CIVIL CONSULTANTS, INC.

October 19, 2024

El Paso County
Planning & Community Development
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Attn.: Project Manager

RE: Dwire Storage Yard Filing No.1
Private Detention/Stormwater Quality Pond 1

Dear Project Manager:

The construction drawings for "Dwire Yard – Stormwater & Detention Pond Plans" were made to construct a water quality and stormwater detention facility and associated outlet works for the development.

Based upon this information and periodic site visits to the project during significant/key phases of the stormwater BMP installation, M&S Civil Consultants, Inc. is of the opinion that the stormwater BMPs have been constructed in general compliance with the approved design plans, and specifications as filed with El Paso County.

Statement Of Engineer In Responsible Charge
To the best of my knowledge, information and belief, for the referenced project above, the improvements have been constructed in general compliance with the approved design plans and specifications as filed with El Paso County to provide the required storage volume and meet the required release rates documented by the SDI design form, the stage areas, elevations and outlet dimensions. In addition, to the best of my knowledge, information and belief, for the referenced project above, the site and adjacent properties (as affected by work performed under the County permit) are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, revegetation or other ground cover, and that the improvements (public improvements, common development improvements, site grading and paving) meet or exceed the minimum design requirements.

Virgil A. Sanchez
Colorado P.E. No.37160
For and on behalf of M&S Civil Consultants, Inc.

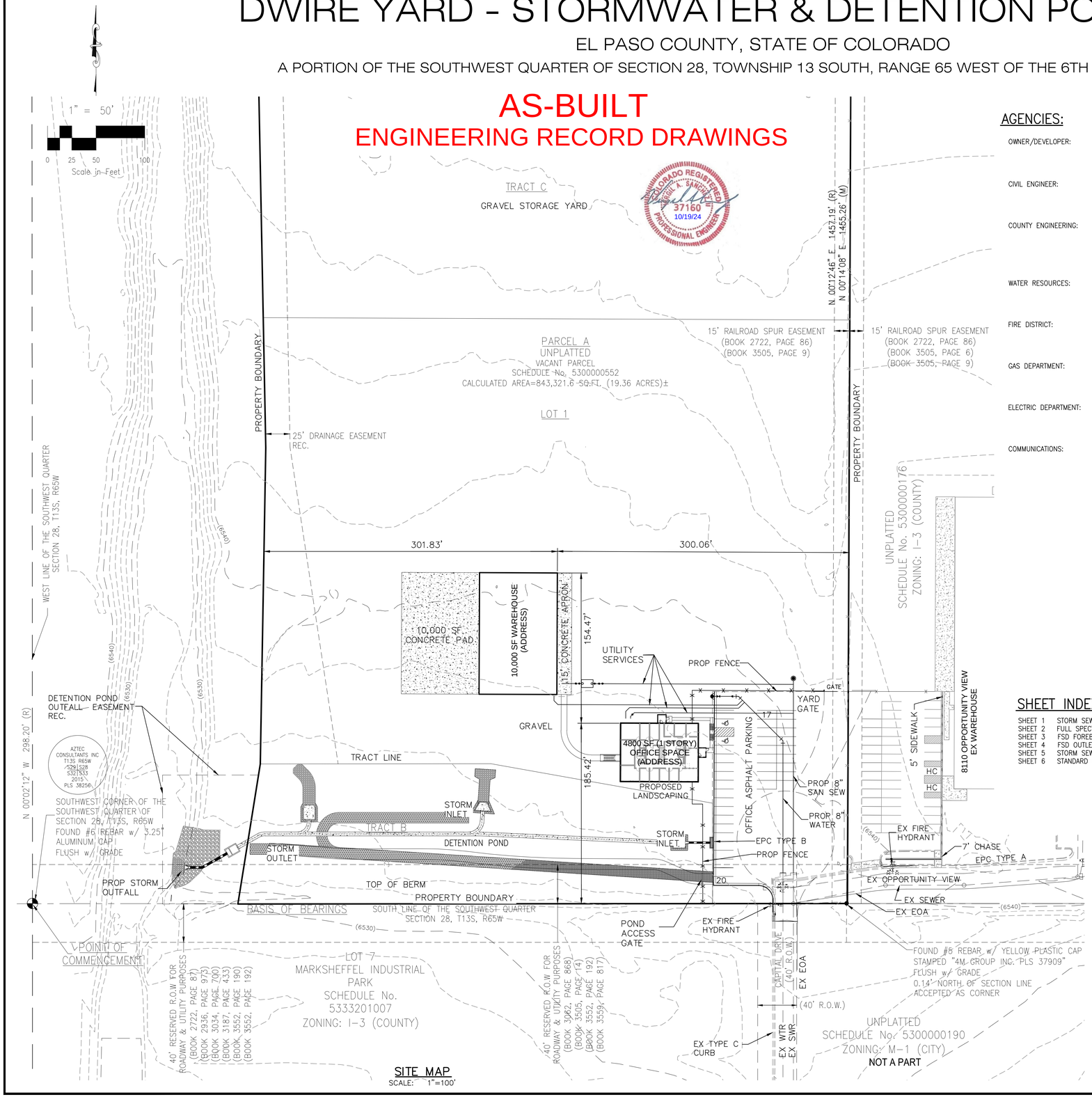
DWIRE YARD - STORMWATER & DETENTION POND PLANS

EL PASO COUNTY, STATE OF COLORADO

A PORTION OF THE SOUTHWEST QUARTER OF SECTION 28, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN,

AS-BUILT

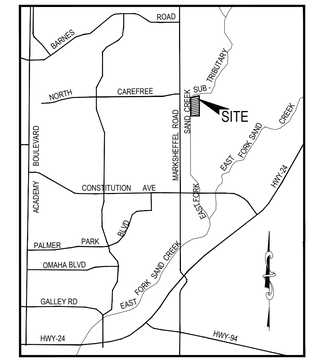
ENGINEERING RECORD DRAWINGS



SITE MAP
SCALE: 1"=100'

AGENCIES:

OWNER/DEVELOPER:	DL HOLDINGS LLC 6547 N. ACADEMY BLVD #523 COLORADO SPRINGS, CO 80918 JEFF DWIRE (719) 574-7123
CIVIL ENGINEER:	M & S CIVIL CONSULTANTS, INC. 102 E. PIKES PEAK AVE, SUITE 500 COLORADO SPRINGS, CO 80903 VIRGIL A. SANCHEZ P.E. (719) 955-5485
COUNTY ENGINEERING:	EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT 2880 INTERNATIONAL CIRCLE, SUITE 110 COLORADO SPRINGS, CO 80910 JEFF RICE, P.E. (719) 520-6300
WATER RESOURCES:	CHEROKEE METRO DISTRICT 6250 PALMER PARK, BLVD COLORADO SPRINGS, CO 80915 JEFF MUNGER (719) 597-5080
FIRE DISTRICT:	FALCON FIRE DISTRICT 7030 OLD MERIDIAN ROAD FALCON, CO 80831 CHIEF TRENT HARWIG (719) 495-4050
GAS DEPARTMENT:	COLORADO SPRINGS UTILITIES 7710 DURANT DR. COLORADO SPRINGS, CO 80947 TIM WENDT (719) 668-3556
ELECTRIC DEPARTMENT:	MOUNTAIN VIEW ELECTRIC 11140 E. WOODMEN ROAD FALCON, CO 80831 (719) 495-2283
COMMUNICATIONS:	QWEST COMMUNICATIONS (U.N.C.C. LOCATORS) (800) 922-1987 AT&T (LOCATORS) (719) 635-3674



VICINITY MAP
N.T.S.

SHEET INDEX:

DESIGN ENGINEER'S STATEMENT

THESE DETAILED PLANS ANS SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

1-29-21

VIRGIL A. SANCHEZ, COLORADO P.E. #37160
FOR AND ON BEHALF OF M & S CIVIL CONSULTANTS, INC. DATE

OWNER/DEVELOPER'S STATEMENT:

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH ALL OF THE REQUIREMENTS SPECIFIED IN THESE DETAILED PLANS AND SPECIFICATIONS.

