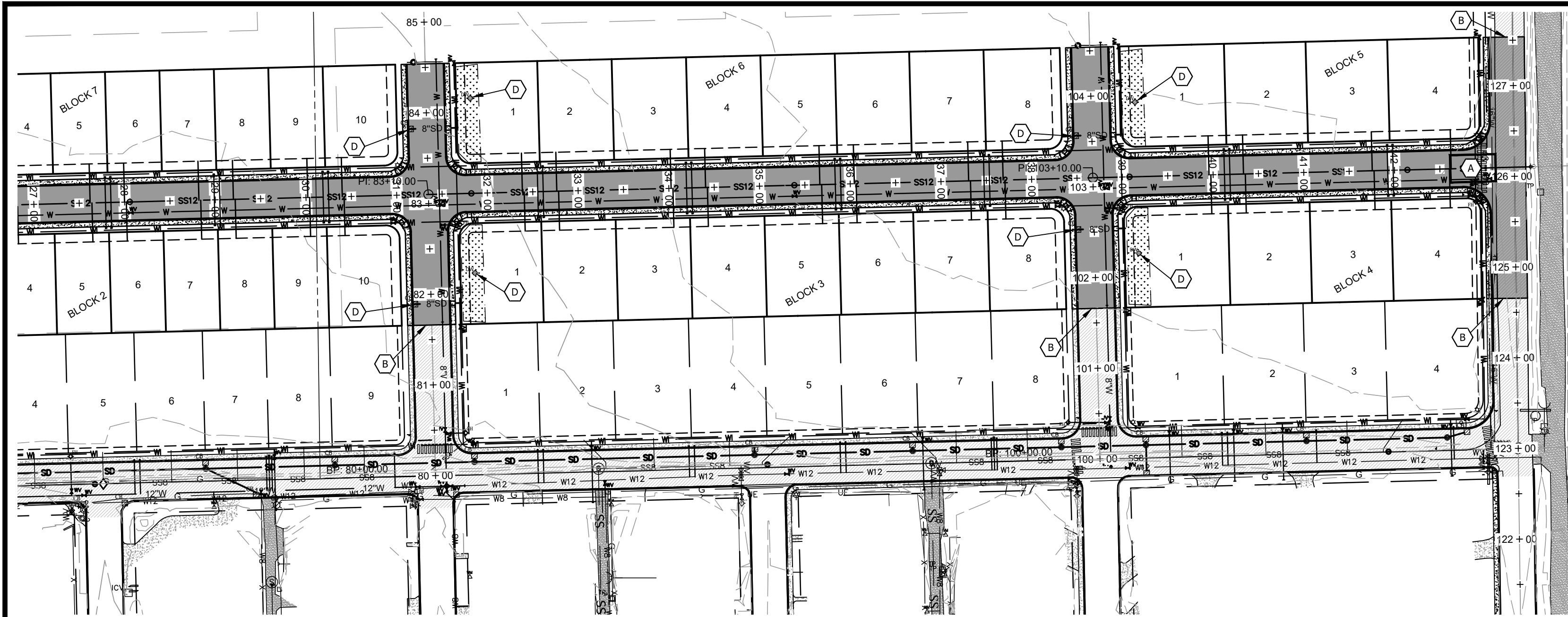
SAND HILL ESTATES II
IMPROVEMENT PLANS
CITY OF OTHELLO, WASHINGTON

T.E.S.C.
PLAN

SHEET #	C2.0
PROJECT #	2019-039
DATE	8/5/19



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EROSION AND SEDIMENTATION CONTROL STANDARD PLAN NOTES

THE FOLLOWING TESC STANDARD PLAN NOTES ORIGINATE FROM THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON. THESE NOTES ARE AN OVERALL SET. USE ONLY WHAT APPLIES TO THE GIVEN PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAILY SITE INSPECTIONS AND FOR IMPLEMENTING ADDITIONAL BEST MANAGEMENT PRACTICES WHEN NECESSARY TO STABILIZE THE SITE DURING THE CONSTRUCTION PROCESS.

1. THE CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS. SEE CONSTRUCTION SEQUENCE ON THIS SHEET.
2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED AND ARE MAINTAINED.
3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED.
4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION (CONTRACTOR TO BE RESPONSIBLE FOR FILING ALL NOTS REQUIRED FOR THIS PROJECT).
5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.
6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH TRIBUTARY SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.
8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.
9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.
10. INSPECT SEDIMENT CONTROL BMPs WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORMWATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.
11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.
12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM." IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FORTH IN THE CONSTRUCTION STORMWATER GENERAL PERMIT, STOCKPILED MATERIALS SHALL BE MANAGED FOR WEED CONTROL BY THE CONTRACTOR.
13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORMWATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.
14. KEEP ROADS ADJACENT TO INLETS CLEAN.
15. INSPECT INLETS BI-WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.
16. CONSTRUCT STORMWATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.
17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.
18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NONINERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.
19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.
20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORMWATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.
21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPs TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPs. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.
22. REMOVE TEMPORARY ESC BMPs WITHIN 60 DAYS AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

BEST MANAGEMENT PRACTICES & KEY NOTES

AT A MINIMUM THE FOLLOWING BEST MANAGEMENT PRACTICES (BMPs) SHALL BE IMPLEMENTED ON THIS PROJECT BY THE CONTRACTOR TO PROTECT AND OR PREVENT EROSION AND SEDIMENTATION. ADDITIONAL BMPs SHALL BE IMPLEMENTED BY THE CONTRACTOR AS NEEDED TO STABILIZE SPECIFIC OR EMERGENCY EROSION CONTROL SITUATIONS. THE CONTRACTOR SHALL REFER TO CHAPTER 7 - CONSTRUCTION STORMWATER POLLUTION PREVENTION, STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (SEPTEMBER 2004) FOR INSTALLATION REQUIREMENTS AND DETAILS, AS WELL AS BMP MANAGEMENT REQUIREMENTS.

- (A) **BMP C105: STABILIZED CONSTRUCTION ENTRANCE** - THE CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION ENTRANCES OFF OF N. 7TH AVE. AND N. 14TH AVE. AS SHOWN. THE ENTRANCE SHALL BE RELOCATED AS NEEDED TO COMPLETE THE PROPOSED IMPROVEMENTS AND RETAIN CONSTRUCTION DEBRIS WITHIN THE PROJECT SITE.
- (B) **BMP C120: TEMPORARY AND PERMANENT SEEDING** - THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY SEEDING (WITH MULCH IF NEEDED), AND THE DEVELOPER WILL BE RESPONSIBLE FOR ALL PERMANENT SEEDING AND LANDSCAPING.
- (C) **BMP C125: TOPSOILING** - THE CONTRACTOR SHALL TOPSOIL ALL FINAL GRADED SLOPES, AFTER NATIVE SLOPE MATERIALS ARE TRACKED FOR SEED BEDDING. 4" MINIMUM TOPSOIL REQUIRED. ONSITE FARMING TOPSOIL MAY BE USED IF SAVED BY THE CONTRACTOR.
- (D) **BMP C130: SURFACE ROUGHENING** - THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRACKING THE NATIVE MATERIAL AND TOPSOIL PRIOR TO SEED PLACEMENT TO PROVIDE A SEED BED. (NOT SWALE BOTTOMS)
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- (G) **BMP C151: CONCRETE HANDLING** - THE CONTRACTOR LEAD SHALL BE RESPONSIBLE FOR IDENTIFYING THE CONCRETE WASHOUT LOCATION ONSITE. ALL WASHED OUT MATERIAL SHALL BE SECURED AND REMOVED FROM THE PROJECT SITE, AND DISPOSED OF AT AN APPROVED WASTE FACILITY. AFTER EACH CONCRETE POUR, THE LEAD SHALL VERIFY THAT ALL CONCRETE IS WASHED OUT IN THE DESIGNATED LOCATION, AND THAT NO FUGITIVE DEBRIS IS TRACKED OR DROPPED OUTSIDE OF THE PROJECT LIMITS, AND THAT THERE IS NO DAMAGE TO ANY EXISTING IMPROVEMENTS.
- (H) **BMP C152: SAWCUTTING AND SURFACE POLLUTION PREVENTION** - ADDITIONAL MEASURES SHALL BE IMPLEMENTED NEAR THE SAW CUT AREAS TO INSURE THAT THE FINE PARTICLES AND DUST GENERATED BY THIS ACTION ARE COLLECTED AND DISPOSED OF ACCORDINGLY, AND THAT SAID DEBRIS IS NOT LEFT ON THE SURFACE TO CREATE A SLURRY THAT CAN MIGRATE TO THE STORMWATER COLLECTION SYSTEM.
- (I) **BMP C160: CONTRACTOR EROSION AND SPILL CONTROL LEAD** - THE CONTRACTOR HAS DESIGNATED:
NAME: _____ TEL: _____
AS THE PROJECT LEAD, THIS PERSON SHALL BE RESPONSIBLE FOR ALL BMP MANAGEMENT AND REPAIRS, AS WELL AS ALL NOI FILING AND SWPPP DOCUMENT PREPARATION AND MANAGEMENT.
- (J) **BMP C207: CHECK DAMS** - THE CONTRACTOR SHALL INSTALL RIPRAP/ROCK CHECK DAMS IN THE INTERCEPTOR SWALE AS NEEDED TO AVOID THE EROSION OF THE SOILS. THE LEAD SHALL INSPECT THESE DAMS BEFORE AND AFTER ALL MAJOR STORM EVENTS AND CLEAR THEM OF DEBRIS AS NEEDED. IT IS RECOMMENDED THAT THE DAMS ARE INSTALLED PER CHAPTER 7 REQUIREMENTS.
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CONSTRUCTION SEQUENCE

THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE IMPLEMENTED AS A PART OF THIS PROJECT:

- A. CLEAR AND GRUB AS NEEDED TO INSTALL TEMPORARY ESC BMPs;
- B. INSTALL TEMPORARY ESC BMPs;
- C. CLEAR, GRUB, AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
- D. STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
- E. CLEAR, GRUB AND GRADE FOR PROPOSED COMBINED SEWER IMPROVEMENTS;
- F. TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPs, THE PROJECT SITE WHERE SUBSTANTIAL CUT OR FILL SLOPES EXIST AS A RESULT OF NECESSARY SITE GRADING;
- G. CONSTRUCT COMBINED SEWER IMPROVEMENTS AND ROAD IMPROVEMENTS;
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- I. INSTALL PERMANENT ESC CONTROLS, WHEN APPLICABLE, PER THE CITY APPROVED CONSTRUCTION PLAN SET;
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- VEGETATION, WHERE REQUIRED, HAS BEEN ESTABLISHED IN THE AREAS NOTED ON THE APPROVED CONSTRUCTION PLAN SET.
THE CONTRACTOR SHALL CONTACT THE TESC ENGINEER FOR AN INSPECTION WHEN THE ABOVE CRITERIA HAS BEEN MET.

TEMPORARY EROSION CONTROL SUMMARY

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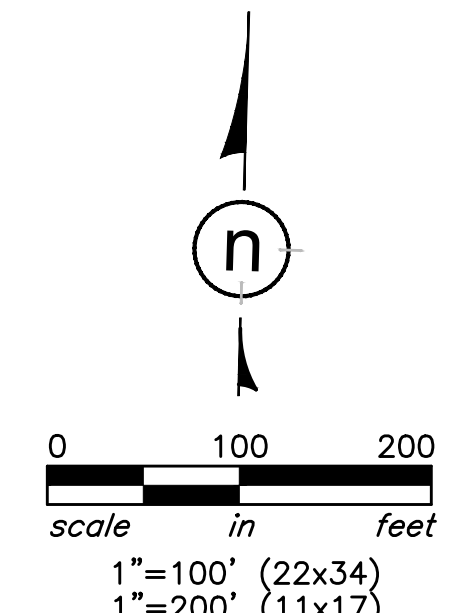
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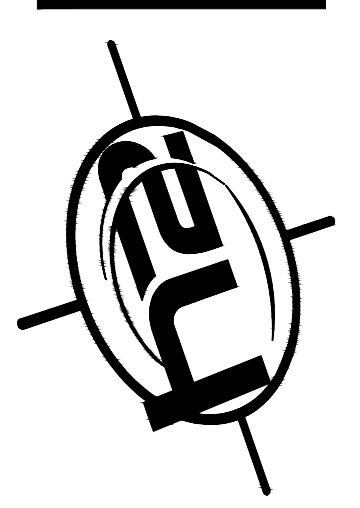
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N: 58930.92
E: 48207.79
EL: 1117.92

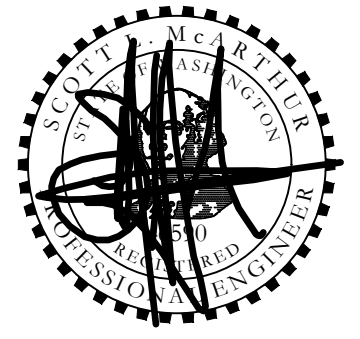
DATUM

HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO



SURVEYORS • ENGINEERS
7600 N. Mineral Dr., Ste. 900
Coeur d'Alene, Idaho 83815
Phone: (208) 772-6600
Fax: (208) 772-6619
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SURVEYED	h2
DESIGNED	h2
DRAWN	rmb
CHECKED	shm



8/30/19

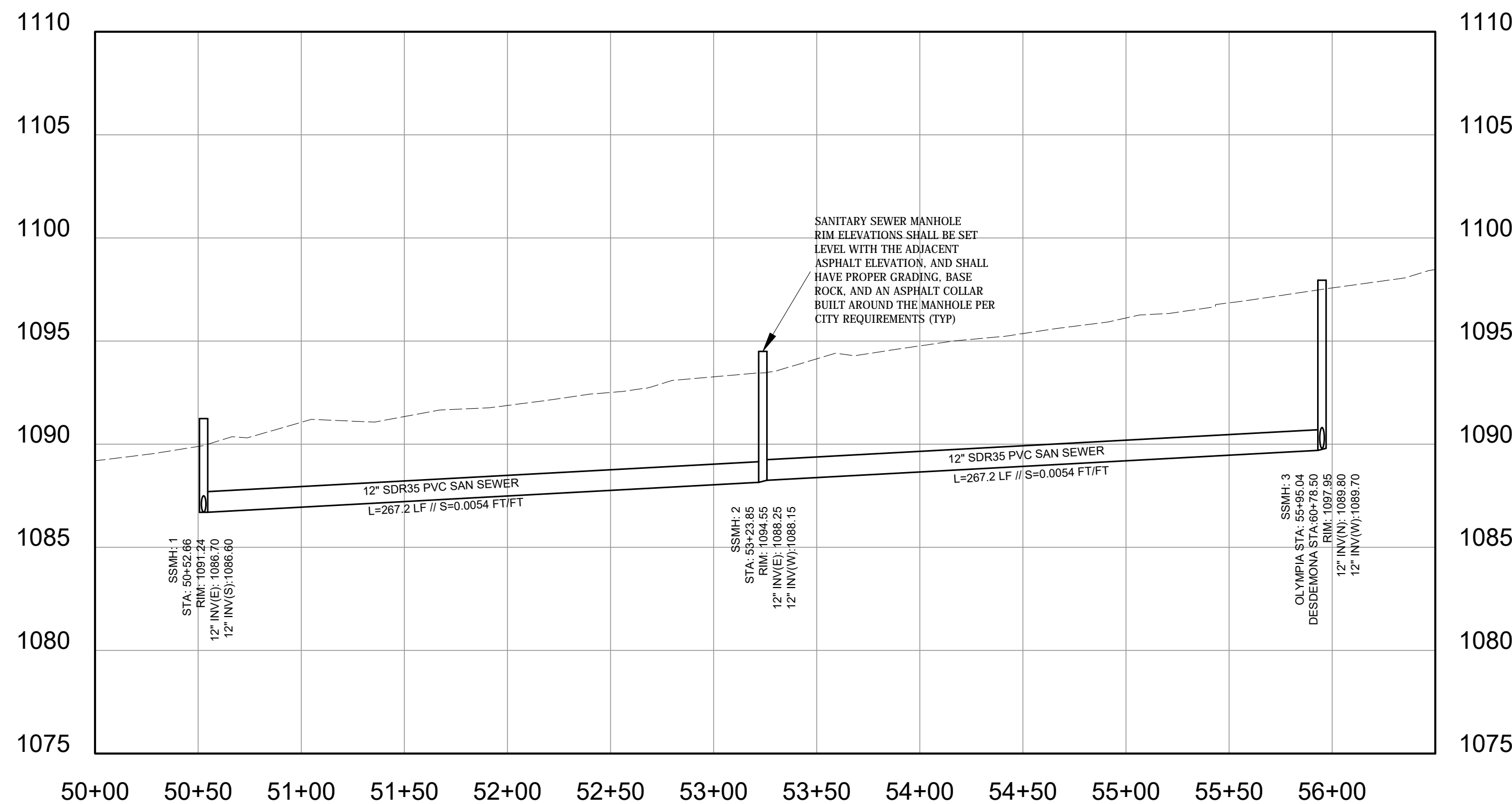
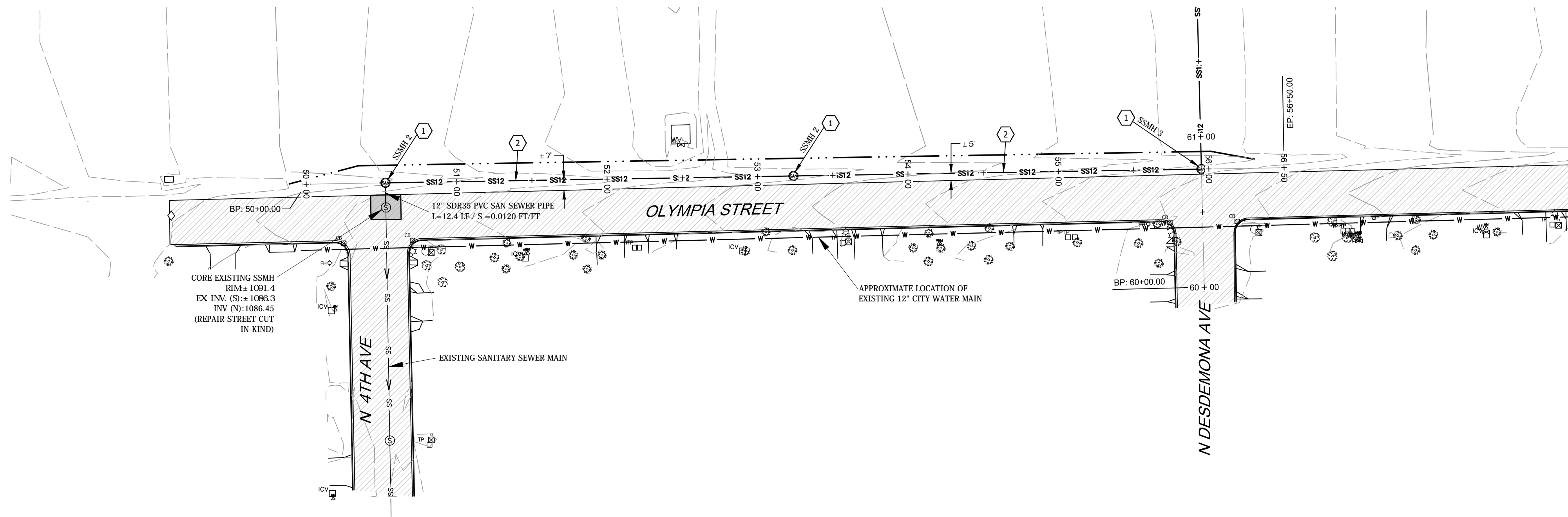
REVISIONS

SAND HILL ESTATES II
IMPROVEMENT PLANS
CITY OF OTHELLO, WASHINGTON

T.E.S.C.
PLAN

SHEET #	C2.0
PROJECT #	2019-039
DATE	8/5/19





OLYMPIA STREET PROFILE

STA: 50+00 - STA: 56+50
 h-SCALE = 1:50
 v-SCALE = 1:5

CONSTRUCTION NOTES

- 1 48" SANITARY SEWER MANHOLE PER CITY OF OHELLO STANDARD DETAIL SE1.
- 2 12" SDR35 PVC SANITARY SEWER MAIN PER CITY OF OHELLO STANDARD DETAIL SE5.
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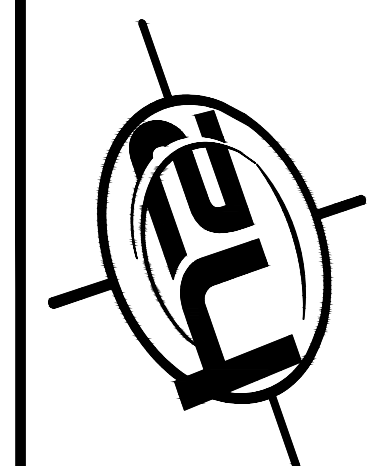
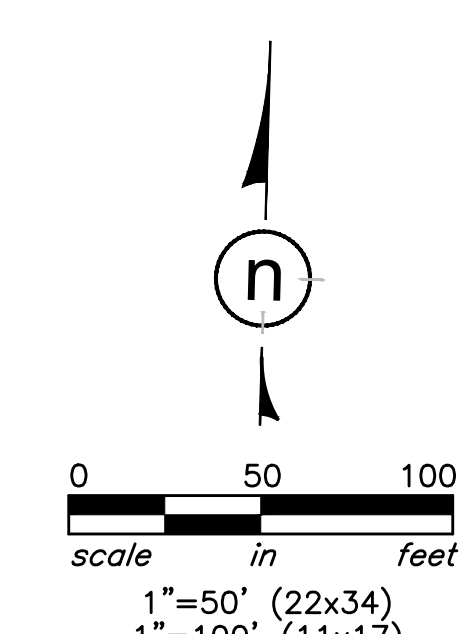
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 EL: 1110.55