NAME: 2-1-21 DATE

DL Holdings, LLC
BUSINESS NAME:

6799 Bismark Rd. Suite A Colorado Springs, CO 80918
ADDRESS:

EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

APPROVED
Engineering Department
03/17/2021 12:26:08 PM
dsdnijkamp
EPC Planning & Community Development Department

JENNIFER IRVINE, P.E.
COUNTY ENGINEER / ECM ADMINISTRATOR

EL PASO COUNTY FILE NO. MS 20-002

DWIRE YARD
STORM SEWER & DETENTION POND PLANS
PROJECT NO. 43-117 | DATE: 11/16/2020 | SHEET 1 OF 6 | ST01
SCALE: HORIZONTAL: 1"=50' VERTICAL: N/A
DESIGNED BY: DLM
DRAWN BY: JP
CHECKED BY: VAS

102 E. PIKES PEAK AVE, SUITE 500
COLORADO SPRINGS, CO 80903
PHONE: (719) 955-5485
CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M & S CIVIL CONSULTANTS, INC.
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:

APPR'D. BY: DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

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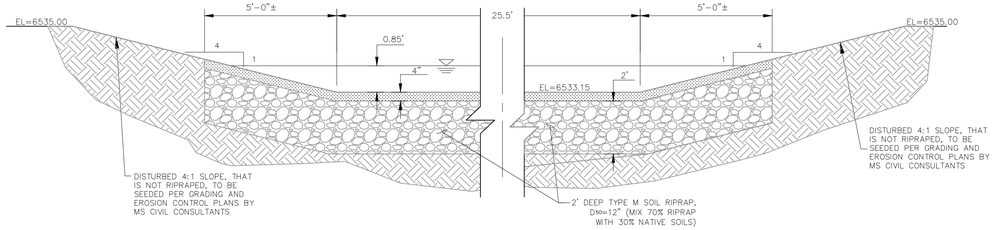
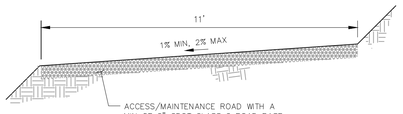


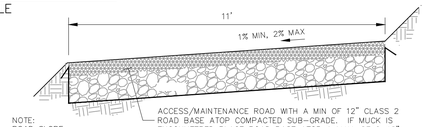
SECTION A-A, EMERGENCY SPILLWAY

NOT TO SCALE



MAINTENANCE & ACCESS ROAD ABOVE EURV TYPICAL SECTION

NOT TO SCALE



MAINTENANCE & ACCESS ROAD BELOW EURV TYPICAL SECTION

NOT TO SCALE

FULL SPECTRUM DETENTION POND DATA
WQ WATER SURFACE EL=6530.15
WQ VOLUME=0.453 AC-FT
EURV WATER SURFACE EL=6532.01
EURV VOLUME=1.519 AC-FT
100-YR WATER SURFACE EL=6533.15
SPILLWAY CREST EL=6533.15
TOP OF EMBANKMENT EL=6535.00
100-YR VOLUME=2.352 AC-FT
100-YR INFLOW=60.4 CFS
100-YR RELEASE=17.5 CFS

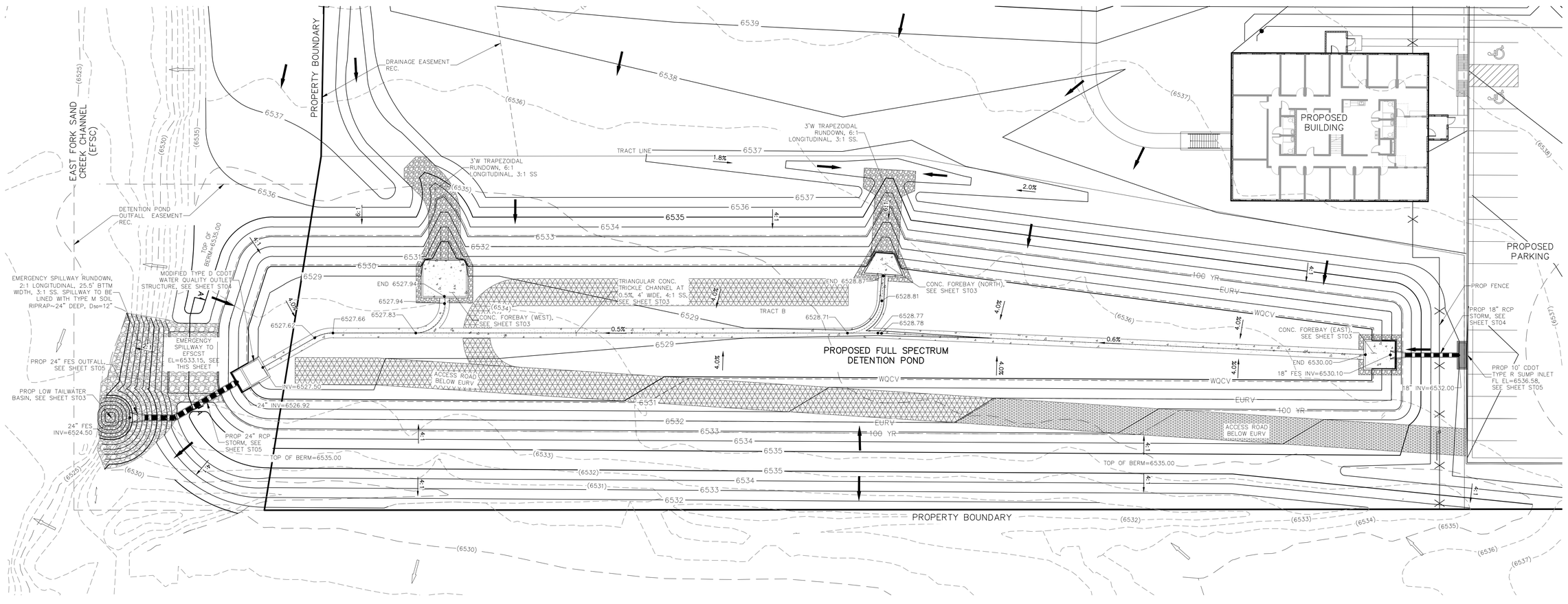
LEGEND

EX	EXISTING
PROP	PROPOSED
6536	PROP MAJ CONT
	PROP MIN CONT
(6536)	EXIST MAJ CONT
	EXIST MIN CONT
100 YR	100YR FLOODPLAIN
	RIPRAP TYP.
	STABILIZED MAINTENANCE ROAD ABOVE EURV
	STABILIZED MAINT. ROAD BELOW EURV
	CONCRETE LOW FLOW CHANNEL
	SC250 EROSION CONTROL MATTING
	EX. FLOW ARROW
	PROP. FLOW ARROW
	PROPERTY LINE
	PROP STORM SEWER PIPE

1" = 20'

0 10 20 40

Scale in Feet



FULL SPECTRUM DETENTION POND SITE PLAN

SCALE 1"=20'

AS-DESIGNED

EPC 3/17/2021

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER APPROVAL DATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

DWIRE STORAGE YARD

FULL SPECTRUM DETENTION POND SITE PLAN

PROJECT NO. 43-117 | DATE: 11/16/2020 | SHEET 2 OF 6 | ST02

DESIGNED BY: CMN | SCALE: HORIZONTAL: 1"=20' | VERTICAL: N/A

DRAWN BY: CMN

CHECKED BY: VAS

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF MS CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REGISTERED PROFESSIONAL ENGINEER
VIRGIL A. SANCHEZ
37160
1-29-21

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:	APPV'D. BY:	DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

File: O:\43117A-Dwire Yard\Dwire Yard\dwg\Const Dwg\ST01.dwg Plotstamp: 11/16/2020 9:56 AM

POND CERTIFICATION

FOREBAY INLETS

DESIGNED INVERT 18" IN (E) = 6530.10', SURVEY INVERT 18" IN (E) = 6530.16'
DESIGNED FLOOR (E) = 6530.00', SURVEY FLOOR (E) = 6530.08'
DESIGNED FLOOR (NW) = 6527.94', SURVEY FLOOR (NW) = 6527.86'
DESIGNED FLOOR (N) = 6528.87', SURVEY FLOOR (N) = 6528.86'

OUTLET STRUCTURE

DESIGNED LF CHANNEL INVERT IN = 6527.50', SURVEY INVERT IN = 6527.19'
DESIGNED 24" INVERT OUT (W) = 6526.92', SURVEY 24" INVERT OUT (W)= 6526.96'
DESIGNED TOP CONC. BOX/GRATE = 6532.01', SURVEY TOP CONC. GRATE = 6532.26'

SPILLWAY (EDB)

DESIGNED SPILLWAY ELEVATION = 6533.15', SURVEY SPILLWAY ELEVATION = 6533.76'

VOLUME

DESIGNED VOLUME = 2.352 ACRE FEET @ 6533.15' (100 YR SURFACE)
PROVIDED VOLUME = 2.352 ACRE FEET @ 6533.31' (100 YR SURFACE)

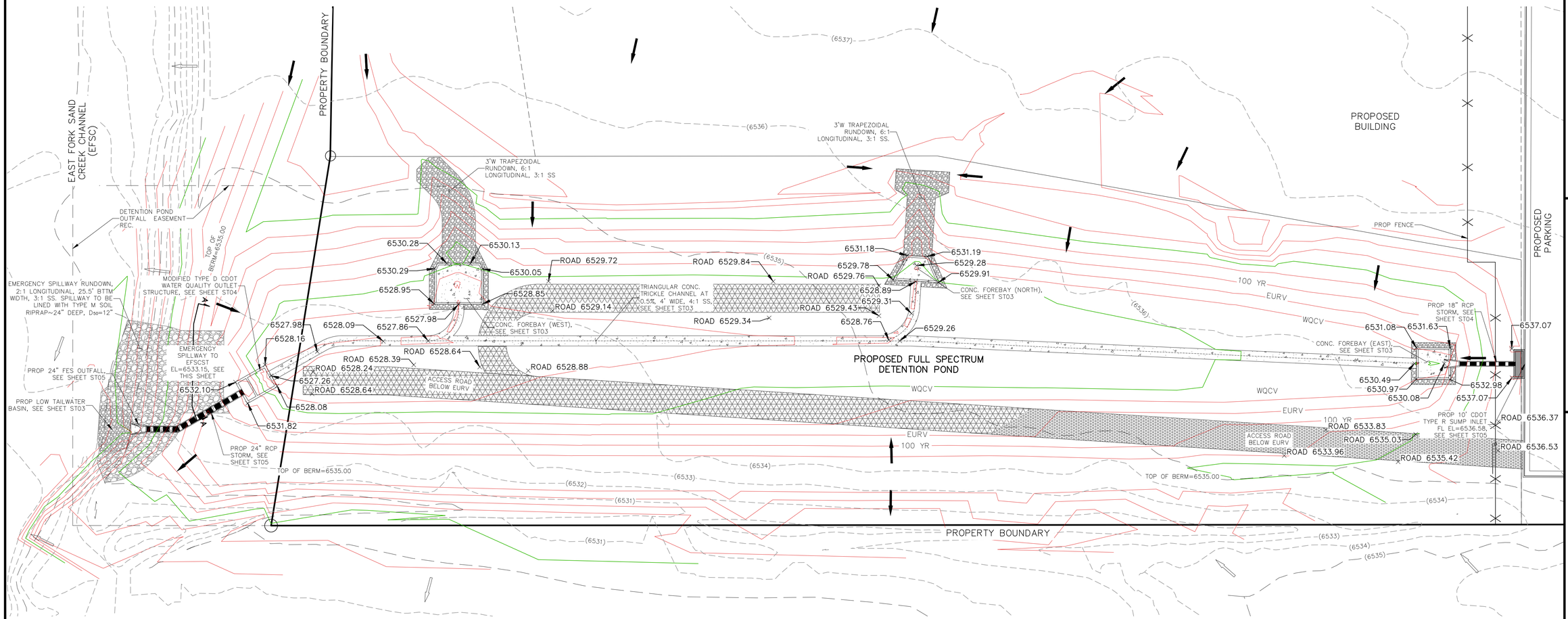
AS-BUILT FULL SPECTRUM DETENTION POND DATA
WQ WATER SURFACE EL=6530.33
WQ VOLUME=0.456 AC-FT
EURV WATER SURFACE EL=6532.21
EURV VOLUME=1.523 AC-FT
100-YR WATER SURFACE EL=6533.31
SPILLWAY CREST EL=65.
TOP OF EMBANKMENT EL=65.
100-YR VOLUME=2.352 AC-FT
100-YR INFLOW=60.4 CFS
100-YR RELEASE=18.2 CFS

LEGEND

EX EXISTING
PROP PROPOSED
ASBUILT MAJ CONT
ASBUILT MIN CONT
EXIST MAJ CONT
EXIST MIN CONT
100 YR 100YR FLOODPLAIN
RIPRAP TYP.
STABILZED MAINTENANCE ROAD ABOVE EURV
STABILIZED MAINT. ROAD BELOW EURV
CONCRETE LOW FLOW CHANNEL
SC250 EROSION CONTROL MATTING
EX. FLOW ARROW
PROP. FLOW ARROW
PROPERTY LINE
PROP STORM SEWER PIPE

1" = 20'
0 10 20 40
Scale in Feet

AS BUILT



FULL SPECTRUM DETENTION POND SITE PLAN
SCALE 1"=20'

DWIRE STORAGE YARD
FULL SPECTRUM DETENTION POND SITE PLAN
PROJECT NO. 43-117 | DATE: 05/18/2022 | SHEET 3 OF | ST02AB
SCALE: HORIZONTAL: 1"=20' VERTICAL: N/A
DESIGNED BY: CMN DRAWN BY: CMN CHECKED BY: VAS