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DATUM

HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OHELLO



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8/30/19

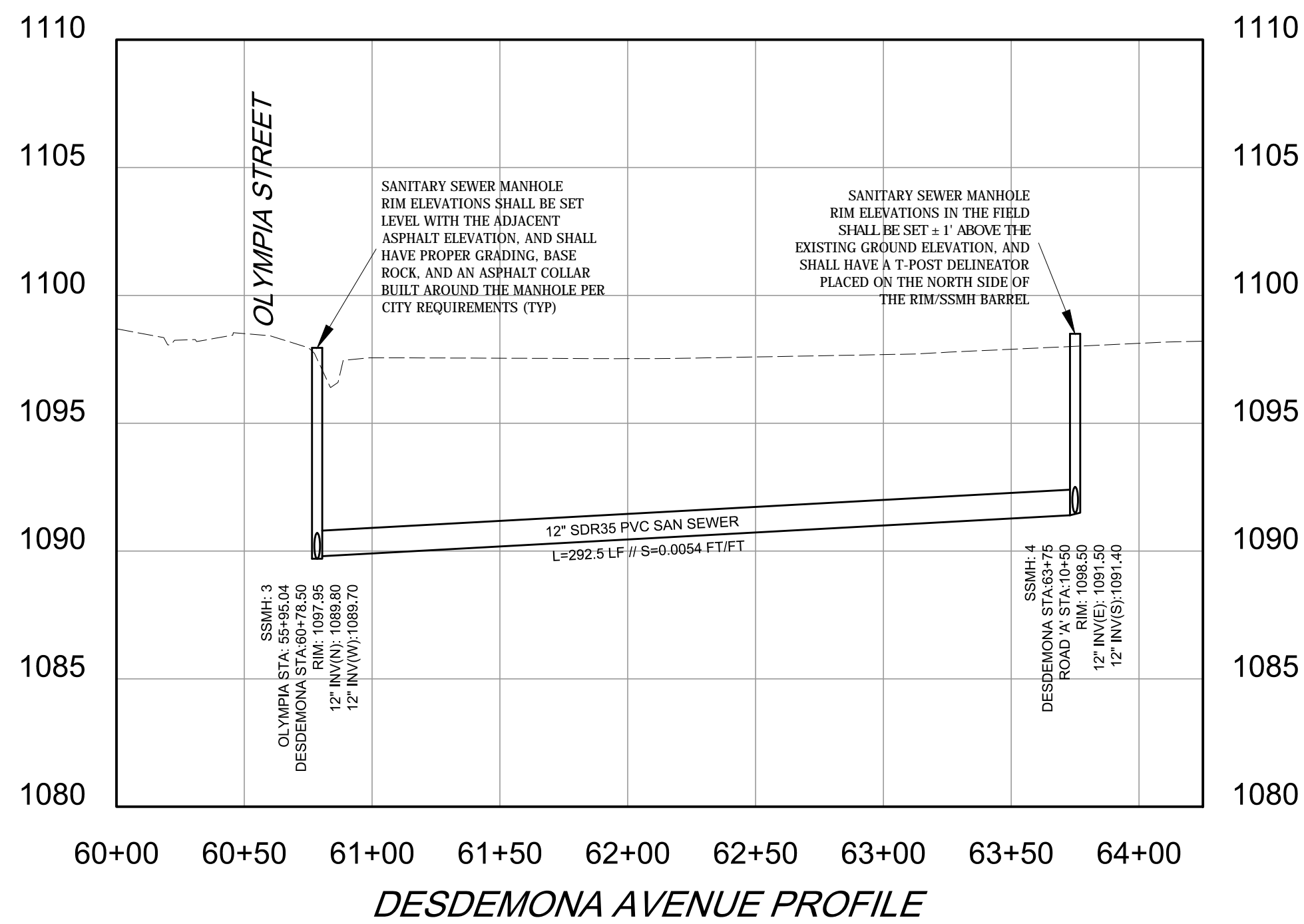
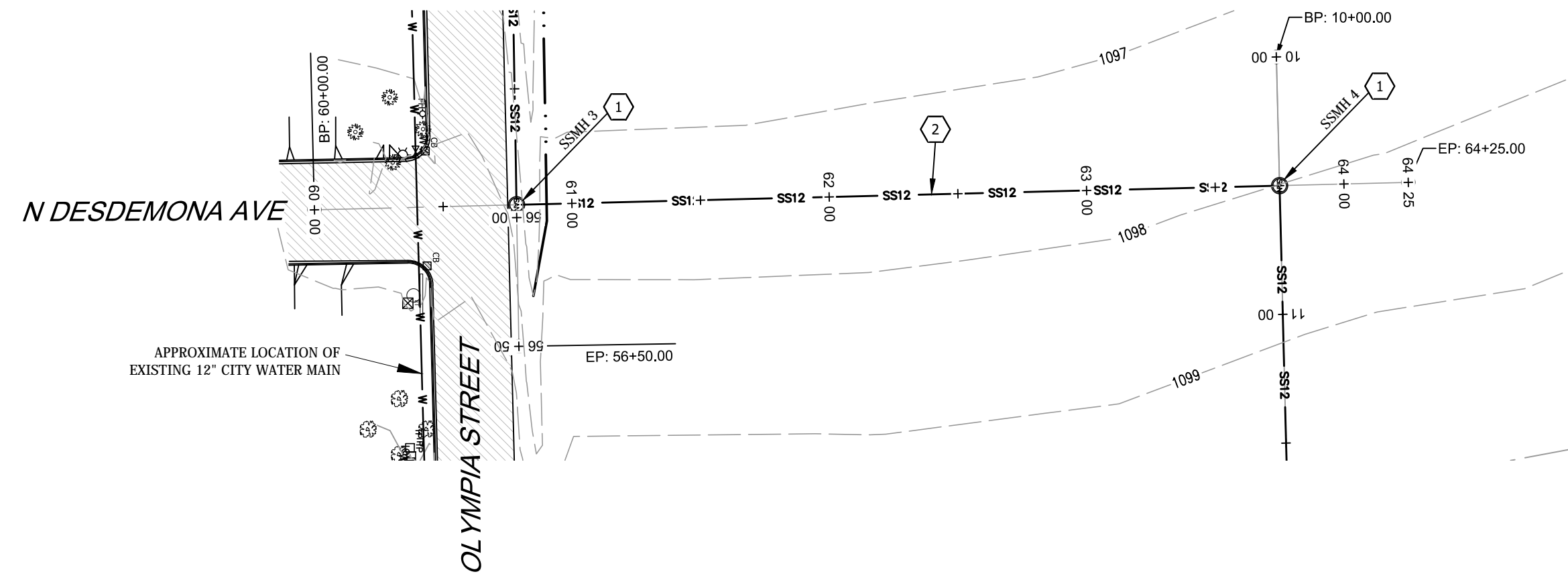
REVISIONS

SAND HILL ESTATES II
IMPROVEMENT PLANS
 CITY OF OHELLO, WASHINGTON

OLYMPIA STREET
 PLAN & PROFILE
 STA: 50+00 - 56+50

SHEET #	C3.0
PROJECT #	2019-039
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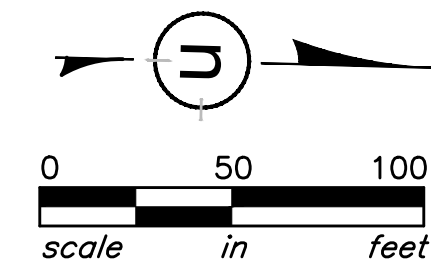
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CONTROL

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 N: 58866.11
 E: 45626.25
 EL: 1110.55

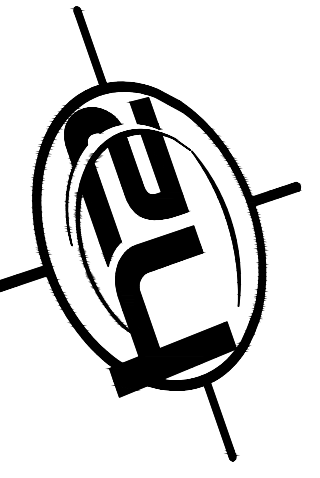
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DATUM

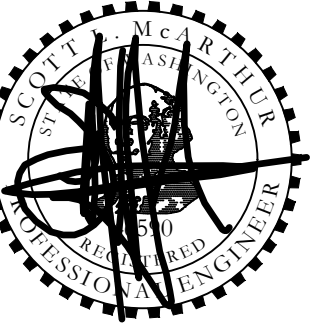
HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OTHELLO

1"=50' (22x34)
 1"=100' (11x17)



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DESIGNED	h2
DRAWN	rnh
CHECKED	shm



8/30/19

REVISIONS

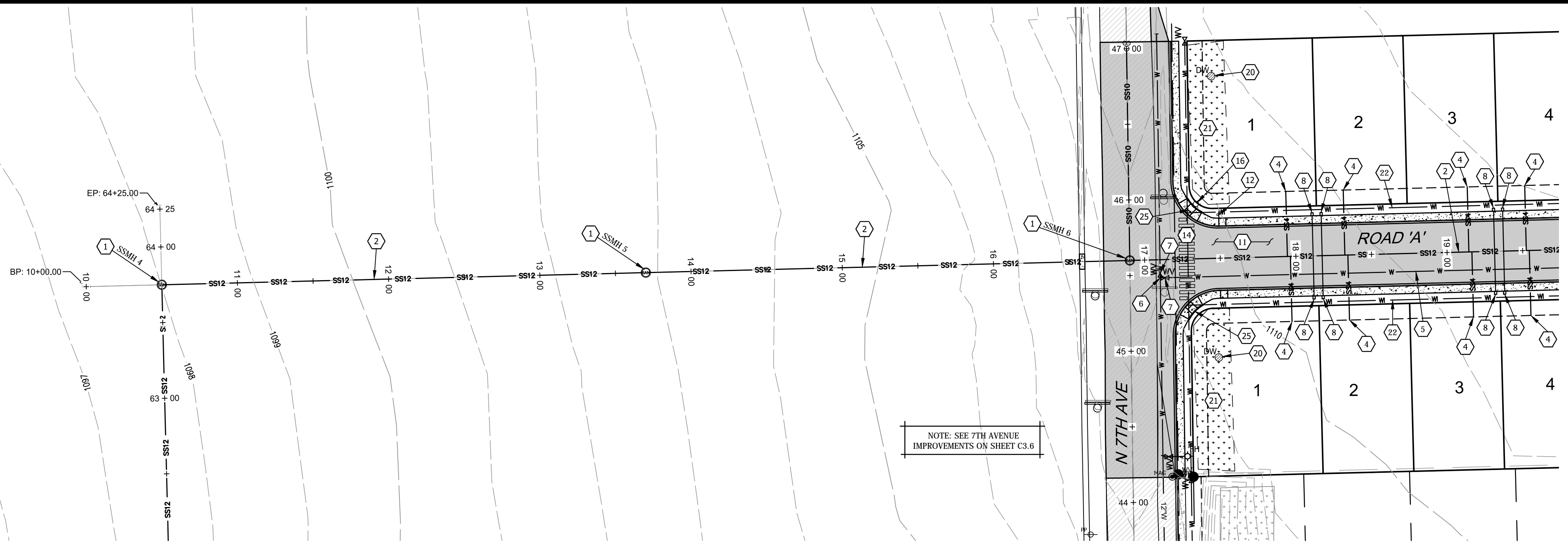
SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

DESDEMONA AVE
 PLAN & PROFILE
 STA:60+00 - 64+25

SHEET #	C3.1
PROJECT #	2019-039
DATE	8/5/19

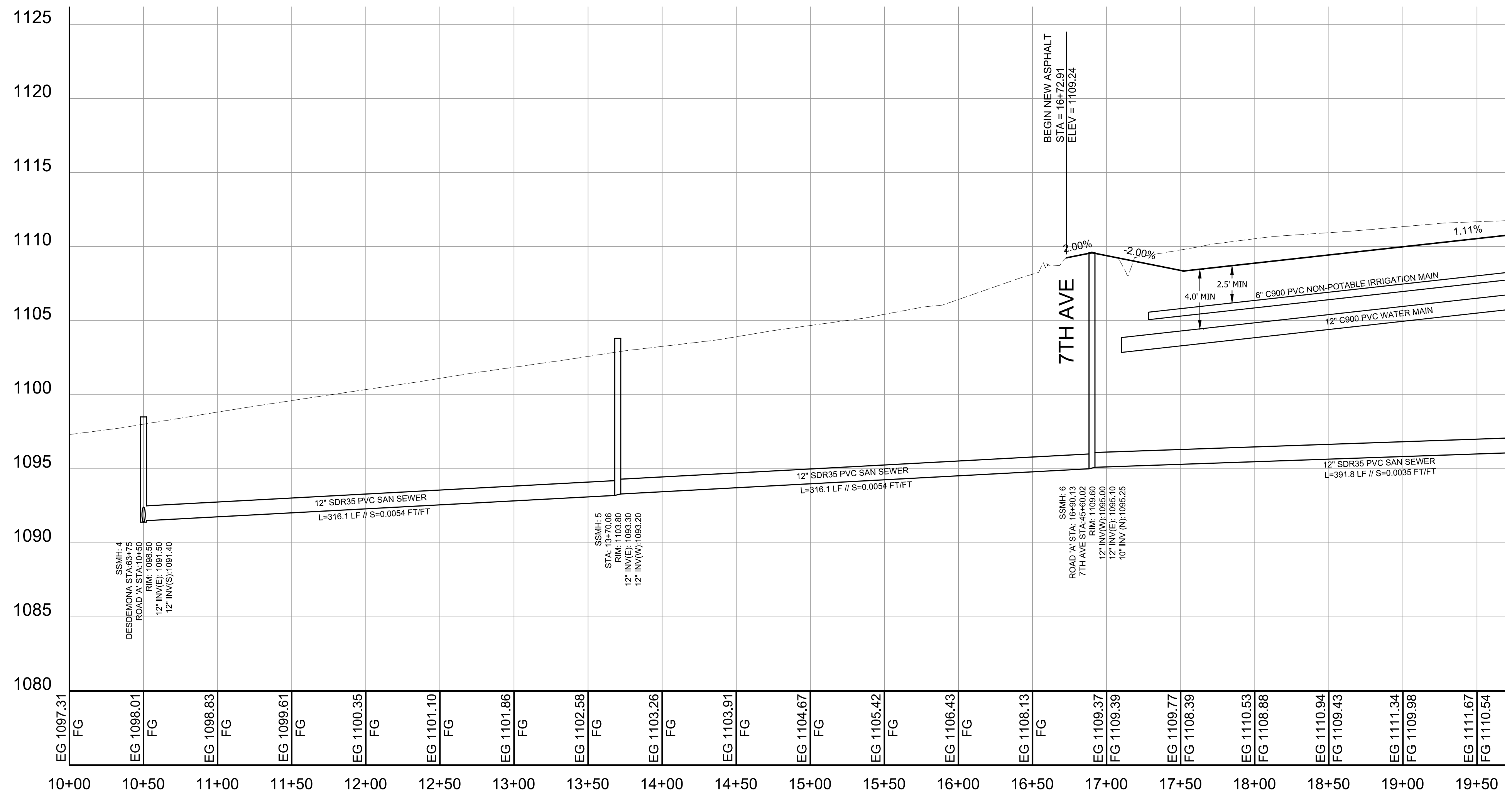


Know what's below.
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ROAD 'A' PROFILE
 STA: 10+00 - STA: 19+50
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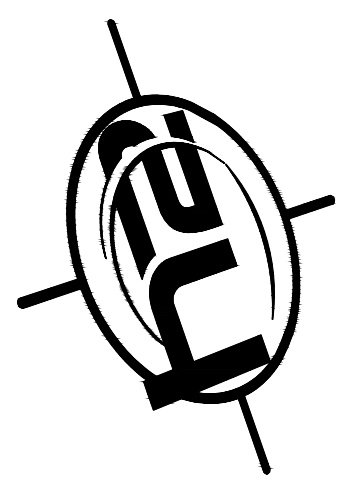
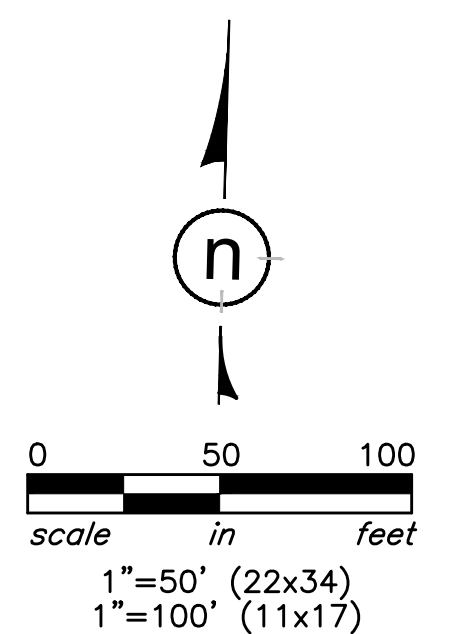
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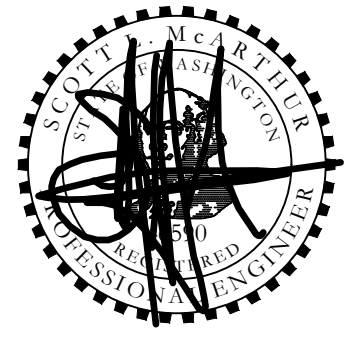
DATUM

HORIZONTAL DATUM: ASSUMED
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SURVEYED	h2	DESIGNED	h2	DRAWN	rnh	CHECKED	sh

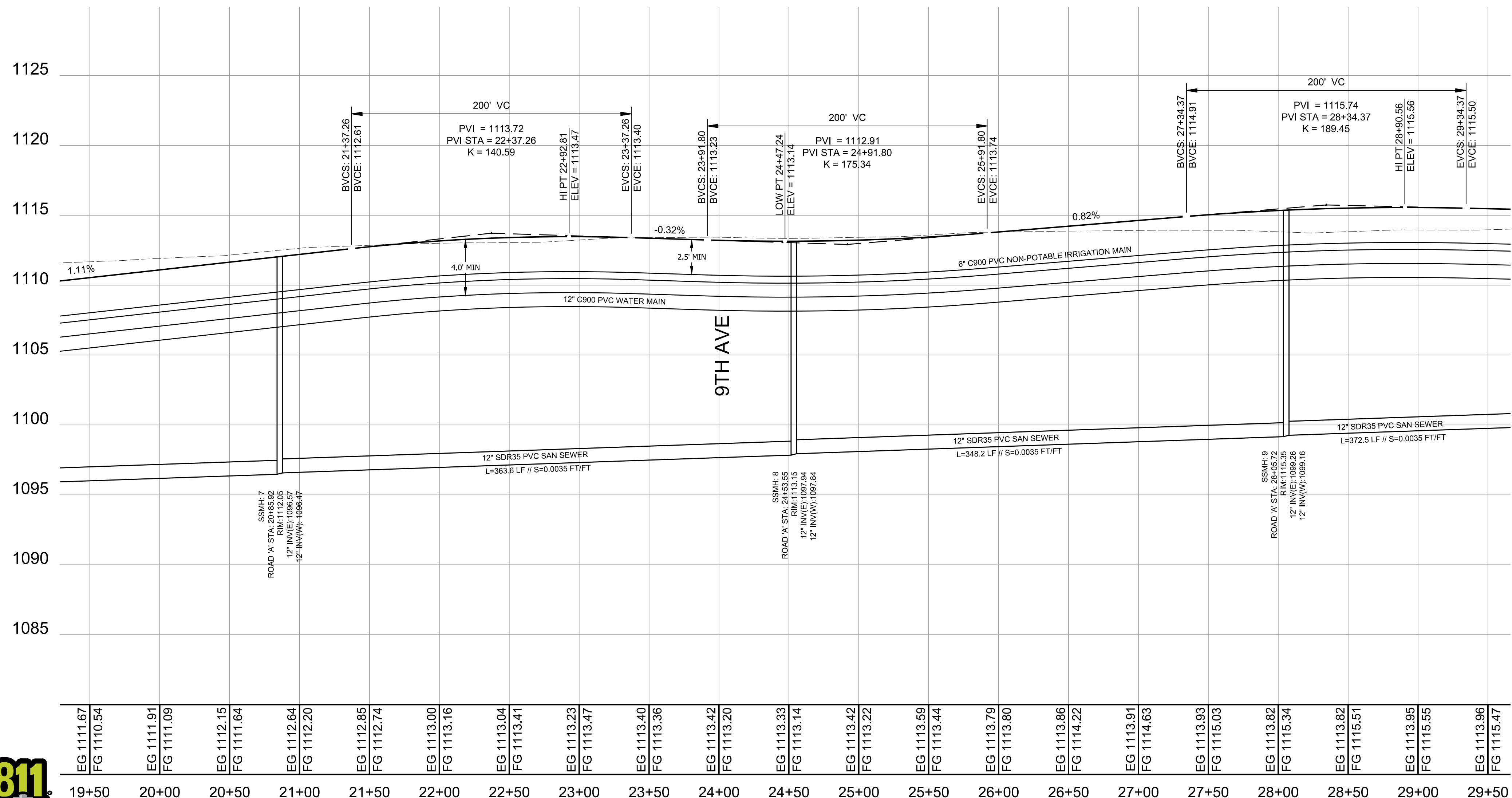
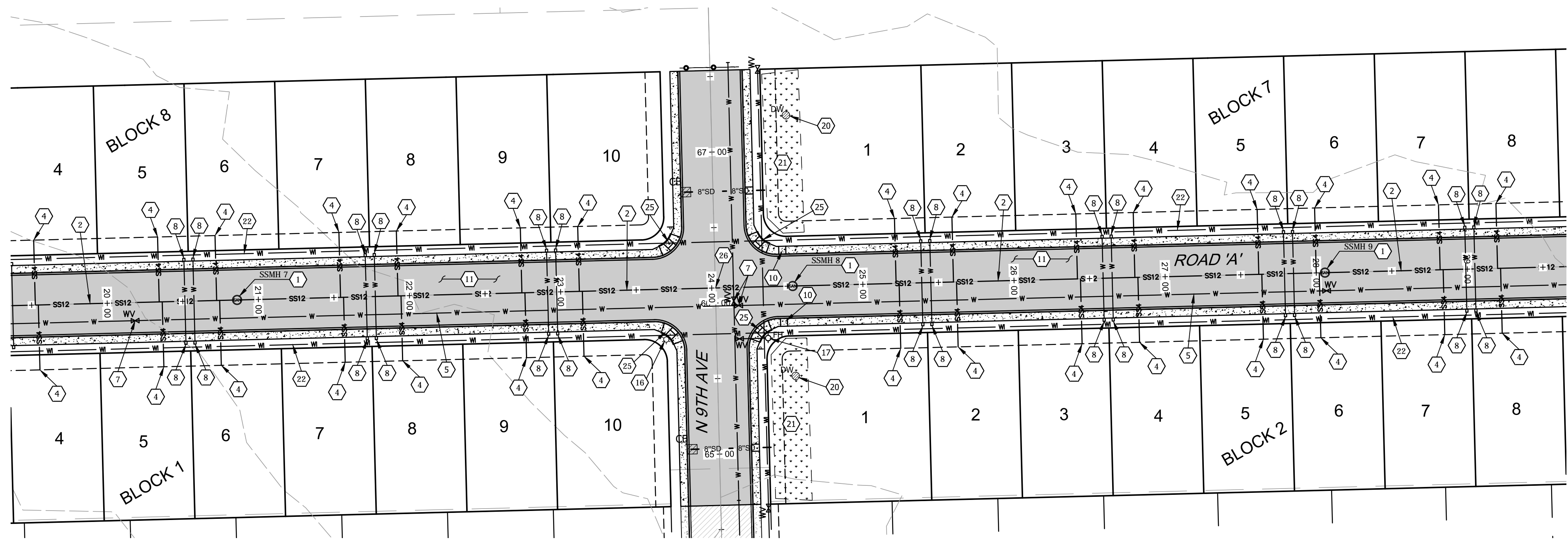


REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

ROAD 'A'
 PLAN & PROFILE
 STA: 10+00 - 19+50

SHEET #	C3.2
PROJECT #	2019-039
DATE	8/5/19



ROAD 'A' PROFILE

STA: 19+50 - STA: 29+50
 h-SCALE = 1:50
 v-SCALE = 1:5

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- 26 CENTERLINE MONUMENT PER CITY OF OTHELLO STANDARD DETAIL SE6.