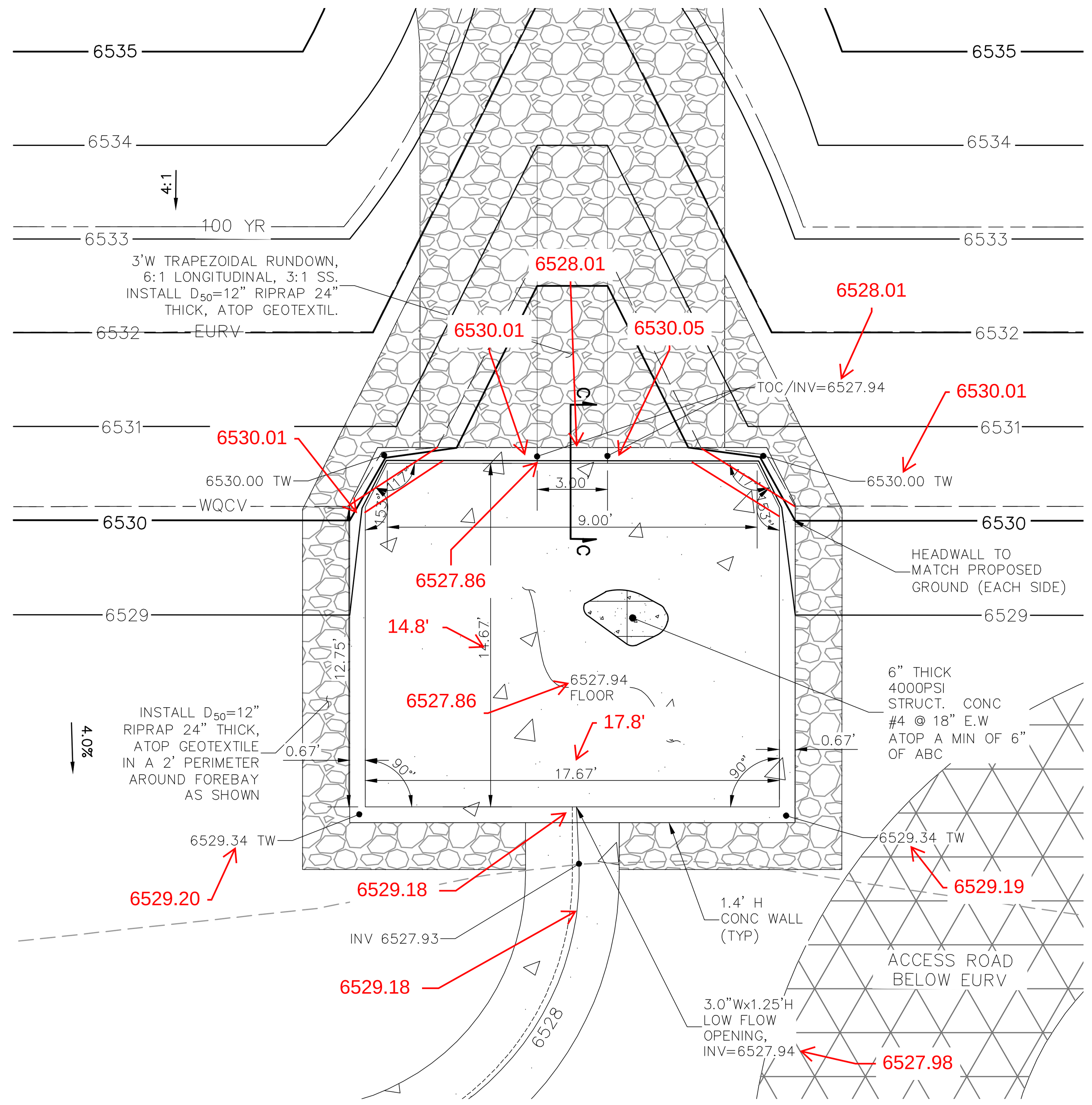
212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.
VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS:

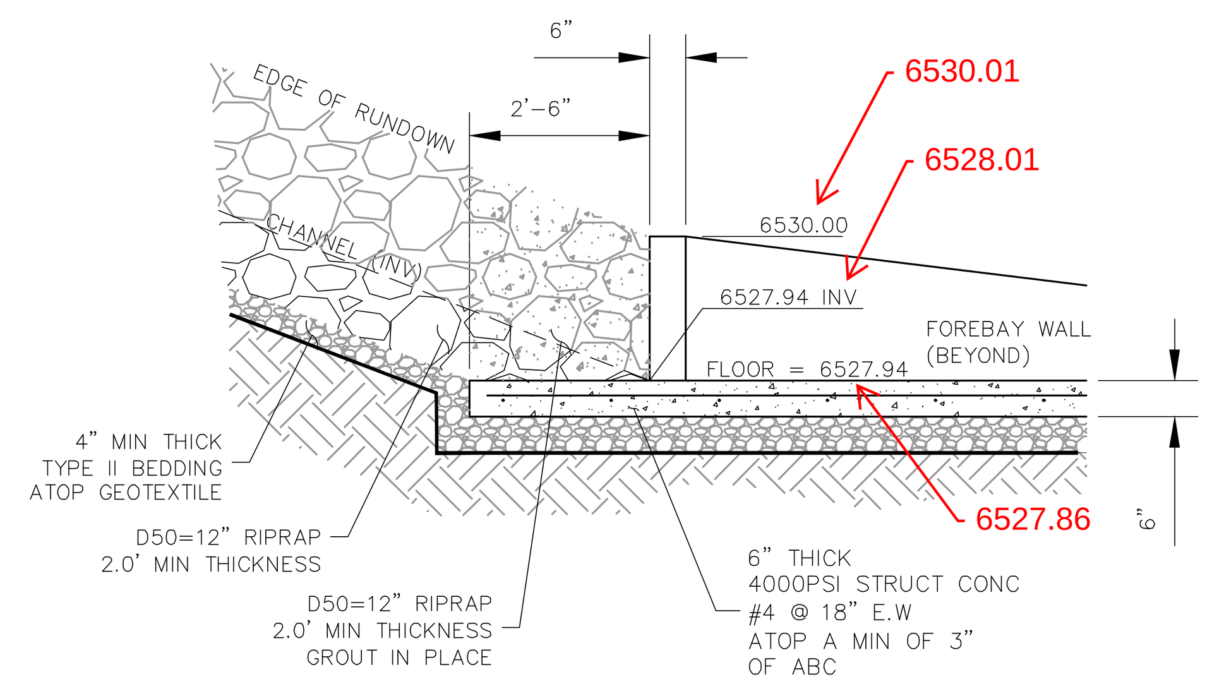
NO.	DATE:	BY:	DESCRIPTION:	APRV'D. BY:	DATE:

File: O:\Archive G Drive\43117A-Dwire Yard\Dwire Yard\dwg\Survey\Pond Asbuilt\43117-Dwire Yard As-Built-10-3-24.dwg Plotstamp: 11/1/2024 11:50 AM



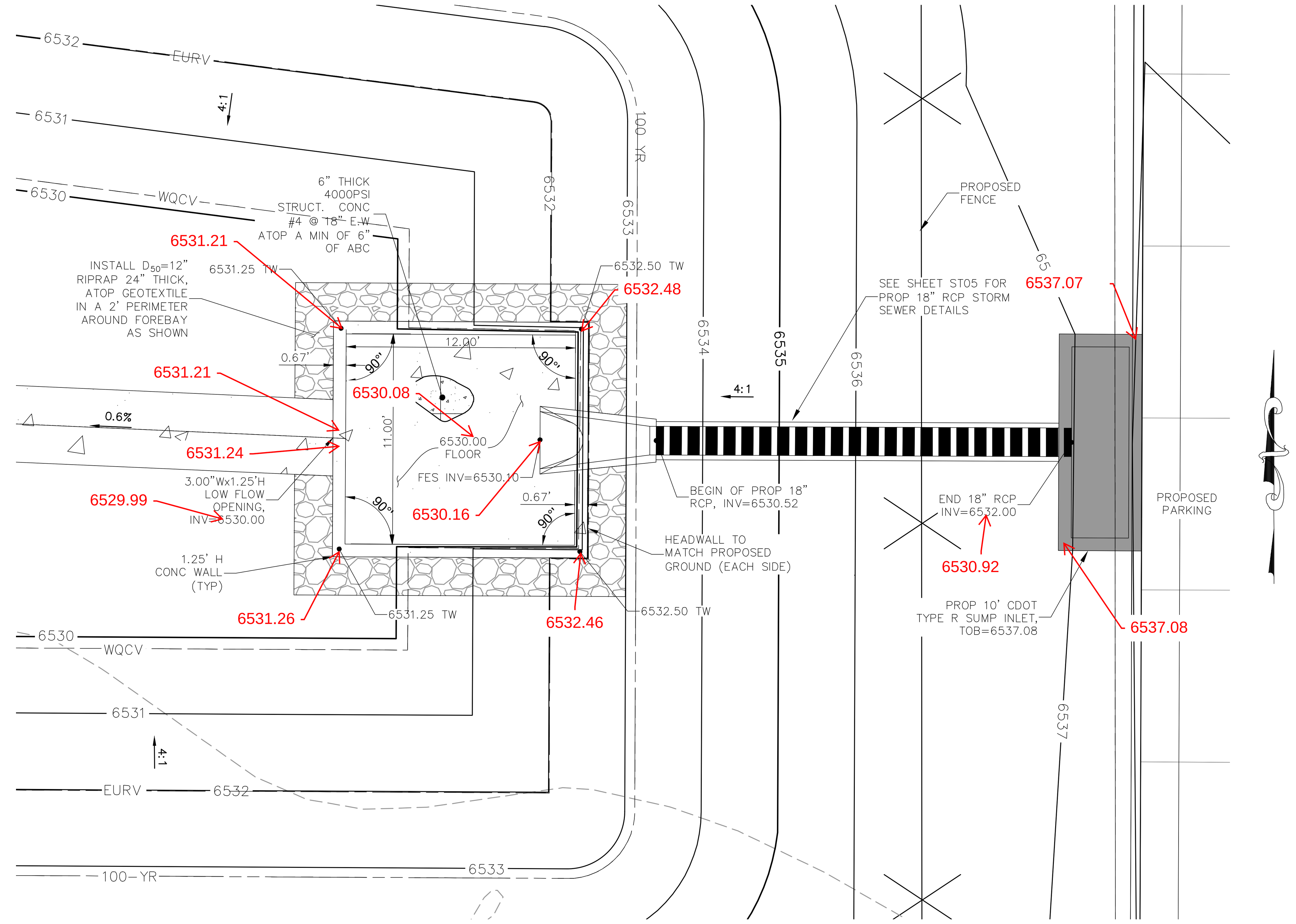
WEST FOREBAY

NTS



SECTION C-C
W FOREBAY RIPRAP RUNDOWN/FOREBAY INTERFACE

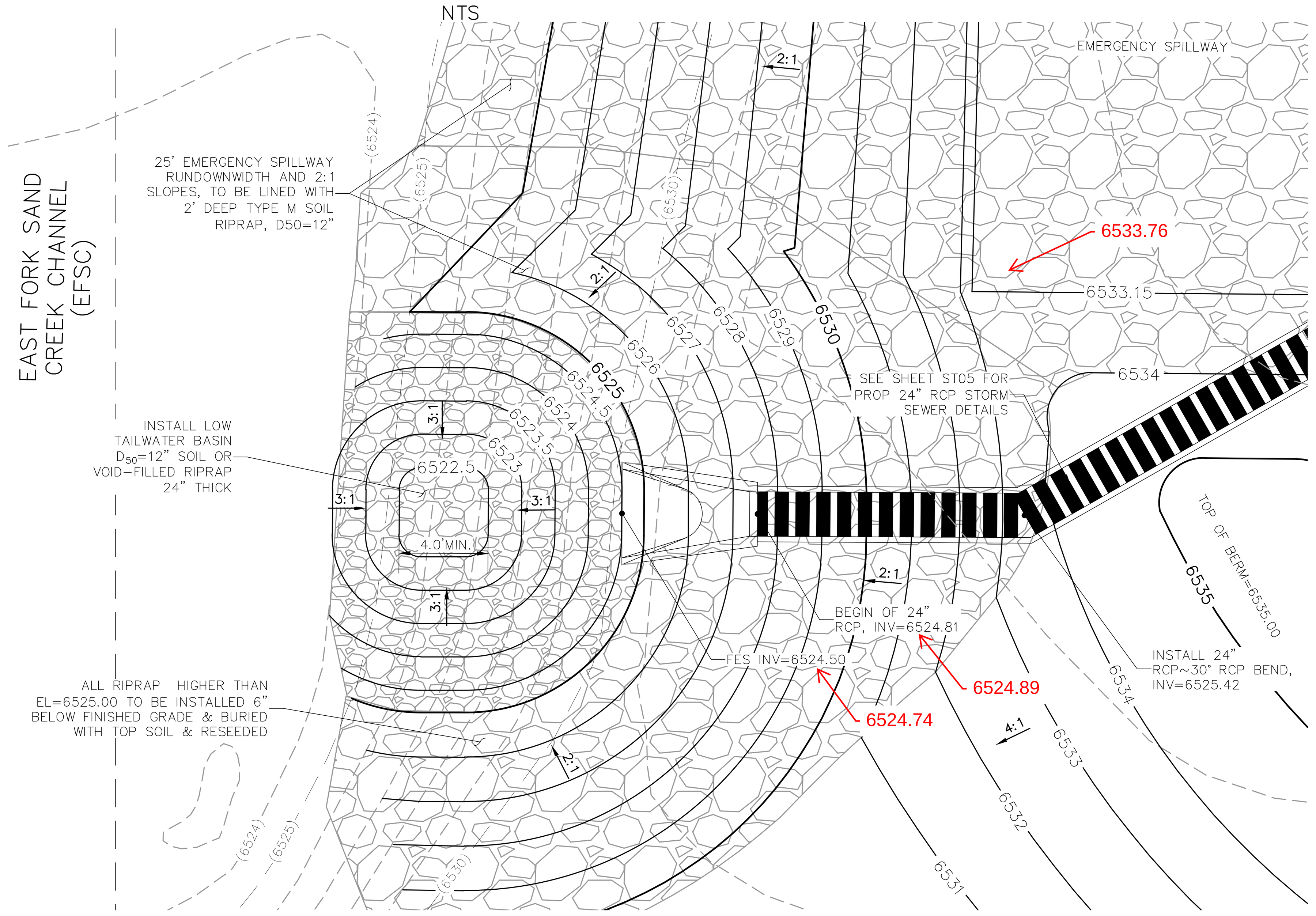
NOT TO SCALE



EAST FOREBAY & 18" STORM SEWER

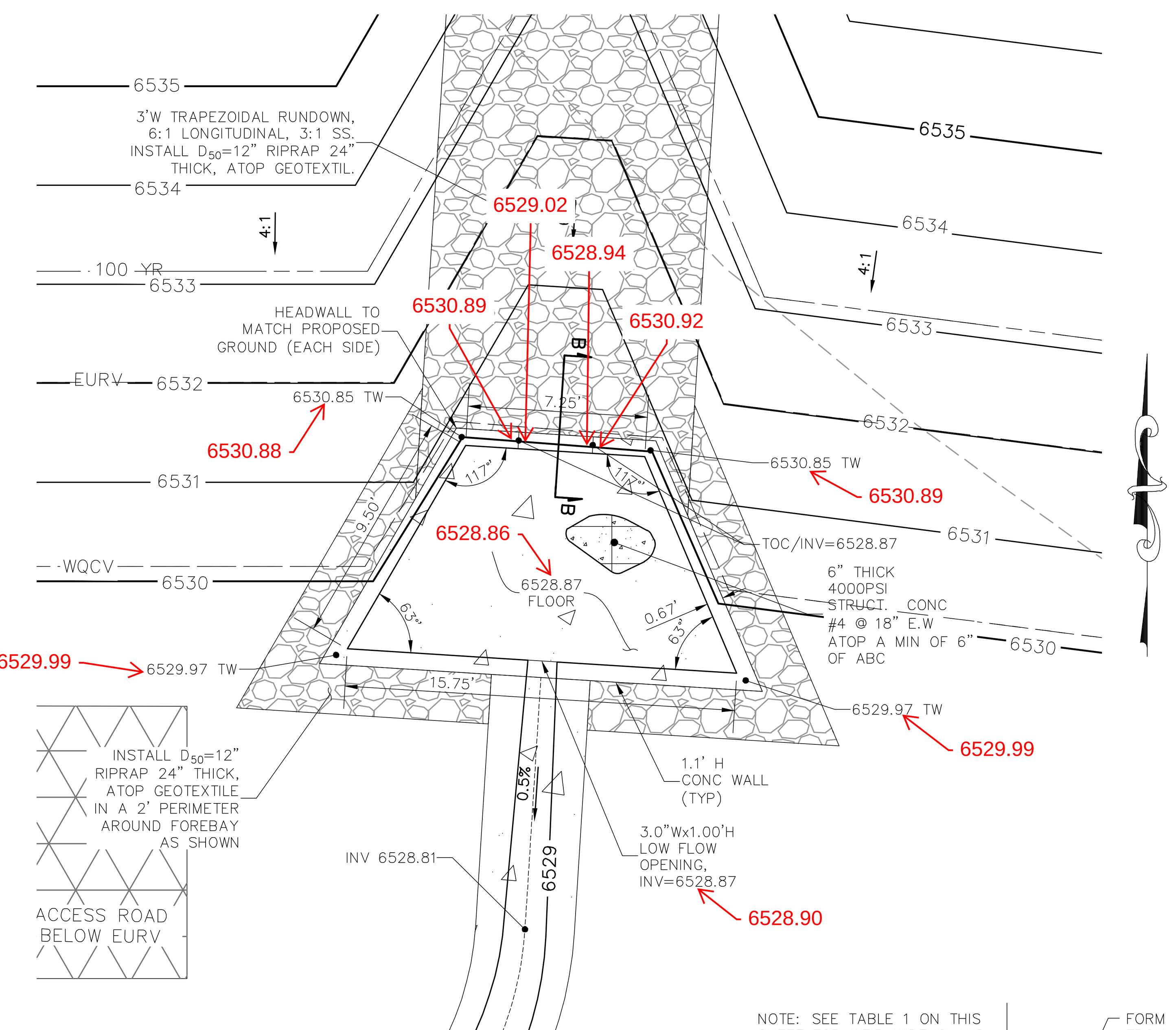