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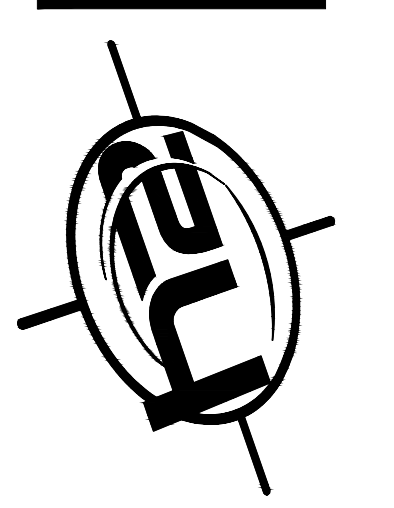
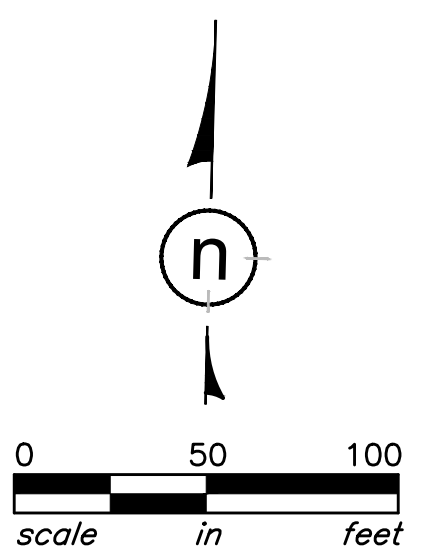
CONTROL

TBM #1: FOUND 5/8" REBAR WITH CAP
 MARKED 'CNW ENG PLS 46321'
 N: 58866.11
 E: 45626.25
 EL: 1110.55

TBM #2: FOUND 5/8" REBAR WITH CAP
 MARKED 'CNW ENG PLS 46321'
 N: 58930.92
 E: 48207.79
 EL: 1117.92

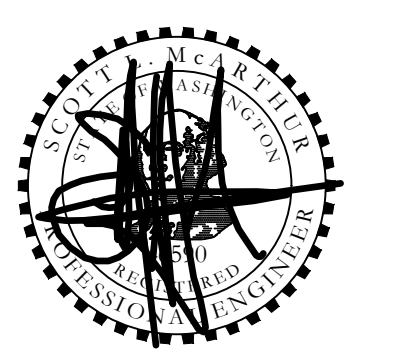
DATUM

HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OTHELLO



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SURVEYED	h2	DESIGNED	h2	DRAWN	rmb	CHECKED	sh



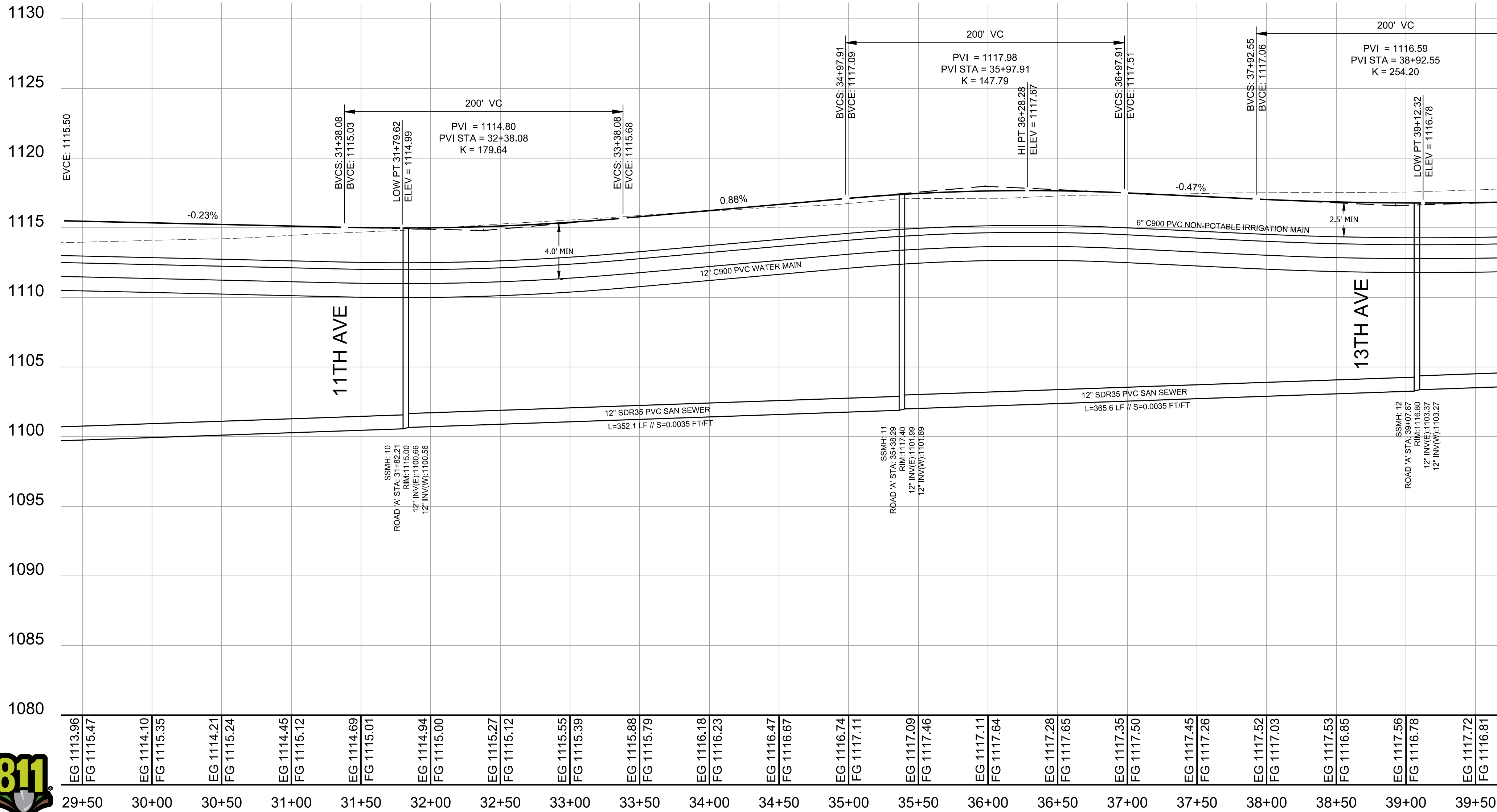
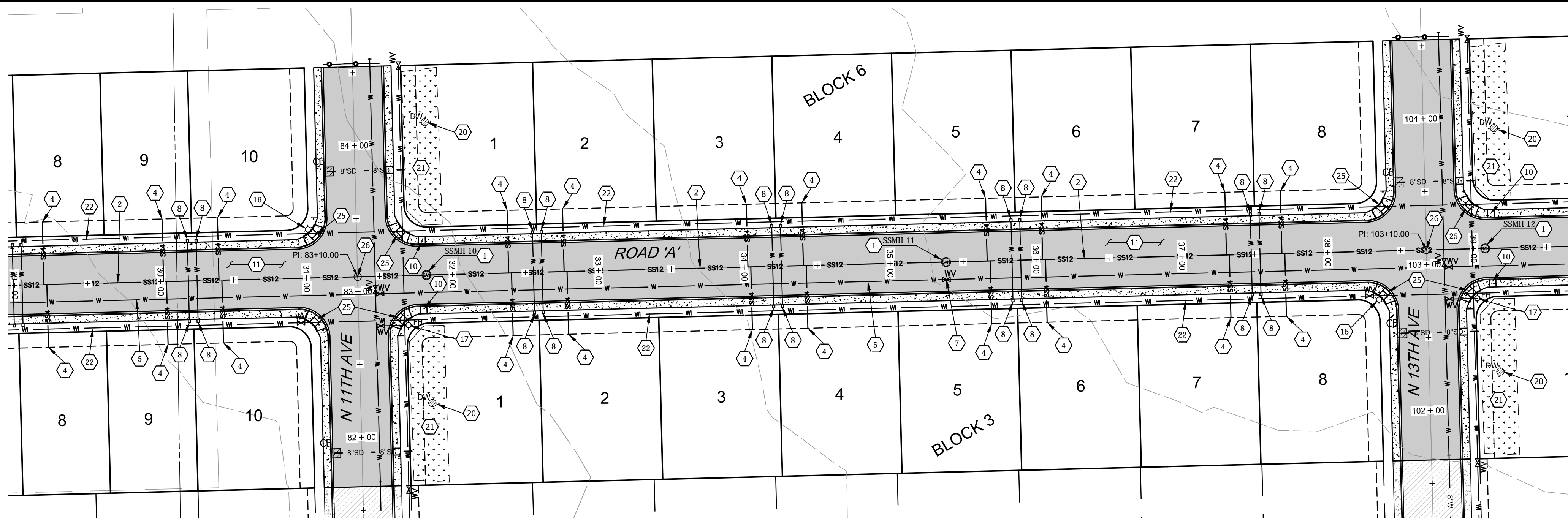
REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

ROAD 'A'
 PLAN & PROFILE
 STA:19+50 - 29+50

SHEET # C3.3
 PROJECT # 2019-039
 DATE 8/5/19





ROAD 'A' PROFILE
 STA: 29+50 = STA: 39+50
 H-SCALE = 1:50
 V-SCALE = 1:5

CONSTRUCTION NOTES

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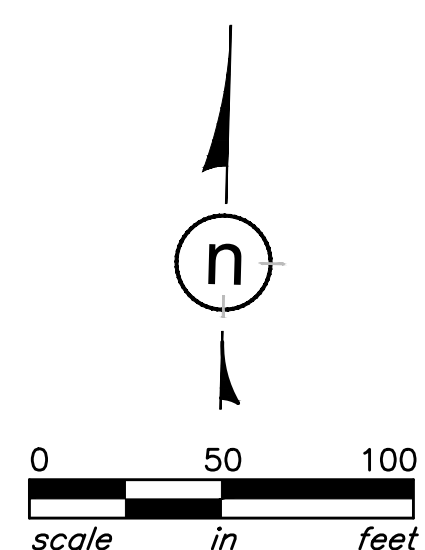
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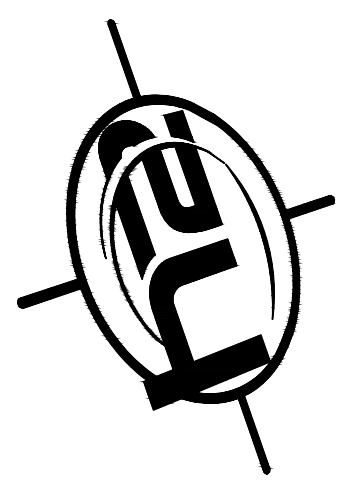
TBM #1: FOUND 5/8" REBAR WITH CAP
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 N: 58866.11
 E: 45626.25
 EL: 1110.55

TBM #2: FOUND 5/8" REBAR WITH CAP
 MARKED 'CNW ENG PLS 46321'
 N: 58930.92
 E: 48207.79
 EL: 1117.92



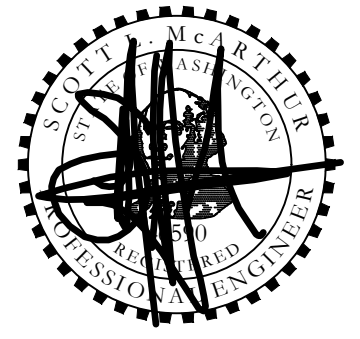
DATUM

HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OHELLO
 1"=50' (22x34)
 1"=100' (11x17)



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SURVEYED	h2	DESIGNED	h2	DRAWN	rnh	CHECKED	sh



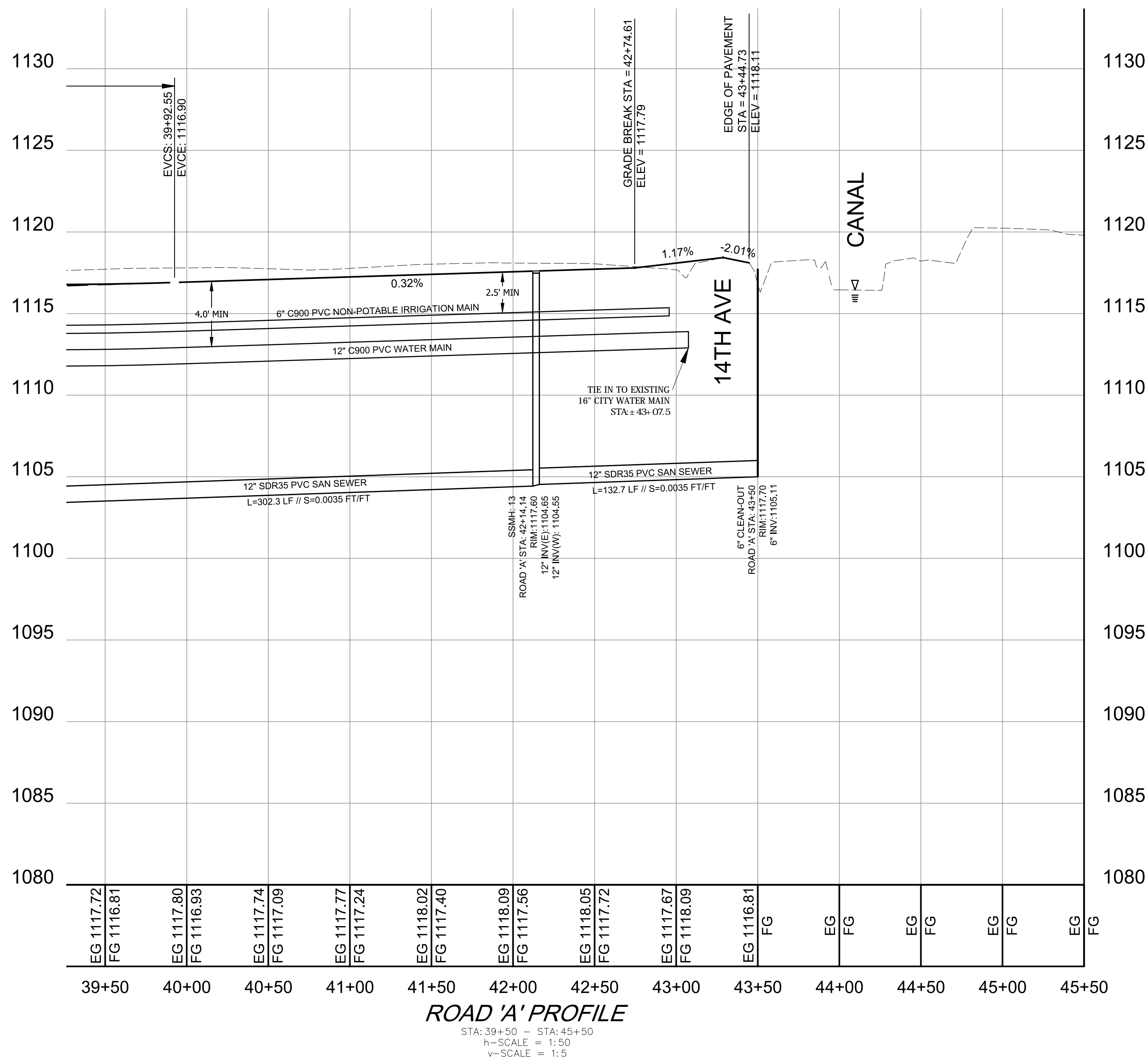
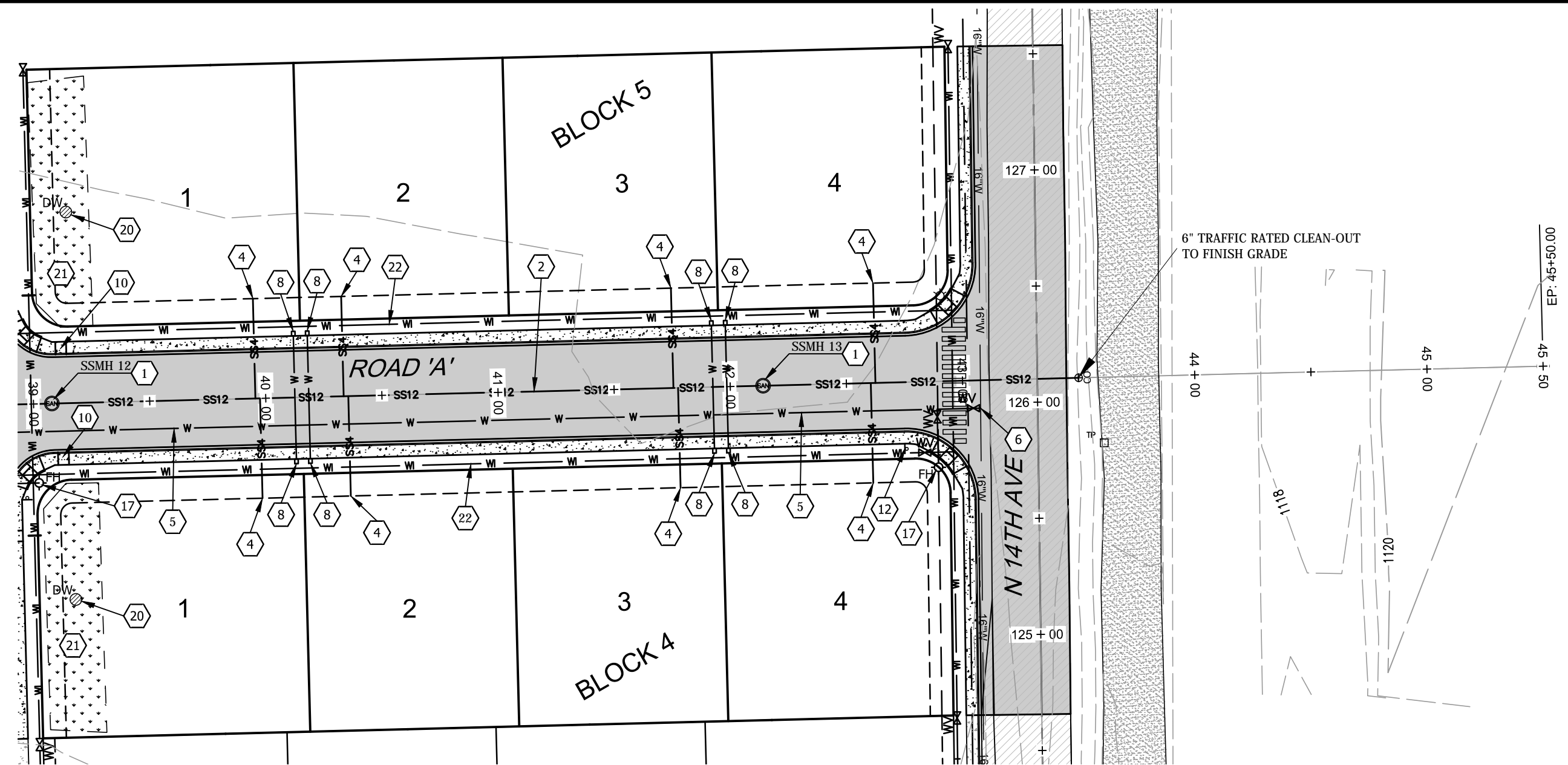
8/30/19

REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OHELLO, WASHINGTON

ROAD 'A'
 PLAN & PROFILE
 STA: 29+50 - 39+50

SHEET # C3.4
 PROJECT # 2019-039
 DATE 8/5/19



CONSTRUCTION NOTES

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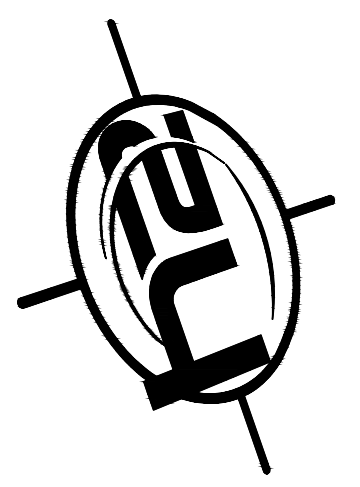
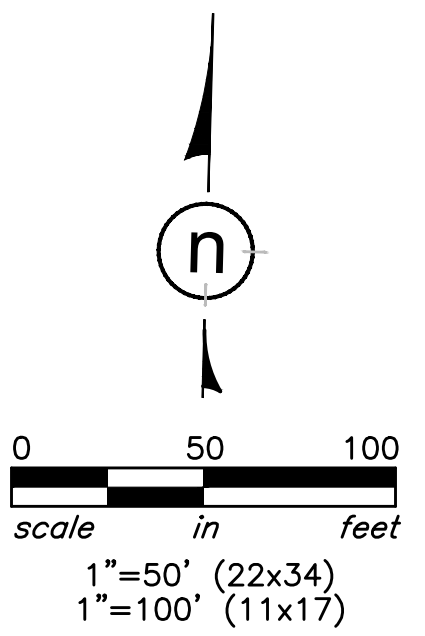
CONTROL

TBM #1: FOUND 5/8" REBAR WITH CAP
MARKED 'CNV ENG PLS 46321'
N: 58866.11
E: 45626.25
EL: 1110.55

TBM #2: FOUND 5/8" REBAR WITH CAP
MARKED 'CNV ENG PLS 46321'
N: 58930.92
E: 48207.79
EL: 1117.92

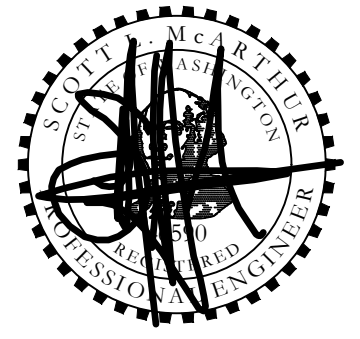
DATUM

HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO



SURVEYORS • ENGINEERS
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Coeur d'Alene, Idaho 83815
Phone: (208) 772-6600
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SURVEYED	h2	DESIGNED	h2	DRAWN	rnh	CHECKED	shn



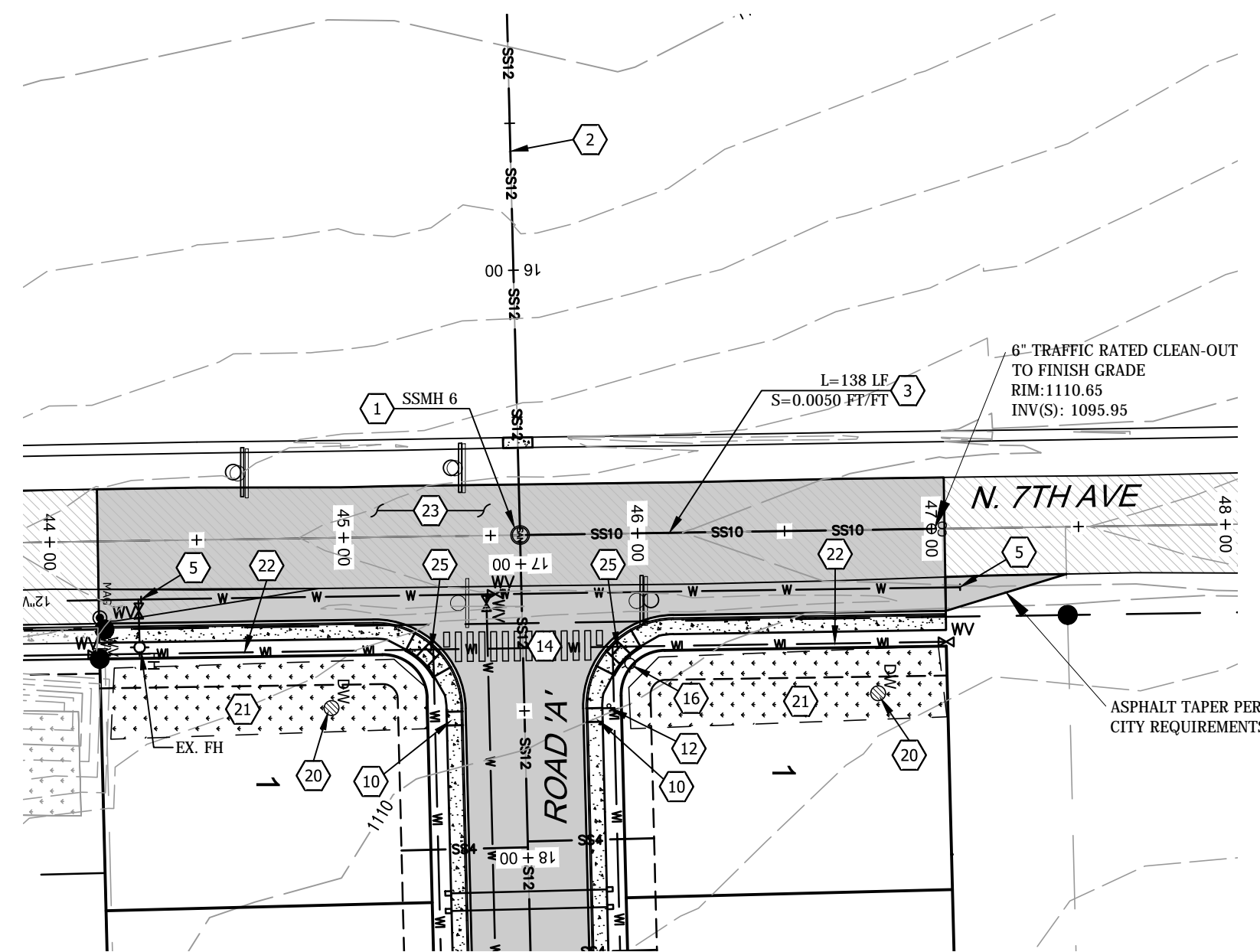
REVISIONS

SAND HILL ESTATES II
IMPROVEMENT PLANS
CITY OF OTHELLO, WASHINGTON

ROAD 'A'
PLAN & PROFILE
STA:39+50 - 45+50

SHEET #	C3.5
PROJECT #	2019-039
DATE	8/5/19





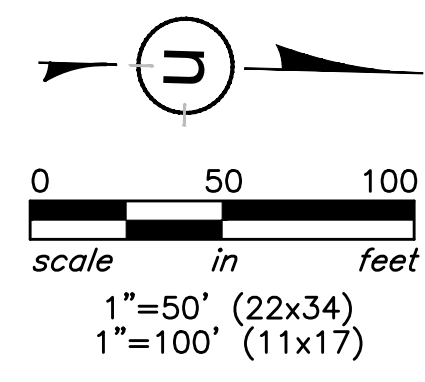
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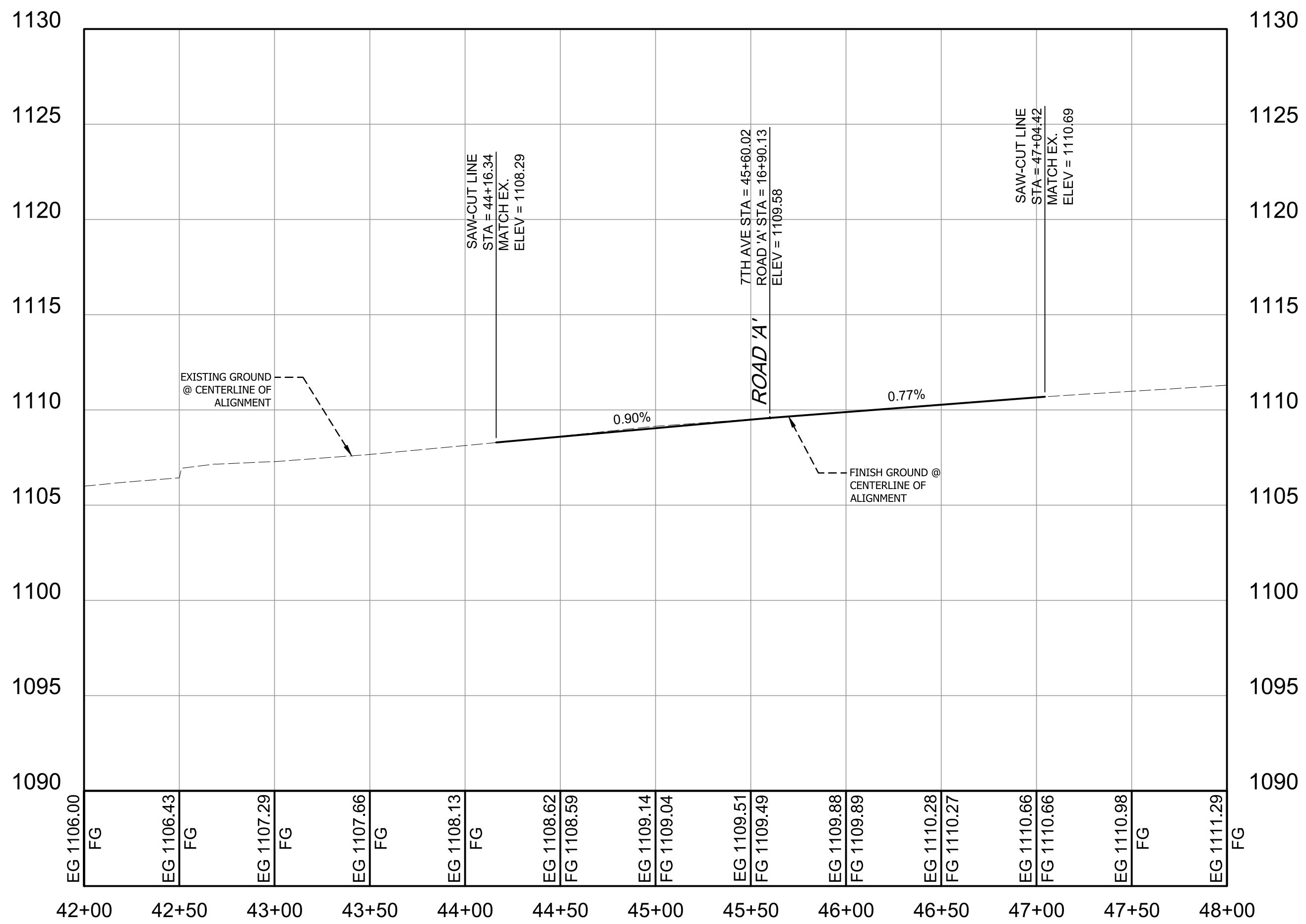
TBM #2: FOUND 5/8" REBAR WITH CAP MARKED 'CNW ENG PLS 46321'
 N: 58930.92
 E: 48207.79
 EL: 1117.92

DATUM

HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OTHELLO

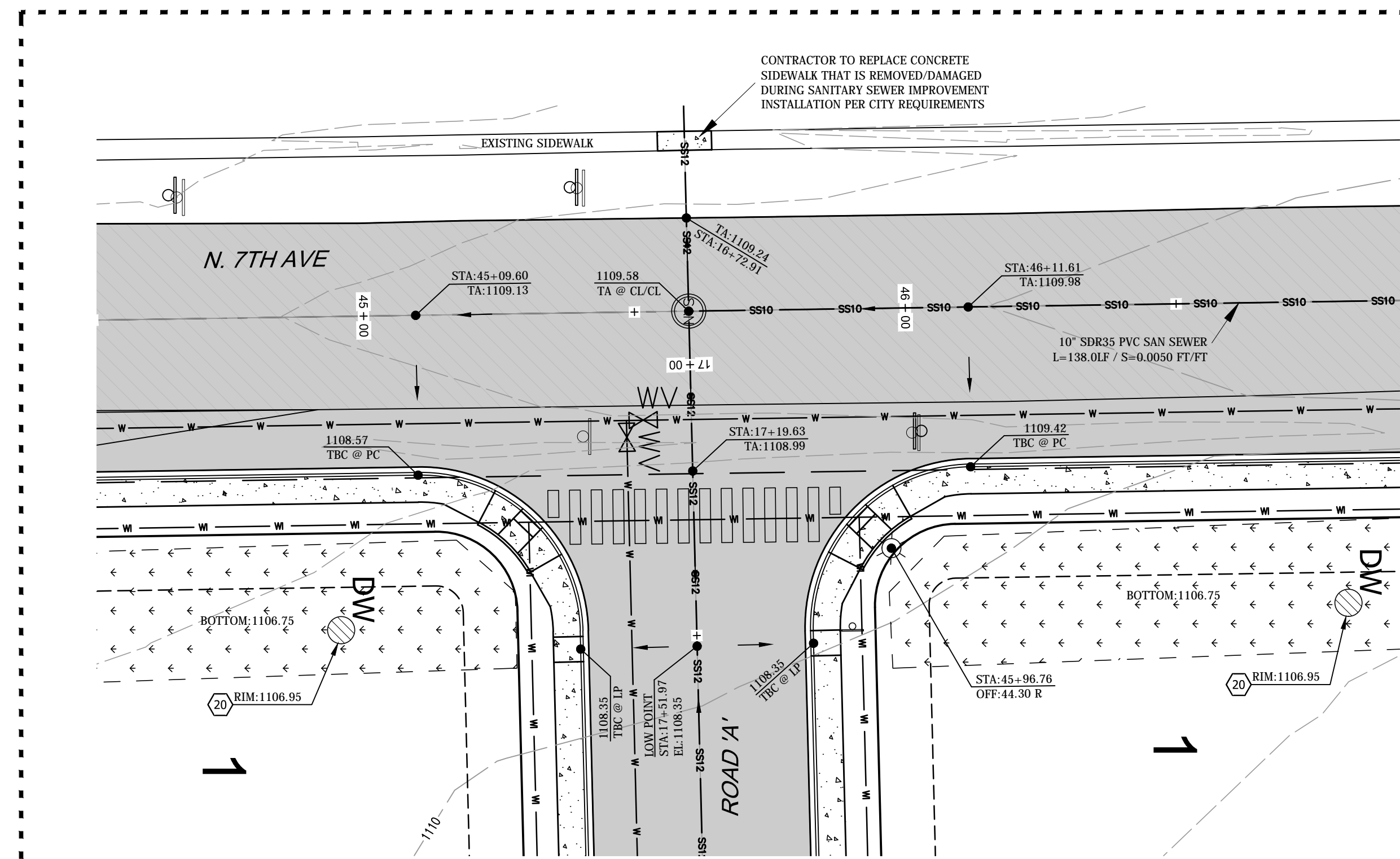
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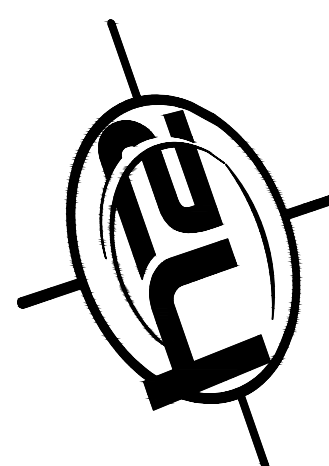
7TH AVENUE PROFILE

STA: 42+00 - STA: 48+00
 h--SCALE = 1:50
 v--SCALE = 1:5



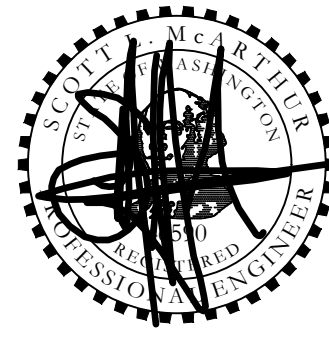
7TH AVENUE/ROAD 'A' INTERSECTION DETAIL

SCALE = 1:20



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 7600 N. Mineral Dr., Ste. 900
 Coeur d'Alene, Idaho 83815
 Phone: (208) 772-6600
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SURVEYED	h2	DESIGNED	h2	DRAWN	rmh	CHECKED	shm



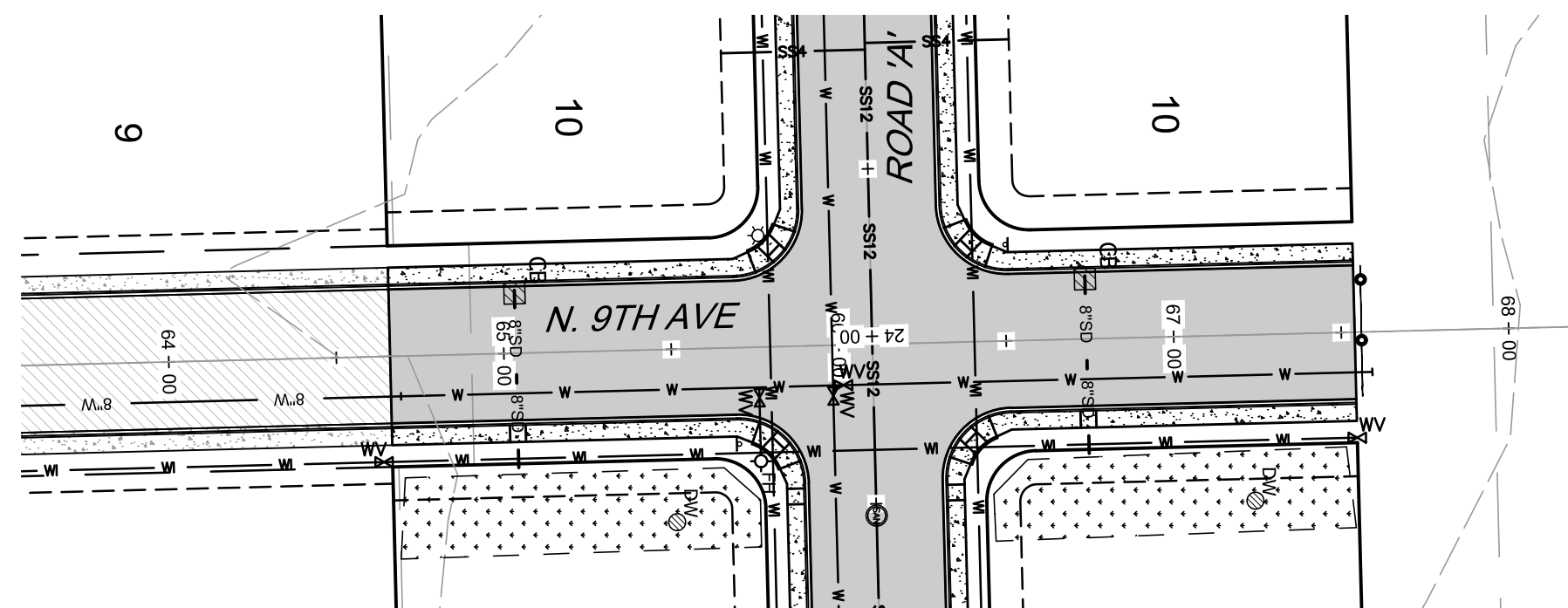
REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

7TH AVENUE
 PLAN & PROFILE
 STA:44+00 - 48+00

SHEET #	C3.6
PROJECT #	2019-039
DATE	8/5/19





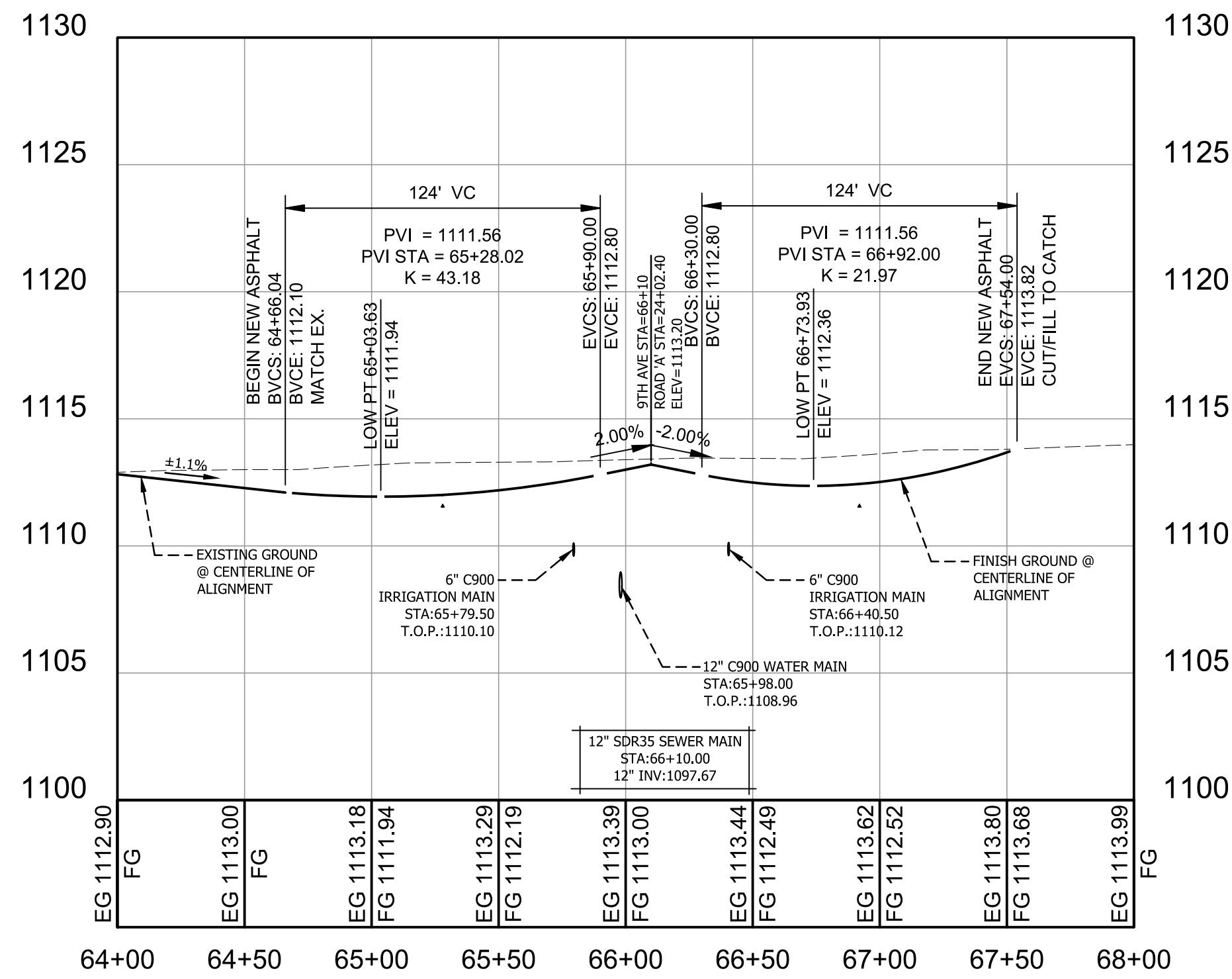
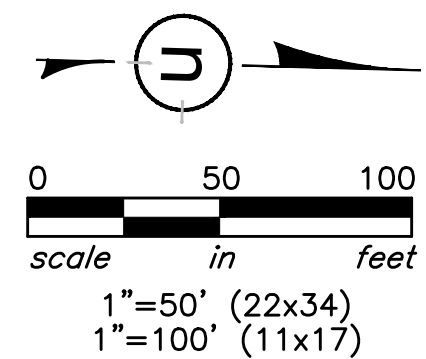
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9TH AVENUE PROFILE

STA: 64+00 - STA: 68+00
 h-SCALE = 1:50
 v-SCALE = 1:5

CONTROL

TBM #1: FOUND 5/8" REBAR WITH CAP
 MARKED 'CNW ENG PLS 46321'
 N: 58866.11
 E: 45626.25
 EL: 1110.55

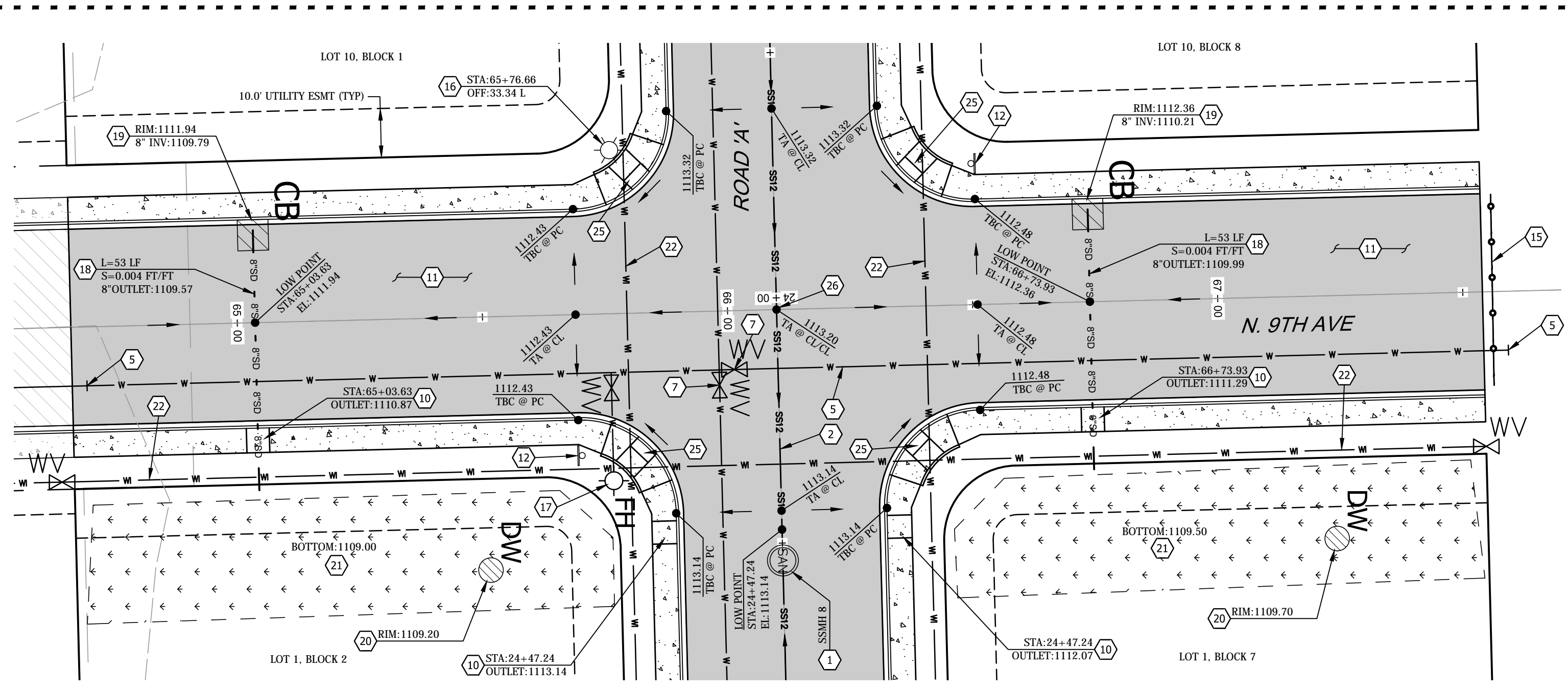
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DATUM

HORIZONTAL DATUM: ASSUMED
 VERTICAL DATUM: CITY OF OTHELLO

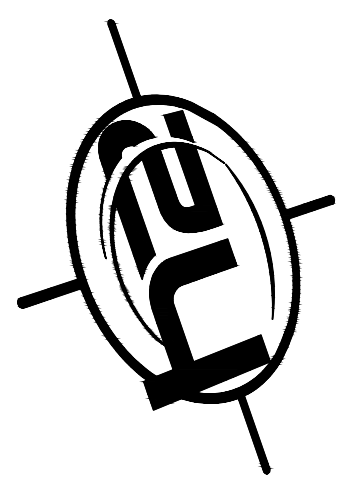
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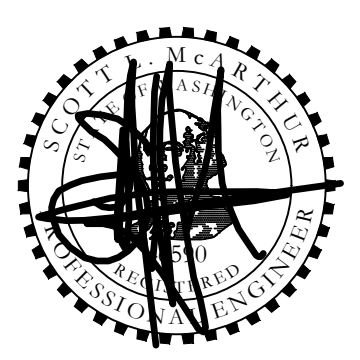
9TH AVENUE/ROAD 'A' INTERSECTION DETAIL

SCALE = 1:20



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SURVEYED	h2	DESIGNED	h2	DRAWN	rmb	CHECKED	sh

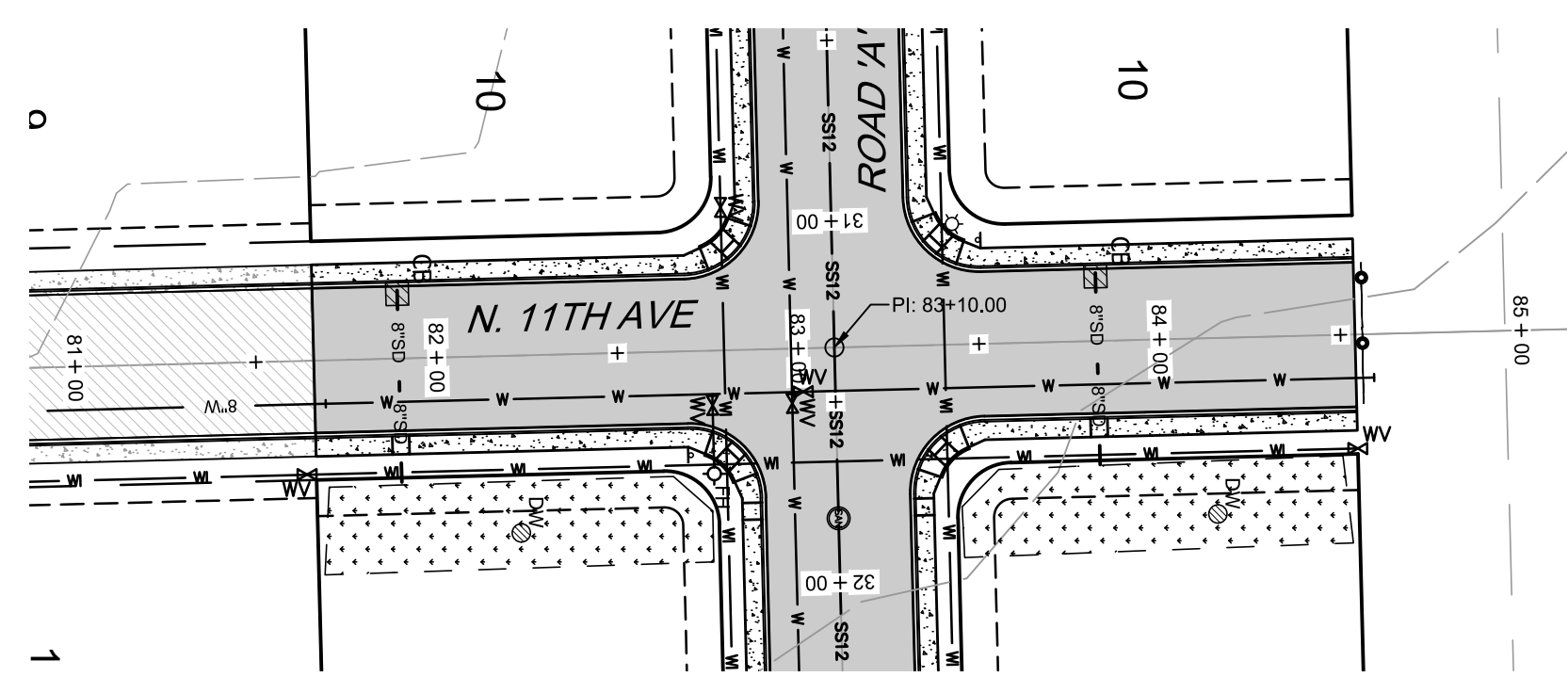


REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

9TH AVENUE
 PLAN & PROFILE
 STA: 64+00 - 68+00

SHEET #	C3.7
PROJECT #	2019-039
DATE	8/5/19



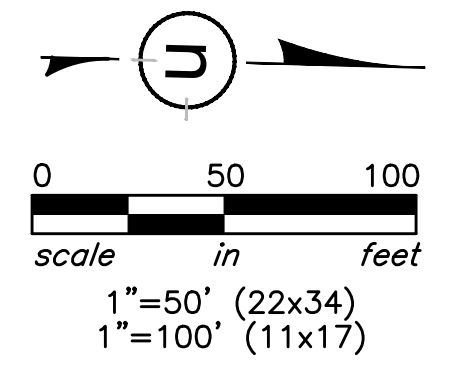
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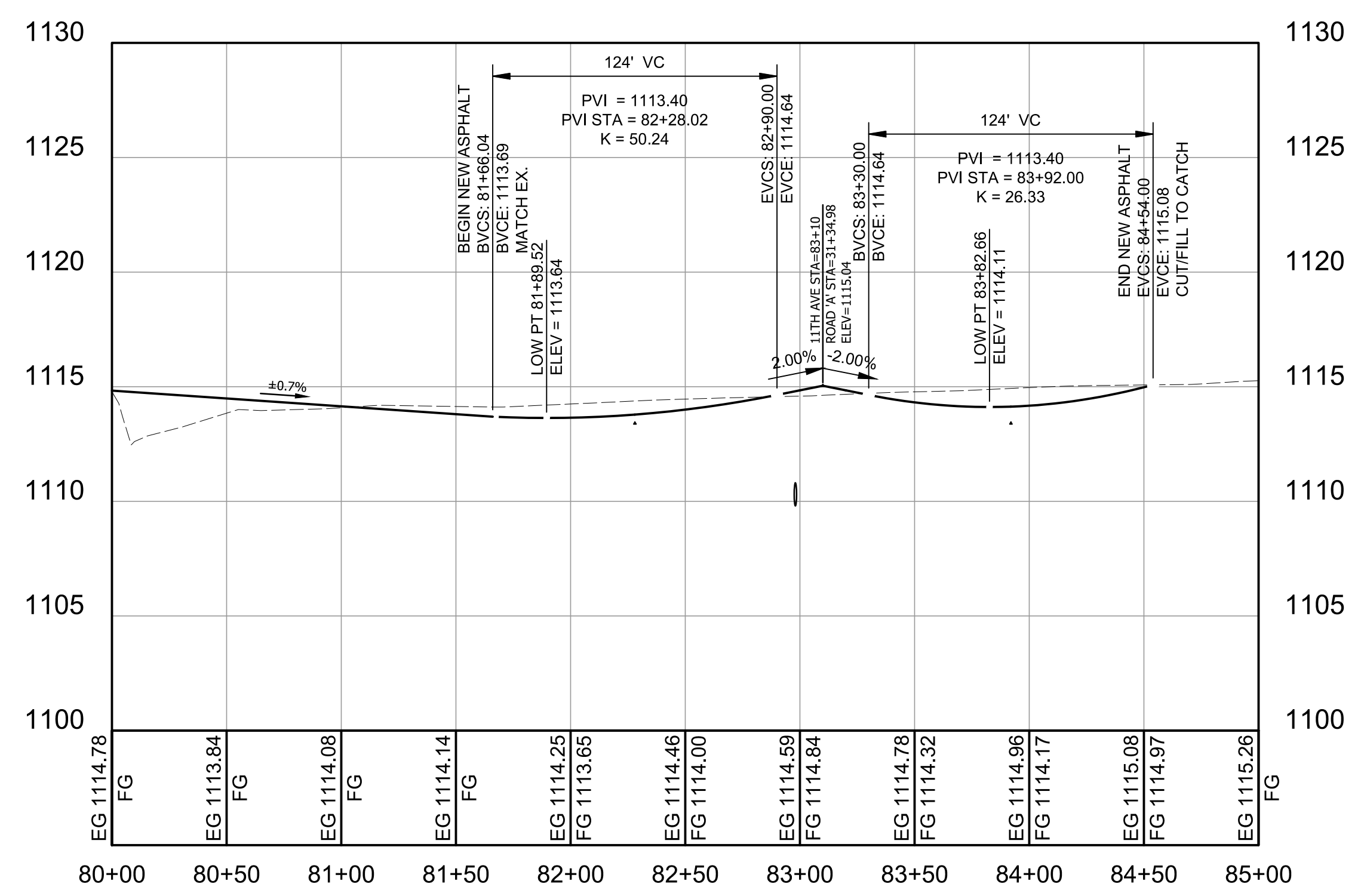
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11TH AVENUE PROFILE
 STA: 80+00 - STA: 85+00
 h-SCALE = 1:50
 v-SCALE = 1:5

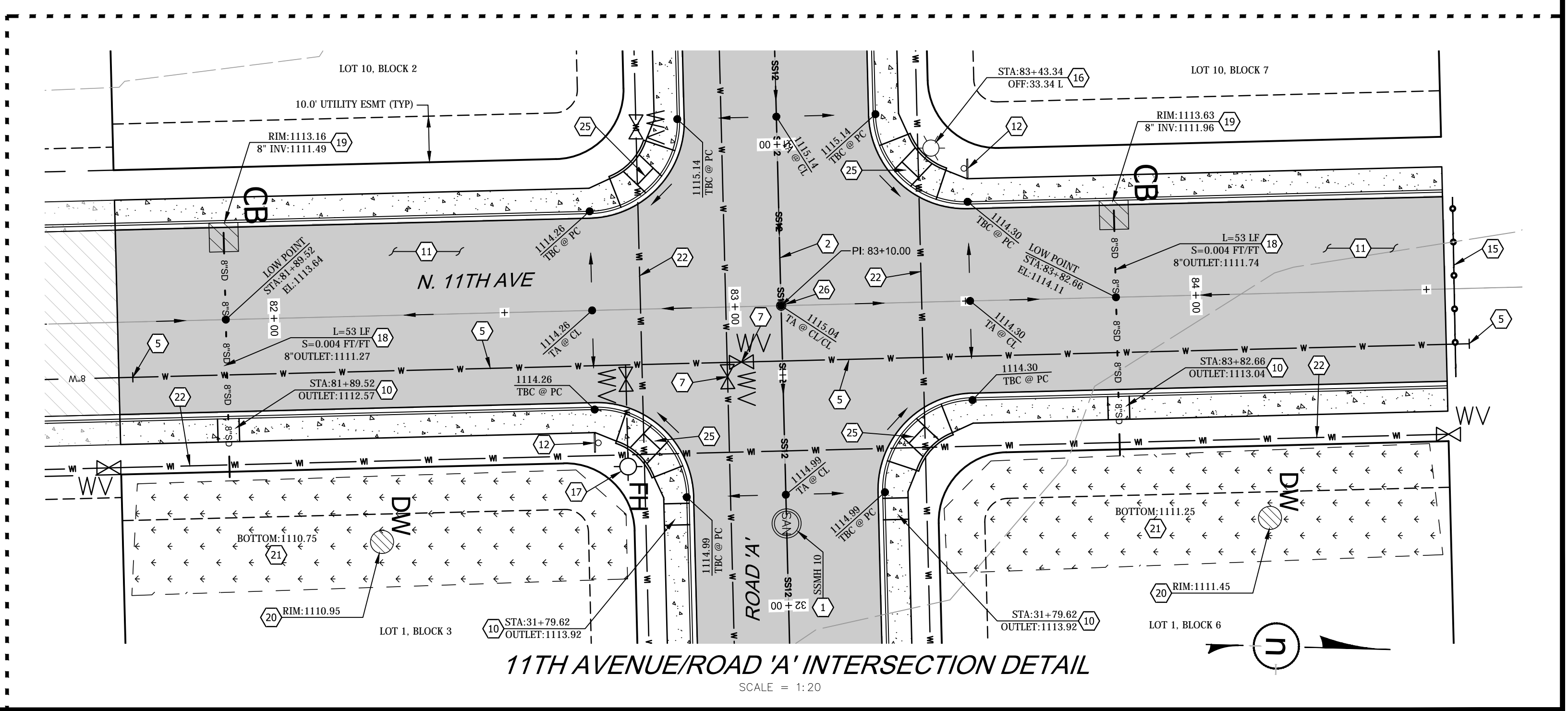
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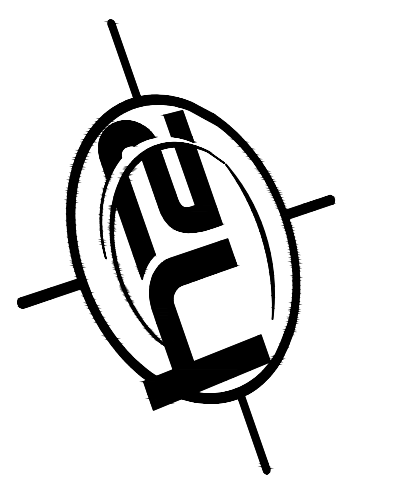
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HORIZONTAL DATUM: ASSUMED
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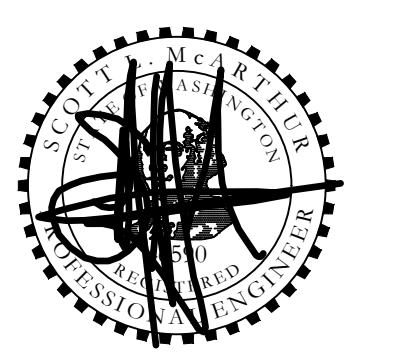


11TH AVENUE/ROAD 'A' INTERSECTION DETAIL
 SCALE = 1:20



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SURVEYED	h2	DESIGNED	h2	DRAWN	rnh	CHECKED	shn