NTS

AS-BUILT
ENGINEERING RECORD DRAWINGS



24" RCP OUTFALL TO EFSC

NTS



NORTH FOREBAY

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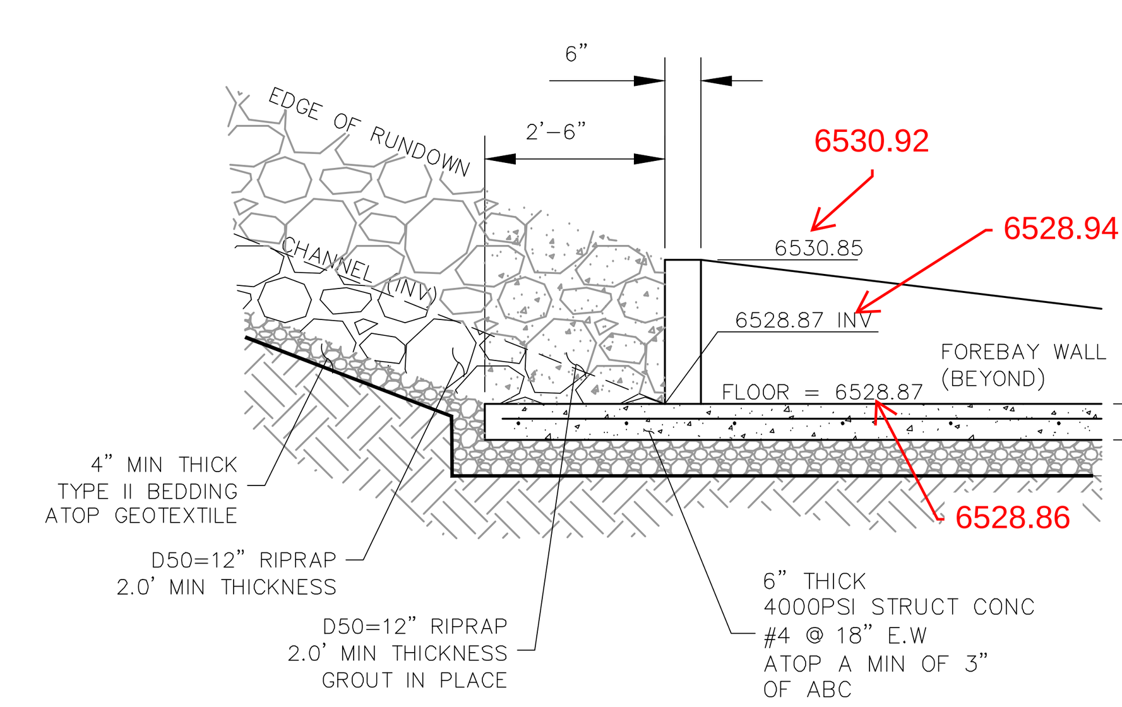
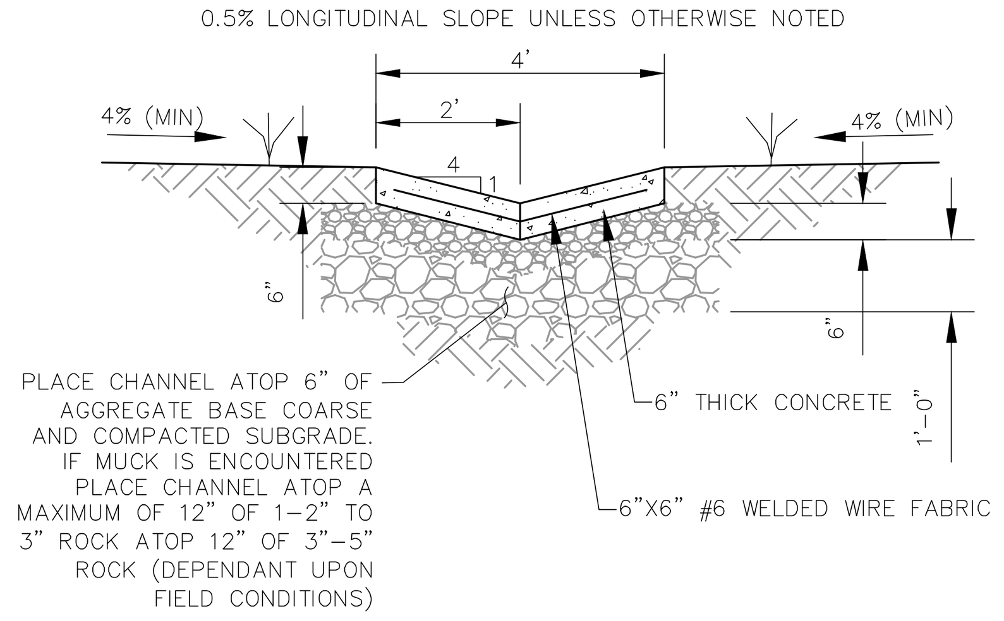