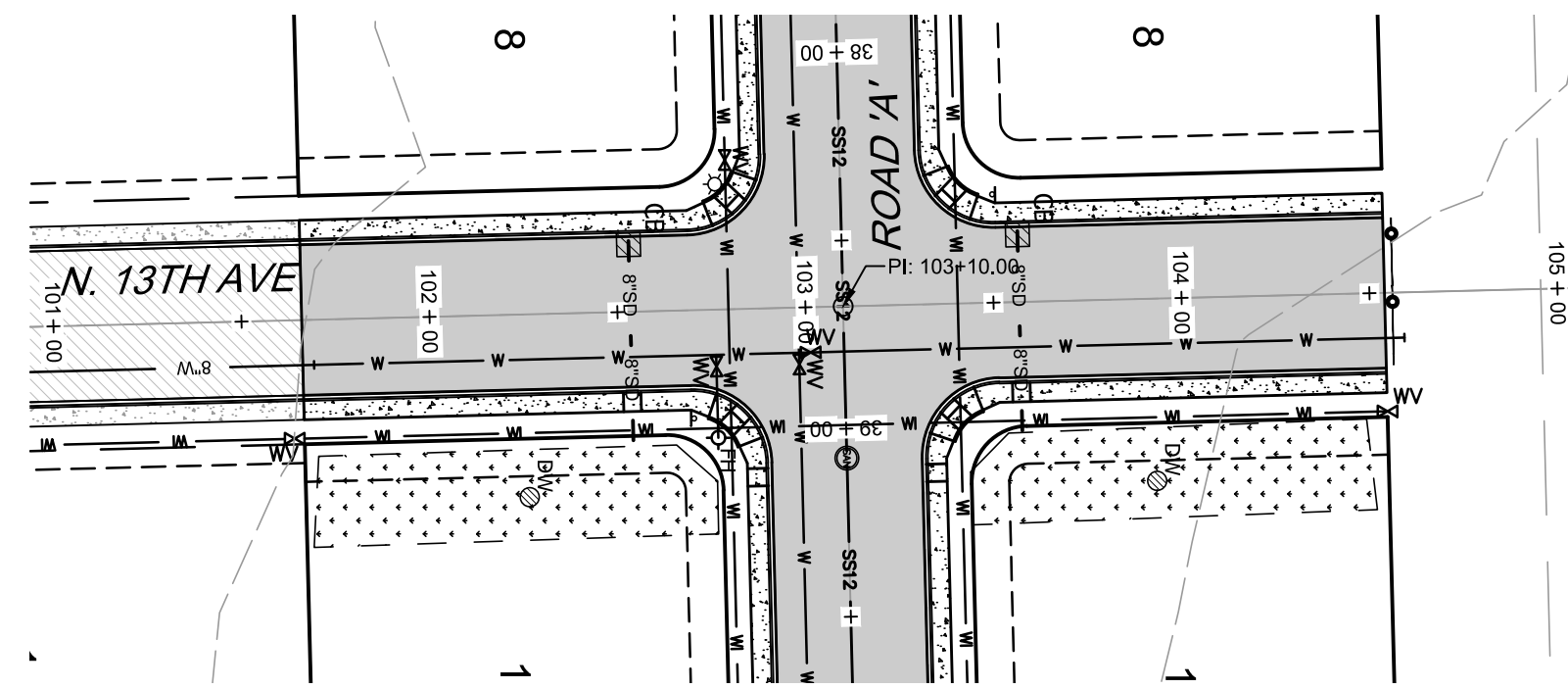
8/30/19

REVISIONS

SAND HILL ESTATES II
 IMPROVEMENT PLANS
 CITY OF OTHELLO, WASHINGTON

11TH AVENUE
 PLAN & PROFILE
 STA: 81+00 - 85+00

SHEET #	C3.8
PROJECT #	2019-039
DATE	8/5/19



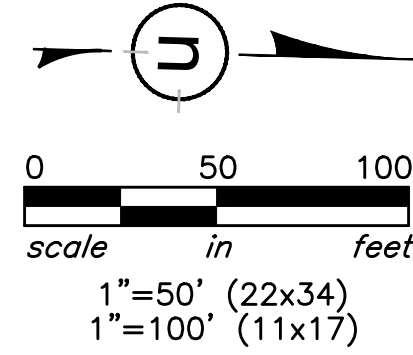
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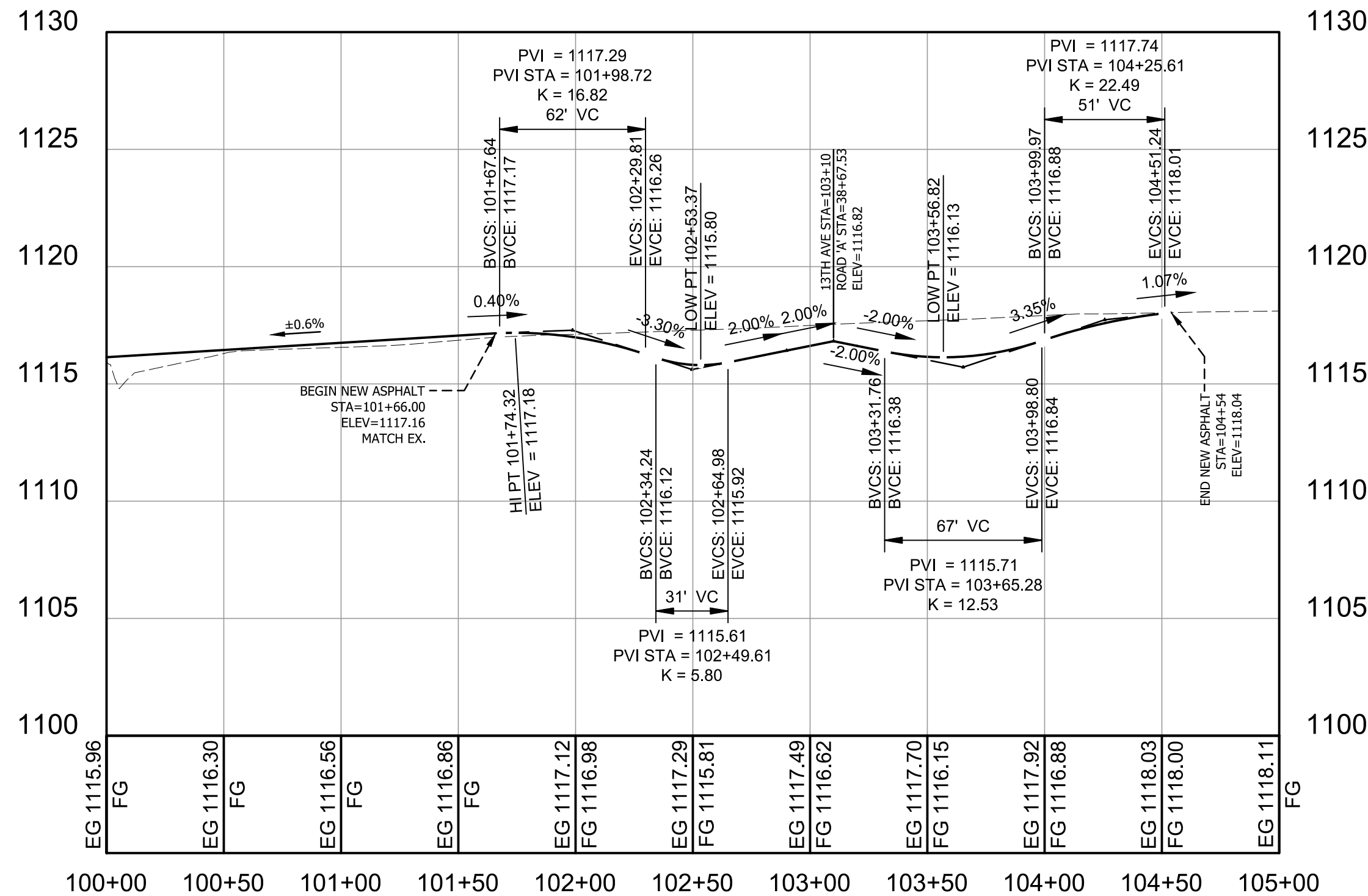
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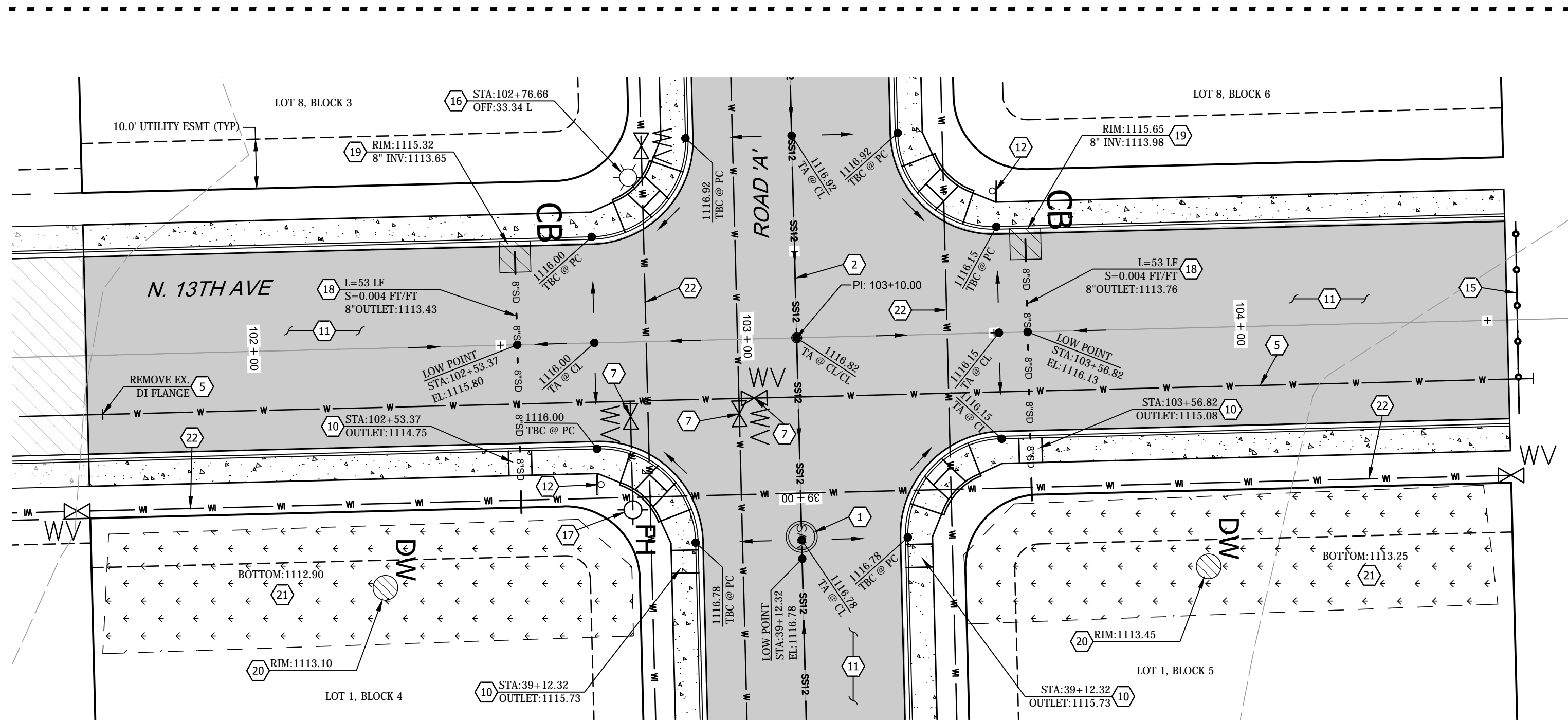
DATUM

HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO



13TH AVENUE PROFILE

STA: 100+00 = STA: 105+00
h-SCALE = 1:50
v-SCALE = 1:5

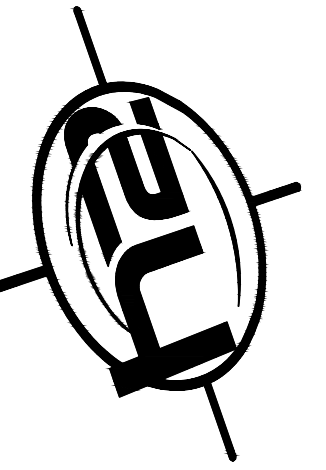


13TH AVENUE/ROAD 'A' INTERSECTION DETAIL

SCALE = 1:20

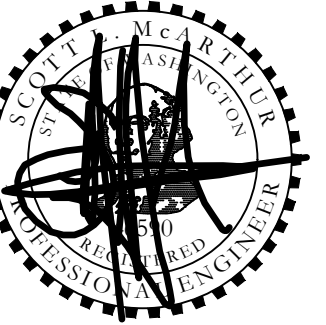
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8/30/19

REVISIONS

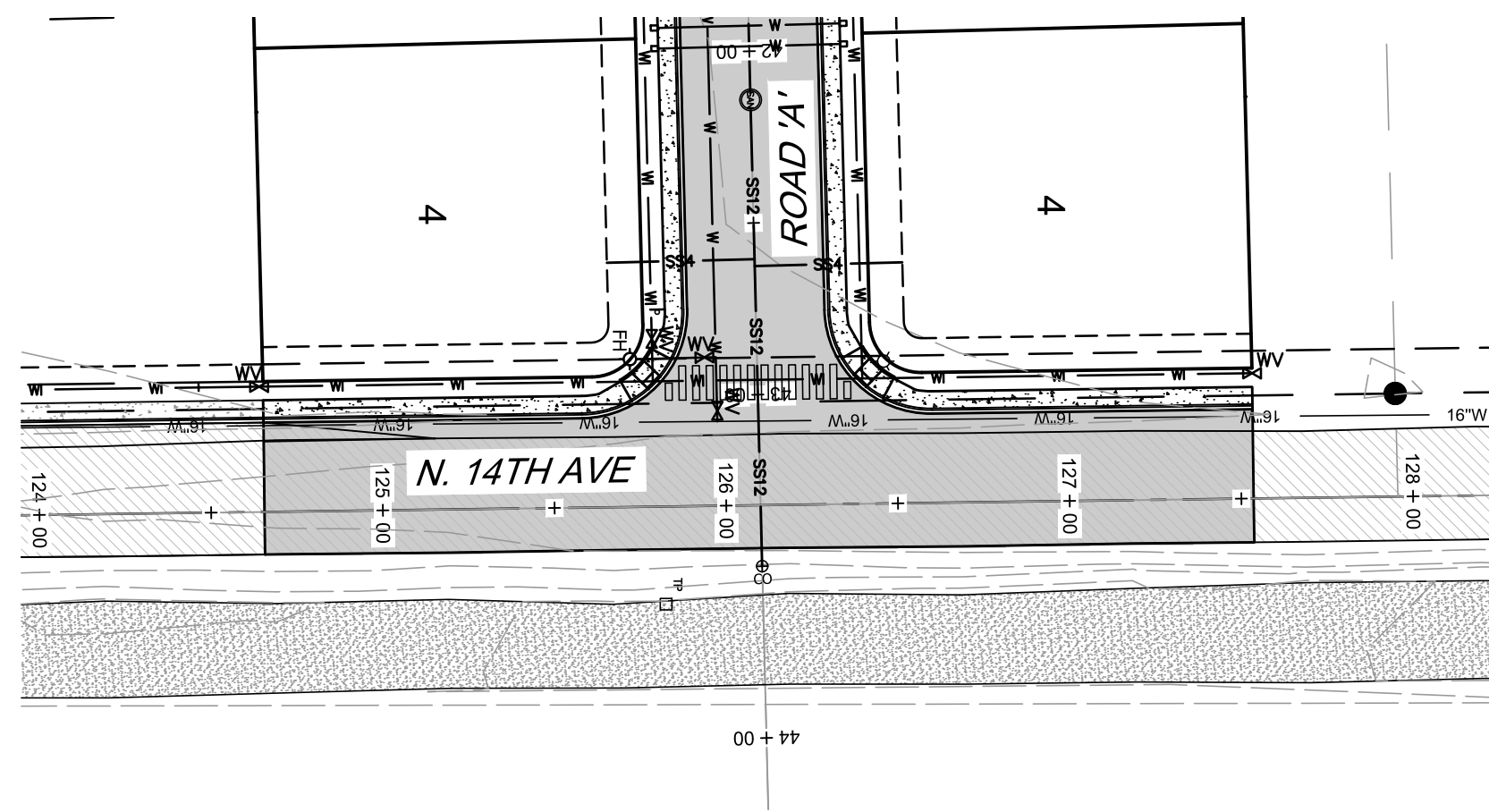
SAND HILL ESTATES II
IMPROVEMENT PLANS
CITY OF OTHELLO, WASHINGTON

13TH AVENUE
PLAN & PROFILE
STA: 101+00 - 105+00

SHEET #	C3.9
PROJECT #	2019-039
DATE	8/5/19



Know what's below.
Call before you dig.



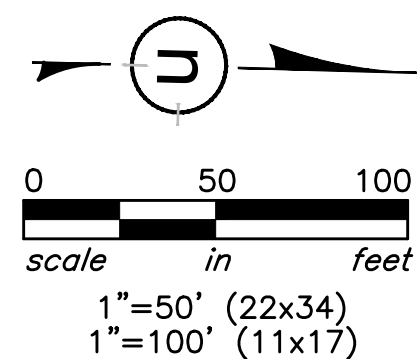
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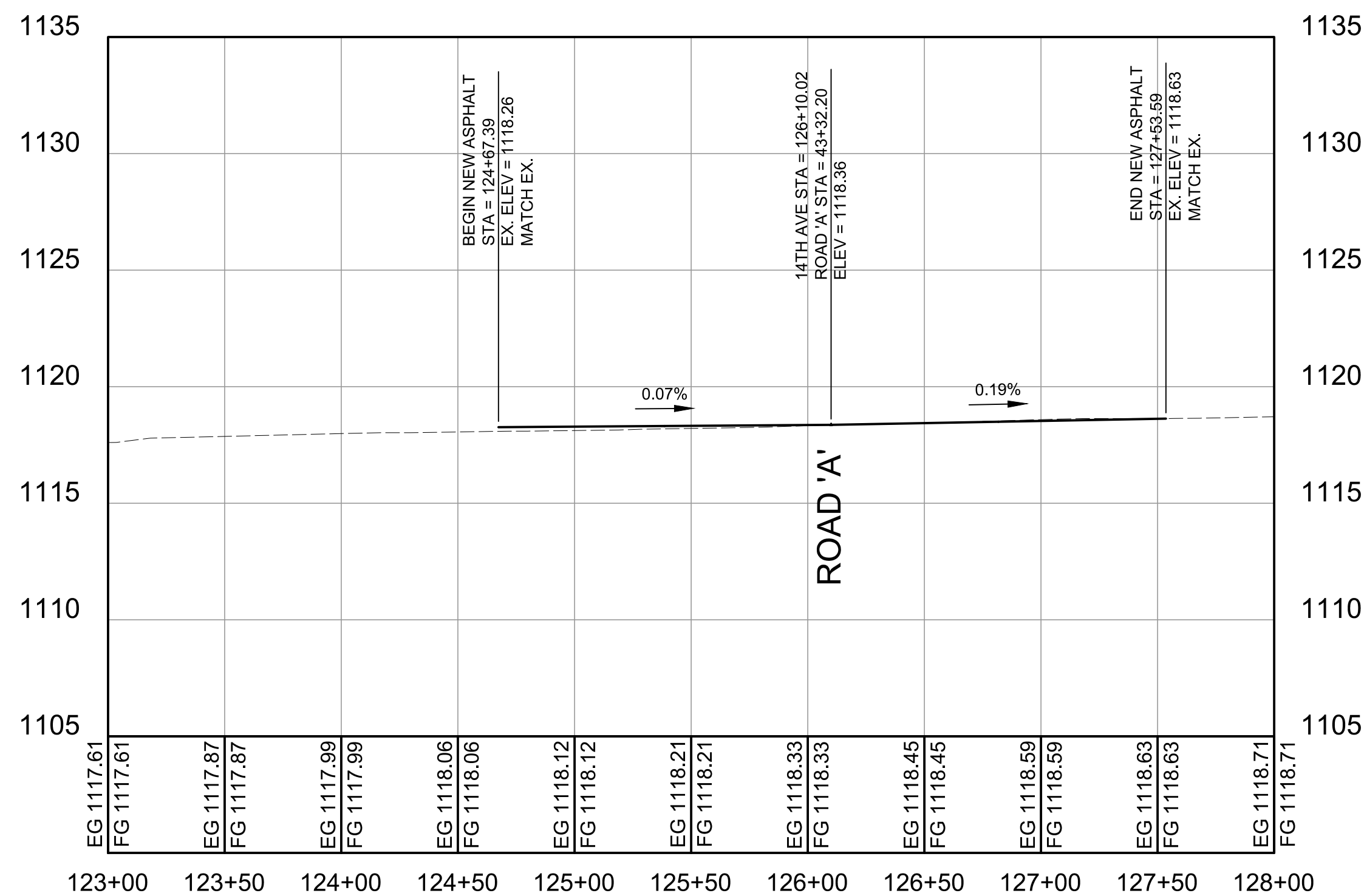
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EL: 1117.92

DATUM

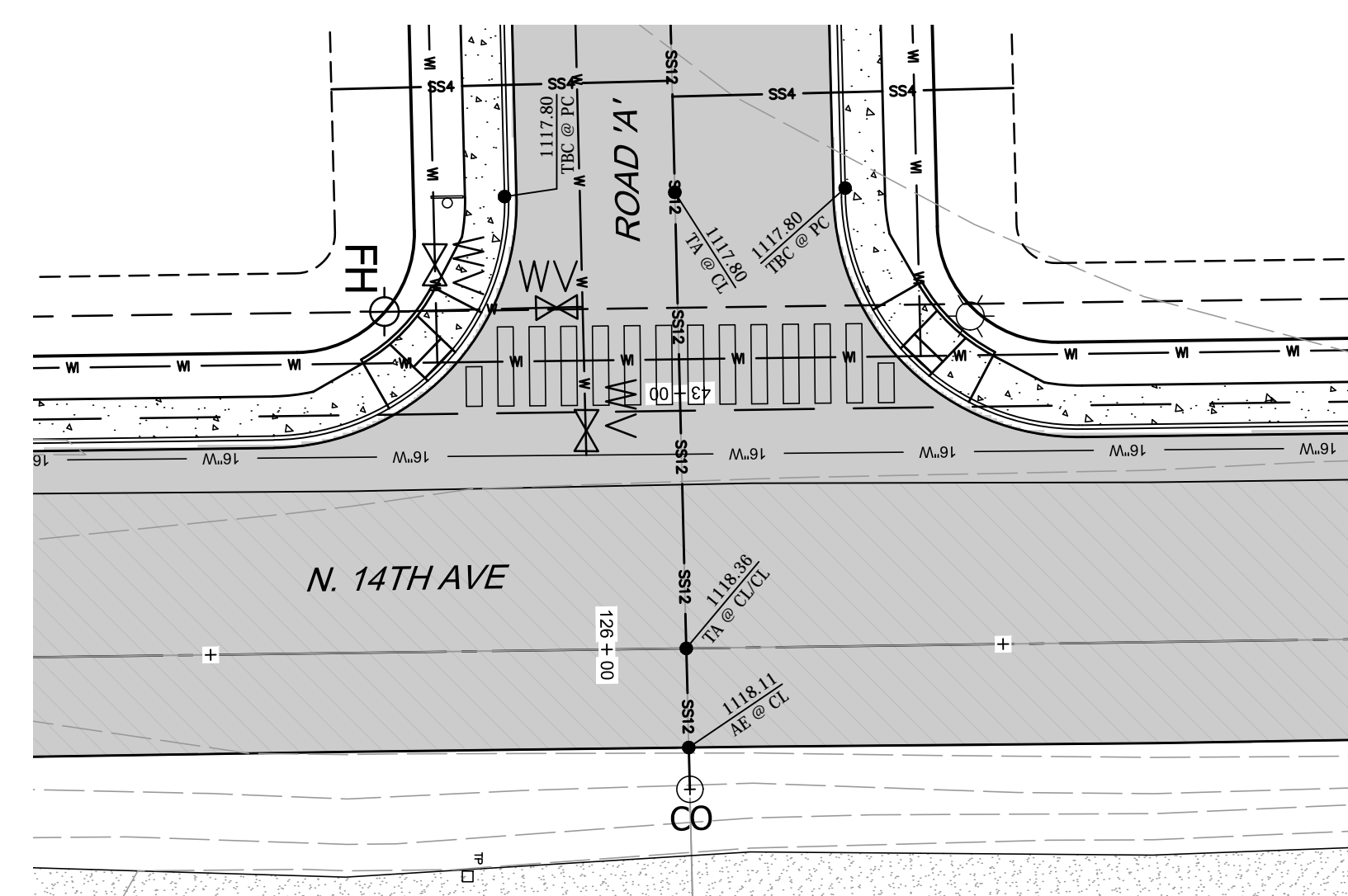
HORIZONTAL DATUM: ASSUMED
VERTICAL DATUM: CITY OF OTHELLO

14TH AVENUE PROFILE



14TH AVENUE PROFILE

STA: 124+00 = STA: 128+00
H-SCALE = 1:50
V-SCALE = 1:5

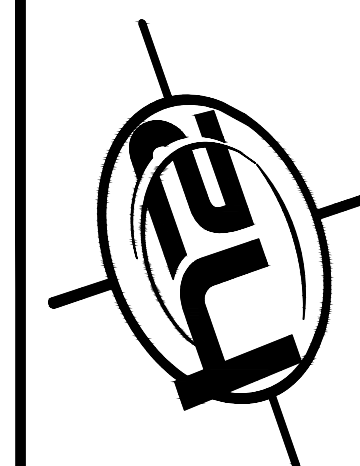


14TH AVENUE/ROAD 'A' INTERSECTION DETAIL

SCALE = 1:20

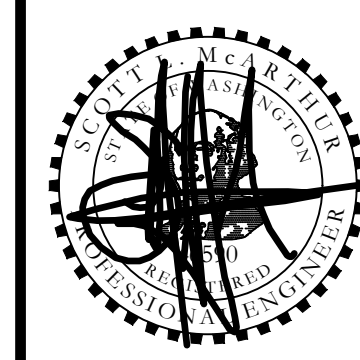


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8/30/19

REVISIONS

SAND HILL ESTATES II
IMPROVEMENT PLANS
CITY OF OTHELLO, WASHINGTON

14TH AVENUE
PLAN & PROFILE
STA:124+00-128+00

SHEET #	C3.10
PROJECT #	2019-039
DATE	8/5/19

Anne Henning

From: Shawn O'Brien
Sent: Tuesday, October 29, 2019 10:37 AM
To: Bill White
Cc: Anne Henning
Subject: RE: Sand Hill Estates

Bill,

Sorry I didn't bump into you at the IACC Conference. I saw you at your booth, but you were talking with someone at the time and didn't want to interrupt.

I think Sand Hill Estates will probably build out a little quicker than 10 years, but we will see.

I have included some responses below, but the main thing is provide a report that is thorough and addresses any potential problems. Let me know if you have any additional questions.

Shawn O'Brien

City Engineer

City of Othello

(509) 331-2711

www.OthelloWa.gov



From: Bill White <bwhite@m-m.net>
Sent: Friday, October 18, 2019 1:21 PM
To: Shawn O'Brien <sobrien@othellowa.gov>
Subject: Sand Hill Estates

Shawn

Good day. I hope this note finds you doing well. I have not chatted with you since your move from Moses Lake. Othello is a good, growing community and I think you will enjoyable challenges there!

I have been asked to perform a TIA for a new the Sand Hills Estates residential development located north of Olympia Street and west of 14th Avenue. I gather this project will be developed with about 250 homes over 10 or so years.

As you are aware, this is referenced as LU Code 210 by Trip Generation. I have a quick estimate of 2,360 weekday trips with about 248 trips generated during the PM peak hour.

I would like to see what your expectations are in terms of a traffic study. Can you please let me know:


- What intersections and streets should be evaluated? **Any intersections that will receive substantial increases in trips. The intersections on SR 17 should be discussed since the DOT may be making improvements in the near future.**

- Do you have any counts to use for these locations? I'm not aware of any current counts.
- What timeframes should be required? I don't have a specific timeframe, but be consistent with other TIA's. The main thing would be to look for traffic problems that will arise with full build out or at least in the next 20 years.
- I assume a build year, but do you have need of a long-term year? Same as the previous answer.
- What background growth rate should I use? Growth rates have varied from what I can tell. From 2000-2010 the City population increase by approximately 2.34% annually. The City's Water System Plan used 4.23% in their estimates, but I think that is pretty high. With the McCain expansion starting, I think we will be fairly healthy over the near future. I would suggest a rate of 3%, but will accept any number that you can justify and feel comfortable with.
- Are there any pipeline projects to be addressed? Not aware of any.
- What analysis might you require beyond LOS/Capacity, if any? I don't have any additional requirements. We just want to have something that shows that a traffic expert has looked at the numbers and has considered the impacts.

I can call at your convience, or you can respond via email.

Please know that I have performed a fair amount of work in Othello, both on behalf of the City and private development. Three years ago I was selected as one of two traffic consultants for the City. We performed to Intersection Control Analyses and then a speed study for Main Street through town for public works. I have probably performed maybe ten TIAs in town over the last twenty or so years for Othello School district and private developers. Please keep me in mind when you need help. Presently we are the on-call traffic consultant for Pullman, Lewiston, Cheney, Airway Heights and several school districts, and are one of a couple go-to's for Spokane, Spokane Valley, and CDA. We perform traffic studies, prepare grants, and develop designs! Pitch is over!

Have a great weekend.



Bill White
Senior Transportation Planner, Morrison-Maierle
 509.315.8366 direct | 509.991.8684 mobile
 316 West Boone Avenue, Suite 360, Spokane, WA 99201

Anne Henning

From: Anne Henning
Sent: Friday, November 1, 2019 9:17 AM
To: Angel Garza (angel@palosverdesllc.com); Scott McArthur (smcarthur@h2survey.com)
Subject: Sand Hill #2 - Engineering comments
Attachments: Sand Hill #2 Eng comments.pdf

City Engineer comments on Sand Hill #2 are attached. Most of these are just corrections that can be addressed on the final plat but I would like to try to make some progress on the swale issue before the public hearing (2nd to last comment). Let me know what is proposed.

Thanks,

Anne Henning

Community Development Director

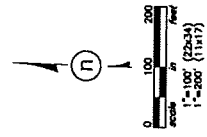
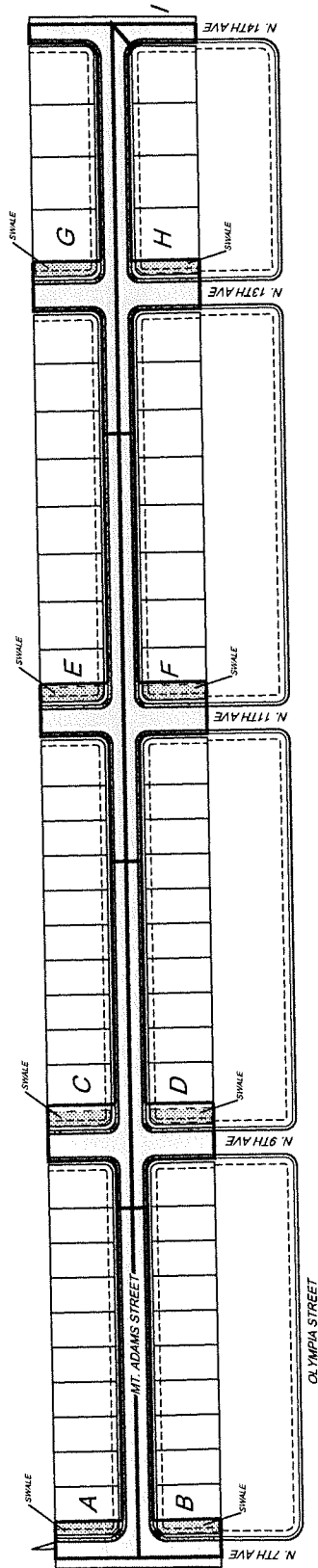
City of Othello

ahenning@othellowa.gov

509-331-2710



Storm Basins



BASIN	BASIN AREA (SF)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	PROVIDED SWALE BOTTOM (SF)	PROVIDED SWALE STORAGE (CF)
BASIN A	23,425	19,161	4,264	800	1,600
BASIN B	23,626	19,148	4,478	800	1,600
BASIN C	27,196	21,023	6,173	900	1,800
BASIN D	27,195	21,022	6,173	900	1,800
BASIN E	30,197	24,522	5,675	1,025	2,050
BASIN F	30,193	24,520	5,673	1,025	2,050
BASIN G	32,625	23,647	8,978	1,055	2,110
BASIN H	28,302	22,013	6,289	940	1,860
BASIN I	4,302	4,168	134	0*	0*

* NOTE: BASIN 'I' WILL FLOW TO THE EXISTING CATCH BASIN AT THE NORTHWEST CORNER OF OLYMPIA STREET AND 14TH AVENUE

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PLANNED: N2
 RECORDED: N2
 COUNTY: SH
 DATE: 11/11/19

SAND HILL ESTATES
 CITY OF OTHELLO, WASHINGTON

SHEET #
STORM
 BASINS
 DATE: 10/12/19
 PROJECT: 2019-039



Basin: A

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	19,161	0.440
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	19,161	0.440
Total Permeable Area (PA):	4,264	0.098
Total Basin Area:	23,425	0.538

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.81

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T_C	=	5.0	(5 minute minimum)
	$T_C = L / (K(S^{1/2})):$	4.6	min
	L:	550	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.01	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12: $T_t = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$))= 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>	
$Q = C i A$	=	1.41	

Basin: A

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

$$4. Q_{out} = 0.04 \text{ cfs, 1 IN/HR INFILTRATION (ASSUMED)}$$

t	t	i	Q	V_t	Q_{out}	V_{out}	Required Storage
<i>(min)</i>	<i>(sec)</i>	<i>in/hr</i>	<i>cfs</i>	<i>CF</i>	<i>cfs</i>	<i>CF</i>	<i>CF</i>
5	300	3.24	1.409	566.44	0.03703704	11	555
10	600	2.04	0.889	714.99	0.03703704	22	693
15	900	1.56	0.679	819.35	0.03703704	33	786
20	1200	1.29	0.561	902.50	0.03703704	44	858
25	1500	1.11	0.484	972.77	0.03703704	56	917
30	1800	0.99	0.429	1034.22	0.03703704	67	968
35	2100	0.89	0.387	1089.20	0.03703704	78	1011
40	2400	0.81	0.354	1139.18	0.03703704	89	1050
45	2700	0.75	0.328	1185.17	0.03703704	100	1085
50	3000	0.70	0.305	1227.88	0.03703704	111	1117
55	3300	0.66	0.287	1267.83	0.03703704	122	1146
60	3600	0.62	0.271	1305.45	0.03703704	133	1172
65	3900	0.59	0.257	1341.03	0.03703704	144	1197
70	4200	0.56	0.244	1374.84	0.03703704	156	1219
75	4500	0.54	0.233	1407.09	0.03703704	167	1240
80	4800	0.51	0.224	1437.93	0.03703704	178	1260
85	5100	0.49	0.215	1467.52	0.03703704	189	1279

POST-DEVELOPMENT

90	5400	0.48	0.207	1495.98	0.03703704	200	1296
95	5700	0.46	0.199	1523.41	0.03703704	211	1312
100	6000	0.44	0.193	1549.89	0.03703704	222	1328
105	6300	0.43	0.187	1575.51	0.03703704	233	1342
110	6600	0.42	0.181	1600.33	0.03703704	244	1356
115	6900	0.40	0.176	1624.41	0.03703704	256	1369
120	7200	0.39	0.171	1647.80	0.03703704	267	1381
125	7500	0.38	0.166	1670.56	0.03703704	278	1393
130	7800	0.37	0.162	1692.72	0.03703704	289	1404
135	8100	0.36	0.158	1714.32	0.03703704	300	1414
140	8400	0.35	0.154	1735.40	0.03703704	311	1424
145	8700	0.35	0.151	1755.98	0.03703704	322	1434
150	9000	0.34	0.147	1776.10	0.03703704	333	1443
155	9300	0.33	0.144	1795.78	0.03703704	344	1451
160	9600	0.32	0.141	1815.03	0.03703704	356	1459
165	9900	0.32	0.138	1833.90	0.03703704	367	1467
170	10200	0.31	0.136	1852.39	0.03703704	378	1475
175	10500	0.31	0.133	1870.52	0.03703704	389	1482
180	10800	0.30	0.130	1888.30	0.03703704	400	1488
360	21600	0.19	0.082	2383.52	0.03703704	800	1584
720	43200	0.12	0.052	3008.60	0.03703704	1600	1409
1440	86400	0.08	0.033	3797.61	0.03703704	3200	598

Basin: A

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	498	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	800	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	1,600	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 1,584 CF

Basin: B

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	19,148	0.440
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	19,148	0.440
Total Permeable Area (PA):	4,478	0.103
Total Basin Area:	23,626	0.542

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.81

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

				<i>minutes</i>
T_C	=	5.0		(5 minute minimum)
	$T_C = L / (K(S^{1/2})):$	4.6		min
	L:	550		ft
	K:	1200		ft/min (Ground Cover Coeff)
	S:	0.01		ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$)) = 1,100

STORMWATER PEAK FLOW RATE (Q)

				<i>cfs</i>
$Q = C i A$	=	1.41		

Basin: B

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.04$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	1.415	568.65	0.03703704	11	558
10	600	2.04	0.893	717.78	0.03703704	22	696
15	900	1.56	0.682	822.54	0.03703704	33	789
20	1200	1.29	0.563	906.02	0.03703704	44	862
25	1500	1.11	0.486	976.56	0.03703704	56	921
30	1800	0.99	0.430	1038.25	0.03703704	67	972
35	2100	0.89	0.389	1093.45	0.03703704	78	1016
40	2400	0.81	0.356	1143.62	0.03703704	89	1055
45	2700	0.75	0.329	1189.79	0.03703704	100	1090
50	3000	0.70	0.307	1232.66	0.03703704	111	1122
55	3300	0.66	0.288	1272.78	0.03703704	122	1151
60	3600	0.62	0.272	1310.54	0.03703704	133	1177
65	3900	0.59	0.258	1346.26	0.03703704	144	1202
70	4200	0.56	0.245	1380.21	0.03703704	156	1225
75	4500	0.54	0.234	1412.57	0.03703704	167	1246
80	4800	0.51	0.224	1443.54	0.03703704	178	1266
85	5100	0.49	0.216	1473.25	0.03703704	189	1284

POST-DEVELOPMENT

90	5400	0.48	0.208	1501.81	0.03703704	200	1302
95	5700	0.46	0.200	1529.35	0.03703704	211	1318
100	6000	0.44	0.194	1555.93	0.03703704	222	1334
105	6300	0.43	0.187	1581.65	0.03703704	233	1348
110	6600	0.42	0.182	1606.57	0.03703704	244	1362
115	6900	0.40	0.176	1630.74	0.03703704	256	1375
120	7200	0.39	0.171	1654.23	0.03703704	267	1388
125	7500	0.38	0.167	1677.08	0.03703704	278	1399
130	7800	0.37	0.163	1699.32	0.03703704	289	1410
135	8100	0.36	0.159	1721.01	0.03703704	300	1421
140	8400	0.35	0.155	1742.17	0.03703704	311	1431
145	8700	0.35	0.151	1762.83	0.03703704	322	1441
150	9000	0.34	0.148	1783.03	0.03703704	333	1450
155	9300	0.33	0.145	1802.78	0.03703704	344	1458
160	9600	0.32	0.142	1822.11	0.03703704	356	1467
165	9900	0.32	0.139	1841.05	0.03703704	367	1474
170	10200	0.31	0.136	1859.61	0.03703704	378	1482
175	10500	0.31	0.133	1877.81	0.03703704	389	1489
180	10800	0.30	0.131	1895.67	0.03703704	400	1496
360	21600	0.19	0.083	2392.81	0.03703704	800	1593
720	43200	0.12	0.052	3020.33	0.03703704	1600	1420
1440	86400	0.08	0.033	3812.42	0.03703704	3200	612

Basin: B

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	498	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	800	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	1,600	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 1,593 CF

Basin: C

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	21,023	0.483
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	21,023	0.483
Total Permeable Area (PA):	6,173	0.142
Total Basin Area:	27,196	0.624

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.79

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T_C	=	5.0	(5 minute minimum)
	$T_C = L / (K(S^{1/2})):$	4.1	min
	L:	440	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.008	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$) = 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>	
$Q = C i A$	=	1.59	

Basin: C

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.04$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	1.590	639.36	0.04166667	13	627
10	600	2.04	1.004	807.03	0.04166667	25	782
15	900	1.56	0.767	924.82	0.04166667	38	887
20	1200	1.29	0.634	1018.67	0.04166667	50	969
25	1500	1.11	0.546	1097.99	0.04166667	63	1035
30	1800	0.99	0.484	1167.35	0.04166667	75	1092
35	2100	0.89	0.437	1229.41	0.04166667	88	1142
40	2400	0.81	0.400	1285.82	0.04166667	100	1186
45	2700	0.75	0.370	1337.73	0.04166667	113	1225
50	3000	0.70	0.345	1385.93	0.04166667	125	1261
55	3300	0.66	0.324	1431.04	0.04166667	138	1294
60	3600	0.62	0.305	1473.49	0.04166667	150	1323
65	3900	0.59	0.290	1513.66	0.04166667	163	1351
70	4200	0.56	0.276	1551.82	0.04166667	175	1377
75	4500	0.54	0.263	1588.21	0.04166667	188	1401
80	4800	0.51	0.252	1623.03	0.04166667	200	1423
85	5100	0.49	0.242	1656.43	0.04166667	213	1444

POST-DEVELOPMENT

90	5400	0.48	0.233	1688.55	0.04166667	225	1464
95	5700	0.46	0.225	1719.51	0.04166667	238	1482
100	6000	0.44	0.218	1749.40	0.04166667	250	1499
105	6300	0.43	0.211	1778.31	0.04166667	263	1516
110	6600	0.42	0.204	1806.33	0.04166667	275	1531
115	6900	0.40	0.198	1833.51	0.04166667	288	1546
120	7200	0.39	0.193	1859.92	0.04166667	300	1560
125	7500	0.38	0.188	1885.60	0.04166667	313	1573
130	7800	0.37	0.183	1910.62	0.04166667	325	1586
135	8100	0.36	0.178	1935.00	0.04166667	338	1597
140	8400	0.35	0.174	1958.79	0.04166667	350	1609
145	8700	0.35	0.170	1982.02	0.04166667	363	1620
150	9000	0.34	0.166	2004.73	0.04166667	375	1630
155	9300	0.33	0.163	2026.94	0.04166667	388	1639
160	9600	0.32	0.159	2048.67	0.04166667	400	1649
165	9900	0.32	0.156	2069.97	0.04166667	413	1657
170	10200	0.31	0.153	2090.83	0.04166667	425	1666
175	10500	0.31	0.150	2111.30	0.04166667	438	1674
180	10800	0.30	0.147	2131.38	0.04166667	450	1681
360	21600	0.19	0.093	2690.33	0.04166667	900	1790
720	43200	0.12	0.059	3395.88	0.04166667	1800	1596
1440	86400	0.08	0.037	4286.46	0.04166667	3600	686

Basin: C

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	547	CF	V = 1133*	(Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24	inches*
Provided Swale Bottom Area:	900	SF	(See plan for swale bottom area dimensions)	
Provided Swale Treatment Volume:	1,800	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)	

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 1,790 CF

Basin: D

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	21,022	0.483
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	21,022	0.483
Total Permeable Area (PA):	6,173	0.142
Total Basin Area:	27,195	0.624

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.79

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T_C	=	5.0	(5 minute minimum)
	$T_C = L / (K(S^{1/2})):$	4.1	min
	L:	440	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.008	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$)) = 1,100

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>	
$Q = C i A$	=	1.59	

Basin: D

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.04$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	1.590	639.33	0.04166667	13	627
10	600	2.04	1.004	806.99	0.04166667	25	782
15	900	1.56	0.767	924.78	0.04166667	38	887
20	1200	1.29	0.633	1018.63	0.04166667	50	969
25	1500	1.11	0.546	1097.94	0.04166667	63	1035
30	1800	0.99	0.484	1167.30	0.04166667	75	1092
35	2100	0.89	0.437	1229.35	0.04166667	88	1142
40	2400	0.81	0.400	1285.77	0.04166667	100	1186
45	2700	0.75	0.370	1337.67	0.04166667	113	1225
50	3000	0.70	0.345	1385.88	0.04166667	125	1261
55	3300	0.66	0.324	1430.98	0.04166667	138	1293
60	3600	0.62	0.305	1473.43	0.04166667	150	1323
65	3900	0.59	0.290	1513.59	0.04166667	163	1351
70	4200	0.56	0.276	1551.76	0.04166667	175	1377
75	4500	0.54	0.263	1588.15	0.04166667	188	1401
80	4800	0.51	0.252	1622.96	0.04166667	200	1423
85	5100	0.49	0.242	1656.36	0.04166667	213	1444