SECTION B-B
N FOREBAY RIPRAP RUNDOWN/FOREBAY INTERFACE

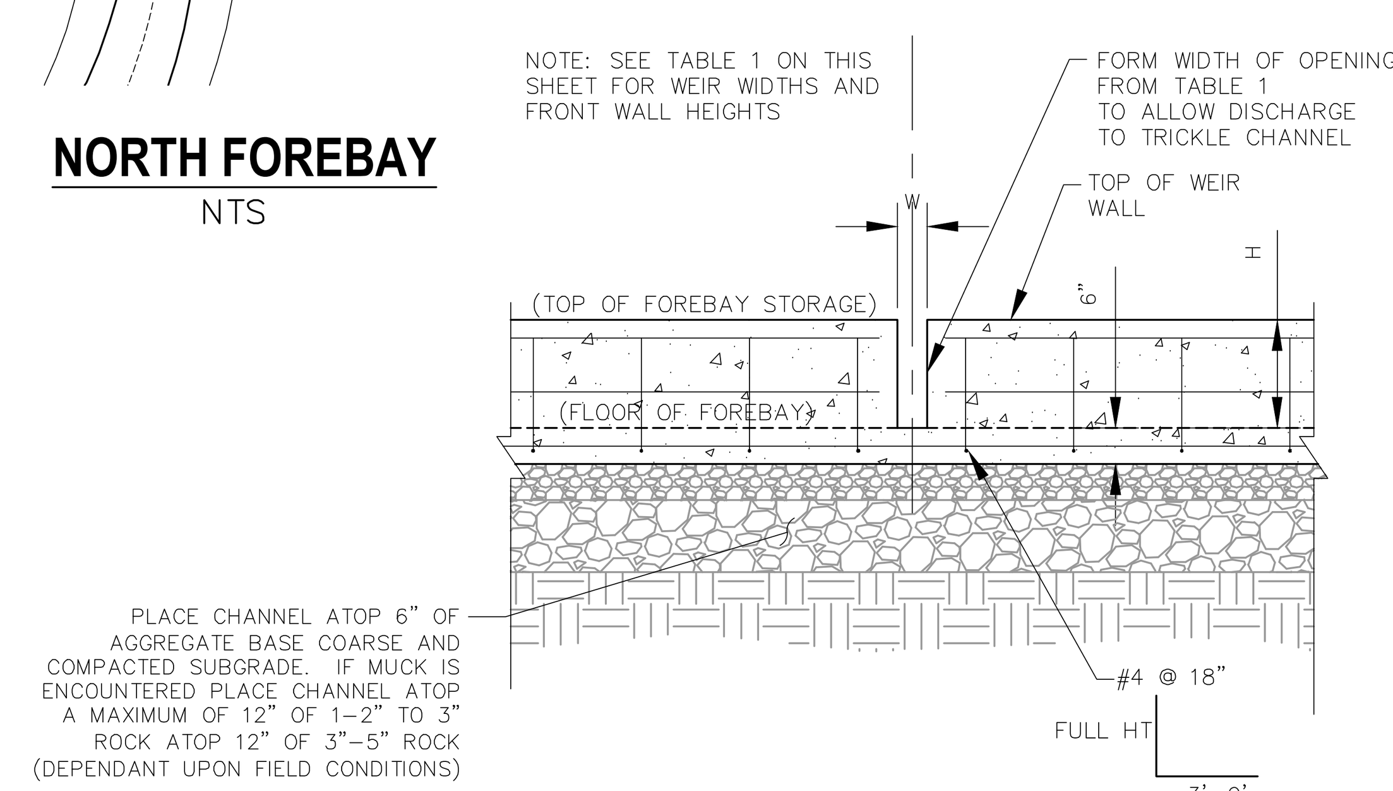
NOT TO SCALE



LOW FLOW CHANNEL TYPICAL SECTION

NOT TO SCALE

TABLE 1		
FOREBAY	WIDTH (W)	HEIGHT (H)
WEST	3.0" IN	1.4 FT
NORTH	3.0" IN	1.10 FT
EAST	3.0" IN	1.25 FT



TYPICAL FOREBAY FRONT WALL W/NOTCH

NOT TO SCALE

LEGEND

- EX — EXISTING
- PROP — PROPOSED
- PROP MAJ CONT
- PROP MIN CONT
- EXIST MAJ CONT
- EXIST MIN CONT
- 100YR FLOODPLAIN
- RIPRAP TYP.
- STABILZED MAINTENANCE ROAD ABOVE EURV
- STABILIZED MAINT. ROAD BELOW EURV
- CONCRETE LOW FLOW CHANNEL
- SC250 EROSION CONTROL MATTING
- EX. FLOW ARROW
- PROP. FLOW ARROW
- PROPERTY LINE
- PROP STORM SEWER PIPE

EPC 3/17/2021

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER APPROVAL DATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

DWIRE STORAGE YARD
FSD FOREBAY AND OUTFALL DETAILS

PROJECT NO. 43-117
DATE: 05/21/2020
SCALE: HORIZONTAL: N/A VERTICAL: N/A
DESIGNED BY: CMN
DRAWN BY: CMN
CHECKED BY: VAS
SHEET 3 OF 6
ST03

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.
COLORADO REGISTERED PROFESSIONAL ENGINEER VIRGIL A. SANCHEZ II 37160 1-29-21

NO.	DATE:	BY:	DESCRIPTION:	APRV'D. BY:	DATE:

REVISIONS:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

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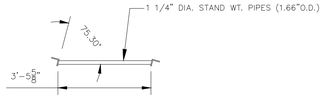

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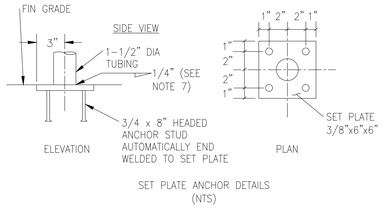
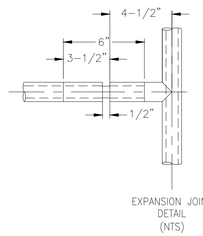
NOT TO SCALE



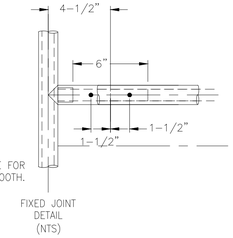
SET PLATE ANCHOR DETAILS
(NTS)



EXPANSION JOINT DETAIL
(NTS)

MECHANICAL TUBING, 1/4" MIN. WALL THICKNESS, 1/16" CHAMFER BOTH ENDS. REAM PIPE FOR SLIP FIT 0.03" MAX. CLEARANCE

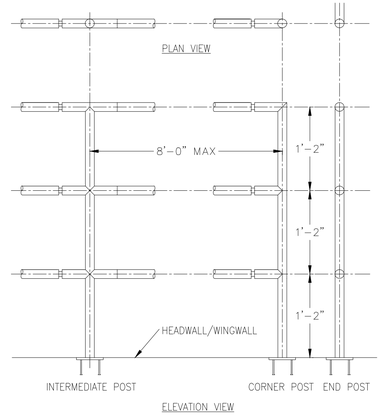
13/32" DRILL AND CSK. PIPE 1/16" DEEP BOTH SIDES. PROVIDE 3/8" DIA SOFT STEEL ROD SUITABLE FOR FIELD RIVETING, GRIND SMOOTH.



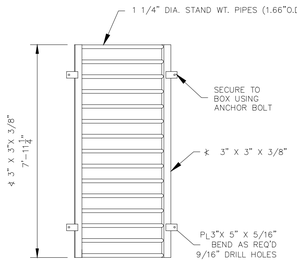
FIXED JOINT DETAIL
(NTS)

1) WELD PLATES MAY BE SUBSTITUTED FOR PIPE EMBEDMENT.
2) CONTRACTOR TO SUBMIT SHOP DRAWINGS TO ENGINEER OF RECORD FOR APPROVAL PRIOR TO FABRICATION.
3) DESIGN CRITERIA SHALL BE IN ACCORDANCE WITH AASHTO STANDARDS.
4) HANDRAIL DESIGN SHALL BE COMPATIBLE WITH THE DESIGN OF THE WINGWALLS AND HEADWALLS.
5) RAILING POSTS SHALL BE SET TO NORMAL TO GRADE. RAILS SHALL RUN PARALLEL TO THE SLOPES OF THE TOP OF WALLS
6) ALL RAILS SHALL BE FREE OF ANY SHARP EDGES OR CORNERS.

HANDRAIL ASSEMBLY DETAILS
NOT TO SCALE

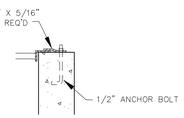


ELEVATION VIEW

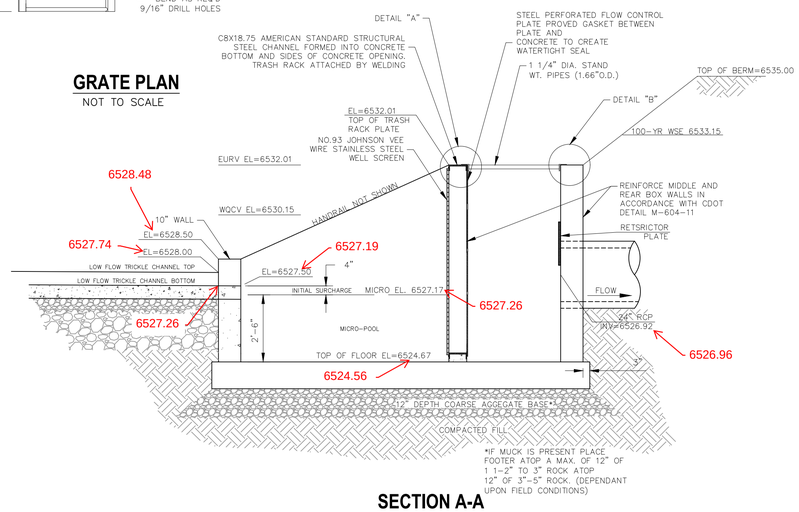


GRATE PLAN
NOT TO SCALE

GRATE DETAIL "A"