POST-DEVELOPMENT

90	5400	0.48	0.233	1688.48	0.04166667	225	1463
95	5700	0.46	0.225	1719.43	0.04166667	238	1482
100	6000	0.44	0.218	1749.32	0.04166667	250	1499
105	6300	0.43	0.211	1778.24	0.04166667	263	1516
110	6600	0.42	0.204	1806.25	0.04166667	275	1531
115	6900	0.40	0.198	1833.43	0.04166667	288	1546
120	7200	0.39	0.193	1859.84	0.04166667	300	1560
125	7500	0.38	0.188	1885.52	0.04166667	313	1573
130	7800	0.37	0.183	1910.54	0.04166667	325	1586
135	8100	0.36	0.178	1934.92	0.04166667	338	1597
140	8400	0.35	0.174	1958.71	0.04166667	350	1609
145	8700	0.35	0.170	1981.94	0.04166667	363	1619
150	9000	0.34	0.166	2004.64	0.04166667	375	1630
155	9300	0.33	0.163	2026.85	0.04166667	388	1639
160	9600	0.32	0.159	2048.59	0.04166667	400	1649
165	9900	0.32	0.156	2069.88	0.04166667	413	1657
170	10200	0.31	0.153	2090.75	0.04166667	425	1666
175	10500	0.31	0.150	2111.21	0.04166667	438	1674
180	10800	0.30	0.147	2131.29	0.04166667	450	1681
360	21600	0.19	0.093	2690.22	0.04166667	900	1790
720	43200	0.12	0.059	3395.74	0.04166667	1800	1596
1440	86400	0.08	0.037	4286.28	0.04166667	3600	686

Basin: D

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	547	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	900	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	1,800	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 1,790 CF

Basin: E

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	24,522	0.563
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	24,522	0.563
Total Permeable Area (PA):	5,675	0.130
Total Basin Area:	30,197	0.693

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.81

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T _C	=	5.0	(5 minute minimum)
	T _C = L / (K(S ^{1/2})):	4.1	min
	L:	444	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.008	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; T_C = L / (K (S^{1/2}))

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow (n=0.040) = 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>
Q = C i A	=	1.81

Basin: E

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.05$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t (min)	t (sec)	i in/hr	Q cfs	V_t CF	Q_{out} cfs	V_{out} CF	Required Storage CF
5	300	3.24	1.810	727.53	0.0474537	14	713
10	600	2.04	1.142	918.33	0.0474537	28	890
15	900	1.56	0.873	1052.36	0.0474537	43	1010
20	1200	1.29	0.721	1159.16	0.0474537	57	1102
25	1500	1.11	0.622	1249.41	0.0474537	71	1178
30	1800	0.99	0.551	1328.34	0.0474537	85	1243
35	2100	0.89	0.497	1398.95	0.0474537	100	1299
40	2400	0.81	0.455	1463.15	0.0474537	114	1349
45	2700	0.75	0.421	1522.22	0.0474537	128	1394
50	3000	0.70	0.392	1577.07	0.0474537	142	1435
55	3300	0.66	0.368	1628.39	0.0474537	157	1472
60	3600	0.62	0.348	1676.70	0.0474537	171	1506
65	3900	0.59	0.330	1722.41	0.0474537	185	1537
70	4200	0.56	0.314	1765.83	0.0474537	199	1567
75	4500	0.54	0.300	1807.25	0.0474537	214	1594
80	4800	0.51	0.287	1846.86	0.0474537	228	1619
85	5100	0.49	0.276	1884.87	0.0474537	242	1643

POST-DEVELOPMENT

90	5400	0.48	0.266	1921.42	0.0474537	256	1665
95	5700	0.46	0.256	1956.64	0.0474537	270	1686
100	6000	0.44	0.248	1990.66	0.0474537	285	1706
105	6300	0.43	0.240	2023.56	0.0474537	299	1725
110	6600	0.42	0.232	2055.44	0.0474537	313	1742
115	6900	0.40	0.226	2086.37	0.0474537	327	1759
120	7200	0.39	0.219	2116.42	0.0474537	342	1775
125	7500	0.38	0.213	2145.65	0.0474537	356	1790
130	7800	0.37	0.208	2174.11	0.0474537	370	1804
135	8100	0.36	0.203	2201.86	0.0474537	384	1817
140	8400	0.35	0.198	2228.93	0.0474537	399	1830
145	8700	0.35	0.193	2255.36	0.0474537	413	1843
150	9000	0.34	0.189	2281.20	0.0474537	427	1854
155	9300	0.33	0.185	2306.47	0.0474537	441	1865
160	9600	0.32	0.181	2331.21	0.0474537	456	1876
165	9900	0.32	0.178	2355.44	0.0474537	470	1886
170	10200	0.31	0.174	2379.18	0.0474537	484	1895
175	10500	0.31	0.171	2402.47	0.0474537	498	1904
180	10800	0.30	0.168	2425.32	0.0474537	513	1913
360	21600	0.19	0.106	3061.36	0.0474537	1025	2036
720	43200	0.12	0.067	3864.21	0.0474537	2050	1814
1440	86400	0.08	0.042	4877.61	0.0474537	4100	778

Basin: E

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	638	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	1,025	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	2,050	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 2,036 CF

Basin: F

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	24,520	0.563
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	24,520	0.563
Total Permeable Area (PA):	5,673	0.130
Total Basin Area:	30,193	0.693

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.81

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>
T_C	=	5.0 (5 minute minimum)
$T_C = L / (K(S^{1/2})):$		4.1 min
L:		444 ft
K:		1200 ft/min (Ground Cover Coeff)
S:		0.008 ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$))= 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>
$Q = C i A$	=	1.81

Basin: F

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

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$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.05$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	1.810	727.45	0.0474537	14	713
10	600	2.04	1.142	918.23	0.0474537	28	890
15	900	1.56	0.873	1052.25	0.0474537	43	1010
20	1200	1.29	0.721	1159.04	0.0474537	57	1102
25	1500	1.11	0.622	1249.28	0.0474537	71	1178
30	1800	0.99	0.551	1328.20	0.0474537	85	1243
35	2100	0.89	0.497	1398.81	0.0474537	100	1299
40	2400	0.81	0.455	1462.99	0.0474537	114	1349
45	2700	0.75	0.421	1522.05	0.0474537	128	1394
50	3000	0.70	0.392	1576.90	0.0474537	142	1435
55	3300	0.66	0.368	1628.22	0.0474537	157	1472
60	3600	0.62	0.348	1676.52	0.0474537	171	1506
65	3900	0.59	0.330	1722.22	0.0474537	185	1537
70	4200	0.56	0.314	1765.65	0.0474537	199	1566
75	4500	0.54	0.300	1807.05	0.0474537	214	1594
80	4800	0.51	0.287	1846.67	0.0474537	228	1619
85	5100	0.49	0.276	1884.67	0.0474537	242	1643

POST-DEVELOPMENT

90	5400	0.48	0.266	1921.21	0.0474537	256	1665
95	5700	0.46	0.256	1956.44	0.0474537	270	1686
100	6000	0.44	0.248	1990.45	0.0474537	285	1706
105	6300	0.43	0.240	2023.35	0.0474537	299	1724
110	6600	0.42	0.232	2055.22	0.0474537	313	1742
115	6900	0.40	0.226	2086.15	0.0474537	327	1759
120	7200	0.39	0.219	2116.19	0.0474537	342	1775
125	7500	0.38	0.213	2145.42	0.0474537	356	1790
130	7800	0.37	0.208	2173.88	0.0474537	370	1804
135	8100	0.36	0.203	2201.62	0.0474537	384	1817
140	8400	0.35	0.198	2228.69	0.0474537	399	1830
145	8700	0.35	0.193	2255.12	0.0474537	413	1842
150	9000	0.34	0.189	2280.96	0.0474537	427	1854
155	9300	0.33	0.185	2306.23	0.0474537	441	1865
160	9600	0.32	0.181	2330.96	0.0474537	456	1875
165	9900	0.32	0.178	2355.19	0.0474537	470	1885
170	10200	0.31	0.174	2378.93	0.0474537	484	1895
175	10500	0.31	0.171	2402.21	0.0474537	498	1904
180	10800	0.30	0.168	2425.06	0.0474537	513	1913
360	21600	0.19	0.106	3061.03	0.0474537	1025	2036
720	43200	0.12	0.067	3863.80	0.0474537	2050	1814
1440	86400	0.08	0.042	4877.08	0.0474537	4100	777

POST-DEVELOPMENT

Basin: F

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	638	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	1,025	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	2,050	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 2,036 CF

Basin: G**Project: SAND HILL ESTATES II****Location: CITY OF OTHELLO, WA - MT. ADAMS STREET****Date: November 2, 2019****Rational Method**

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	23,647	0.543
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	23,647	0.543
Total Permeable Area (PA):	8,978	0.206
Total Basin Area:	32,625	0.749

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.76

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>
T_C	=	7.7 (5 minute minimum)
	$T_C = L / (K(S^{1/2}))$:	7.7 min
	L:	525 ft
	K:	1200 ft/min (Ground Cover Coeff)
	S:	0.0032 ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$) = 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>
$Q = C i A$	=	1.85

Basin: G

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.05$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t	t	i	Q	V_t	Q_{out}	V_{out}	Required Storage
<i>(min)</i>	<i>(sec)</i>	<i>in/hr</i>	<i>cfs</i>	<i>CF</i>	<i>cfs</i>	<i>CF</i>	<i>CF</i>
5	300	3.24	1.849	743.48	0.04884259	15	729
7.7	464	2.42	1.384	860.84	0.04884259	23	838
10	600	2.04	1.167	938.46	0.04884259	29	909
15	900	1.56	0.892	1075.43	0.04884259	44	1031
20	1200	1.29	0.737	1184.58	0.04884259	59	1126
25	1500	1.11	0.635	1276.81	0.04884259	73	1204
30	1800	0.99	0.563	1357.47	0.04884259	88	1270
35	2100	0.89	0.508	1429.63	0.04884259	103	1327
40	2400	0.81	0.465	1495.23	0.04884259	117	1378
45	2700	0.75	0.430	1555.59	0.04884259	132	1424
50	3000	0.70	0.401	1611.65	0.04884259	147	1465
55	3300	0.66	0.376	1664.10	0.04884259	161	1503
60	3600	0.62	0.355	1713.47	0.04884259	176	1538
65	3900	0.59	0.337	1760.17	0.04884259	190	1570
70	4200	0.56	0.321	1804.55	0.04884259	205	1599
75	4500	0.54	0.306	1846.87	0.04884259	220	1627
80	4800	0.51	0.293	1887.36	0.04884259	234	1653

POST-DEVELOPMENT

85	5100	0.49	0.282	1926.20	0.04884259	249	1677
90	5400	0.48	0.271	1963.55	0.04884259	264	1700
95	5700	0.46	0.262	1999.55	0.04884259	278	1721
100	6000	0.44	0.253	2034.31	0.04884259	293	1741
105	6300	0.43	0.245	2067.93	0.04884259	308	1760
110	6600	0.42	0.238	2100.51	0.04884259	322	1778
115	6900	0.40	0.231	2132.12	0.04884259	337	1795
120	7200	0.39	0.224	2162.83	0.04884259	352	1811
125	7500	0.38	0.218	2192.70	0.04884259	366	1826
130	7800	0.37	0.213	2221.78	0.04884259	381	1841
135	8100	0.36	0.207	2250.14	0.04884259	396	1855
140	8400	0.35	0.202	2277.80	0.04884259	410	1868
145	8700	0.35	0.198	2304.82	0.04884259	425	1880
150	9000	0.34	0.193	2331.22	0.04884259	440	1892
155	9300	0.33	0.189	2357.05	0.04884259	454	1903
160	9600	0.32	0.185	2382.33	0.04884259	469	1913
165	9900	0.32	0.181	2407.08	0.04884259	484	1924
170	10200	0.31	0.178	2431.35	0.04884259	498	1933
175	10500	0.31	0.174	2455.15	0.04884259	513	1942
180	10800	0.30	0.171	2478.50	0.04884259	528	1951
360	21600	0.19	0.108	3128.49	0.04884259	1055	2073
720	43200	0.12	0.068	3948.94	0.04884259	2110	1839
1440	86400	0.08	0.043	4984.56	0.04884259	4220	764.56

Basin: G

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	615	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	1,055	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	2,110	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 2,073 CF

Basin: H

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	22,013	0.505
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	22,013	0.505
Total Permeable Area (PA):	6,289	0.144
Total Basin Area:	28,302	0.650

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.79

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T_C	=	5.7	(5 minute minimum)
$T_C = L / (K(S^{1/2}))$:		5.7	min
	L:	390	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.0032	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_c = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$)) = 1,100

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>
$Q = C i A$	=	1.66

Basin: H

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.04$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	1.660	667.38	0.04351852	13	654
5.7	345	2.95	1.514	699.27	0.04351852	15	684
10	600	2.04	1.048	842.40	0.04351852	26	816
15	900	1.56	0.800	965.35	0.04351852	39	926
20	1200	1.29	0.661	1063.32	0.04351852	52	1011
25	1500	1.11	0.570	1146.10	0.04351852	65	1081
30	1800	0.99	0.505	1218.51	0.04351852	78	1140
35	2100	0.89	0.456	1283.28	0.04351852	91	1192
40	2400	0.81	0.417	1342.17	0.04351852	104	1238
45	2700	0.75	0.386	1396.35	0.04351852	118	1279
50	3000	0.70	0.360	1446.67	0.04351852	131	1316
55	3300	0.66	0.338	1493.75	0.04351852	144	1350
60	3600	0.62	0.319	1538.07	0.04351852	157	1381
65	3900	0.59	0.302	1579.99	0.04351852	170	1410
70	4200	0.56	0.288	1619.83	0.04351852	183	1437
75	4500	0.54	0.275	1657.82	0.04351852	196	1462
80	4800	0.51	0.263	1694.16	0.04351852	209	1485

POST-DEVELOPMENT

85	5100	0.49	0.253	1729.02	0.04351852	222	1507
90	5400	0.48	0.244	1762.55	0.04351852	235	1528
95	5700	0.46	0.235	1794.86	0.04351852	248	1547
100	6000	0.44	0.227	1826.06	0.04351852	261	1565
105	6300	0.43	0.220	1856.25	0.04351852	274	1582
110	6600	0.42	0.213	1885.49	0.04351852	287	1598
115	6900	0.40	0.207	1913.86	0.04351852	300	1614
120	7200	0.39	0.201	1941.43	0.04351852	313	1628
125	7500	0.38	0.196	1968.24	0.04351852	326	1642
130	7800	0.37	0.191	1994.35	0.04351852	339	1655
135	8100	0.36	0.186	2019.80	0.04351852	353	1667
140	8400	0.35	0.182	2044.63	0.04351852	366	1679
145	8700	0.35	0.177	2068.88	0.04351852	379	1690
150	9000	0.34	0.174	2092.58	0.04351852	392	1701
155	9300	0.33	0.170	2115.77	0.04351852	405	1711
160	9600	0.32	0.166	2138.46	0.04351852	418	1721
165	9900	0.32	0.163	2160.68	0.04351852	431	1730
170	10200	0.31	0.160	2182.46	0.04351852	444	1739
175	10500	0.31	0.157	2203.82	0.04351852	457	1747
180	10800	0.30	0.154	2224.78	0.04351852	470	1755
360	21600	0.19	0.097	2808.24	0.04351852	940	1868
720	43200	0.12	0.061	3544.70	0.04351852	1880	1665
1440	86400	0.08	0.039	4474.31	0.04351852	3760	714

POST-DEVELOPMENT

Basin: H

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	573	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	2	FEET*, or	24 inches*
Provided Swale Bottom Area:	940	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	1,880	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

SWALE TREATMENT VOLUME IS ADEQUATE

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 1,868 CF

Basin: I

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Rational Method

*Reference 13.10 - Rational Method, Page 674, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

IMPERVIOUS AREA

	<i>SF</i>	<i>Acres</i>
Asphalt/Concrete:	4,168	0.096
Other:	0	0.000

BASIN AREA

	<i>SF</i>	<i>Acres</i>
Total Impervious Area (IA):	4,168	0.096
Total Permeable Area (PA):	134	0.003
Total Basin Area:	4,302	0.099

RUNOFF COEFFICIENT (C)

Impervious Area (C_{IA}) =	0.90
Permeable Area (C_{PA}) =	0.40

*Reference Table 13.5, Page 677, Hydrology and Hydraulic Systems, 2nd Addition - Gupta

COMPOSITE RUNOFF COEFFICIENT (C)

	<i>unitless</i>
$C = IA (C_{IA}) + PA (C_{PA}) / \text{Total Basin Area} =$	0.88

RAINFALL INTENSITY (i)

	<i>in/hr</i>
25-year event at T_c =	3.24

*Reference EWSM method for deriving T_c

POST-DEVELOPMENT

TIME OF CONCENTRATION (T_C)

		<i>minutes</i>	
T_C	=	5.0	(5 minute minimum)
	$T_C = L / (K(S^{1/2}))$:	2.1	min
	L:	115	ft
	K:	1200	ft/min (Ground Cover Coeff)
	S:	0.002	ft/ft

*EASTERN WASHINGTON REGIONAL STORMWATER MANUAL - 5.5.2 TIME OF CONCENTRATION, Equation 5-12; $T_C = L / (K (S^{1/2}))$

Common Ground Cover Coefficients "K" from Table 5-6 (WSDOT Hydraulics Manual, March 2004): (Lawn = 420); (Nearly Bare Ground = 600); (Roadside Ditch with Grass = 900); (Paved area = 1,200); (Gutter Flow = 4" = 1,500, 6" = 2,400, 8" = 3,100); (Open Channel Flow ($n=0.040$)= 1,100)

STORMWATER PEAK FLOW RATE (Q)

		<i>cfs</i>	
$Q = C i A$	=	0.28	

Basin: I

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Bowstring Method

*Reference Bowstring Method, Page 5-23, Spokane Regional Stormwater Manual, April 2008

BOWSTRING METHOD NOTES FOR SPREADSHEET DEVELOPMENT

1. Rainfall Intensity Coefficients , m and n, for Spokane County, derived by NOAA, under Atlas 2

$$\text{Where } i = m/T_c^n \qquad m = 9.43 \qquad n = 0.664$$

*Reference NOAA Atlas 2 for 25-year Event Coefficients for the Eastern Washington/Adams Co. Area

2. Hydrograph Volume (V_t) is derived through the use of the following equations:

$$\text{When } t \leq T_c \text{ use } T_c = 1.34 \times Q \times t \quad \text{and} \quad \text{When } t > T_c, \text{ use } T_c = (Q \times t) + (0.34 \times Q \times T_c)$$

3. Outflow Volume (V_{out}) was derived by multiplying the outflow rate by the event duration in seconds

4. $Q_{out} = 0.00$ cfs, 1 IN/HR INFILTRATION (ASSUMED)

t <i>(min)</i>	t <i>(sec)</i>	i <i>in/hr</i>	Q <i>cfs</i>	V_t <i>CF</i>	Q_{out} <i>cfs</i>	V_{out} <i>CF</i>	Required Storage <i>CF</i>
5	300	3.24	0.283	113.73	0	0	114
10	600	2.04	0.179	143.55	0	0	144
15	900	1.56	0.136	164.50	0	0	165
20	1200	1.29	0.113	181.20	0	0	181
25	1500	1.11	0.097	195.31	0	0	195
30	1800	0.99	0.086	207.65	0	0	208
35	2100	0.89	0.078	218.68	0	0	219
40	2400	0.81	0.071	228.72	0	0	229
45	2700	0.75	0.066	237.95	0	0	238
50	3000	0.70	0.061	246.53	0	0	247
55	3300	0.66	0.058	254.55	0	0	255
60	3600	0.62	0.054	262.10	0	0	262
65	3900	0.59	0.052	269.25	0	0	269
70	4200	0.56	0.049	276.04	0	0	276
75	4500	0.54	0.047	282.51	0	0	283
80	4800	0.51	0.045	288.70	0	0	289
85	5100	0.49	0.043	294.64	0	0	295

POST-DEVELOPMENT

90	5400	0.48	0.042	300.36	0	0	300
95	5700	0.46	0.040	305.86	0	0	306
100	6000	0.44	0.039	311.18	0	0	311
105	6300	0.43	0.037	316.32	0	0	316
110	6600	0.42	0.036	321.31	0	0	321
115	6900	0.40	0.035	326.14	0	0	326
120	7200	0.39	0.034	330.84	0	0	331
125	7500	0.38	0.033	335.41	0	0	335
130	7800	0.37	0.033	339.86	0	0	340
135	8100	0.36	0.032	344.19	0	0	344
140	8400	0.35	0.031	348.43	0	0	348
145	8700	0.35	0.030	352.56	0	0	353
150	9000	0.34	0.030	356.60	0	0	357
155	9300	0.33	0.029	360.55	0	0	361
160	9600	0.32	0.028	364.41	0	0	364
165	9900	0.32	0.028	368.20	0	0	368
170	10200	0.31	0.027	371.91	0	0	372
175	10500	0.31	0.027	375.55	0	0	376
180	10800	0.30	0.026	379.13	0	0	379
360	21600	0.19	0.017	478.55	0	0	479
720	43200	0.12	0.010	604.05	0	0	604
1440	86400	0.08	0.007	762.47	0	0	762

POST-DEVELOPMENT

Basin: I

Project: SAND HILL ESTATES II

Location: CITY OF OTHELLO, WA - MT. ADAMS STREET

Date: November 2, 2019

Design Summary

Required Swale Treatment Volume:	108	CF	V = 1133* (Imp Asphalt/Conc. Area in acres)
Proposed Swale Depth:	0	FEET*, or	0 inches*
Provided Swale Bottom Area:	0	SF	(See plan for swale bottom area dimensions)
Provided Swale Treatment Volume:	0	CF	(Swale bottom area multiplied by the swale depth to top of finish grade or rim of drywell)

STORMWATER DRAINS SOUTH TO CATCHBASIN AT OLYMPIA/14TH

Notes

MAXIMUM BOWSTRING REQUIRED STORAGE: 762 CF