GRATE DETAIL "B"



SECTION A-A
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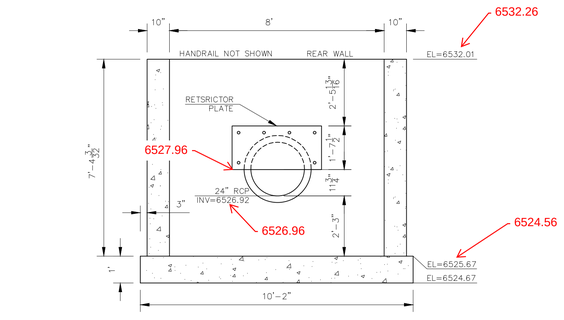

REAR WALL
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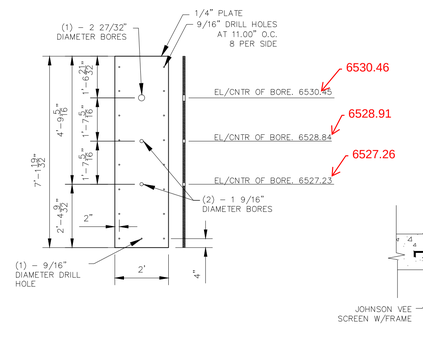
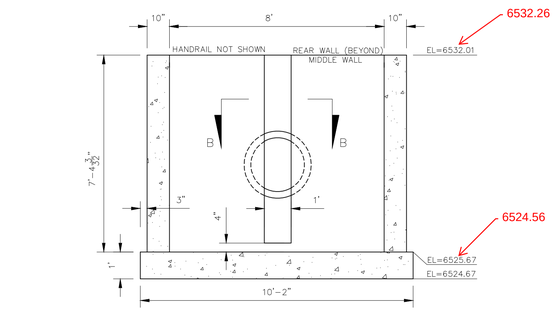


ORIFICE PLATE
NOT TO SCALE



MIDDLE WALL
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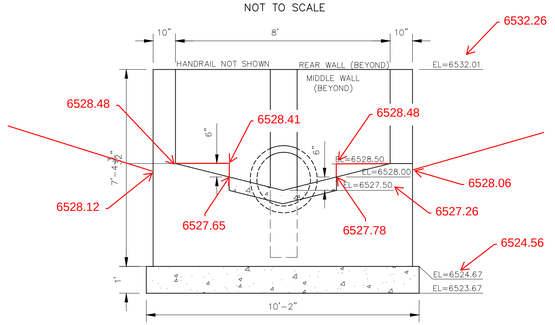
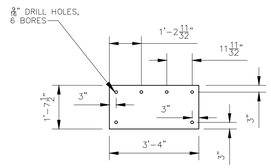


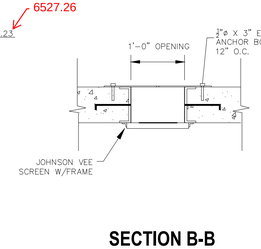
FRONT/STEM WALL
NOT TO SCALE



RESTRICTOR PLATE
NOT TO SCALE

NOTE:
ALL GRATES, IMBEDS, AND FASTENERS SHALL BE FABRICATED USING GALVANIZED STEEL, UNLESS OTHERWISE NOTED.

ALL GRATE DIMENSIONS TO BE FIELD VERIFIED PRIOR TO FABRICATION. ALL GRATE MATERIAL SHALL BE GALVANIZED.



SECTION B-B
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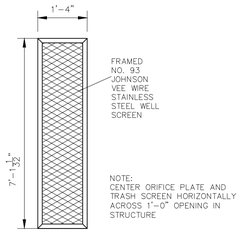

TRASH SCREEN DETAIL
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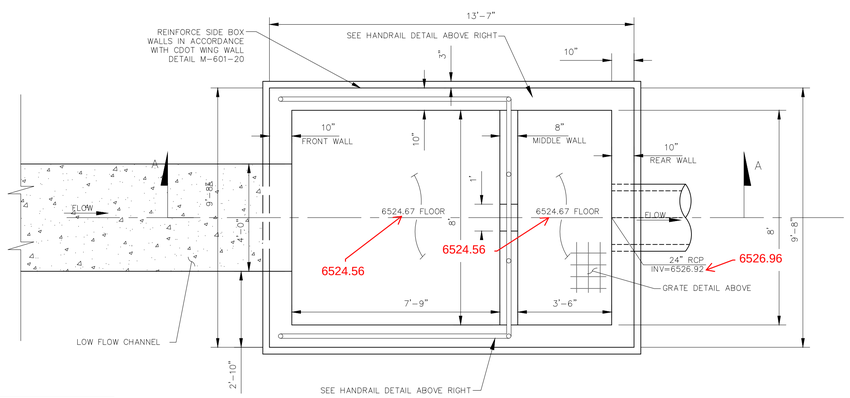

FDS POND WATER QUALITY OUTLET STRUCTURE
NOT TO SCALE

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
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CALL 1-800-922-1987

AS-BUILT
ENGINEERING RECORD DRAWINGS

EPC 3/17/2021

DWIRE STORAGE YARD
FSD OUTLET STRUCTURE DETAILS
PROJECT NO. 43-117 | DATE: 11/16/2020 | SHEET 4 OF 6 | ST04
SCALE: HORIZONTAL: N/A VERTICAL: N/A
DESIGNED BY: CMN
DRAWN BY: CMN
CHECKED BY: VAS

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

REVISIONS:
NO. | DATE: | BY: | DESCRIPTION:

APRVD. BY: | DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION

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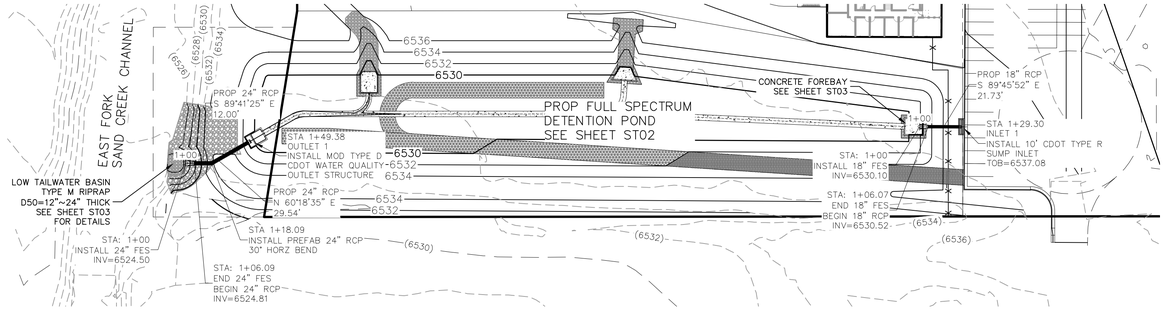
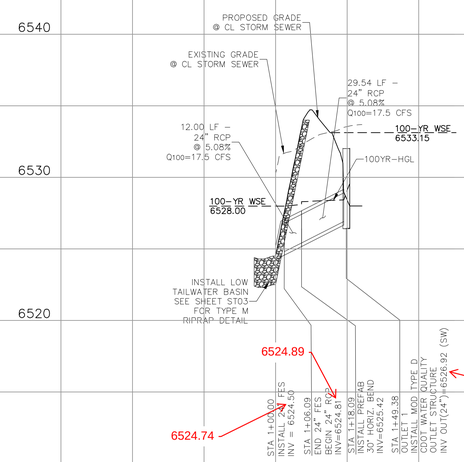


24" RCP OUTFALL
STA 1+00.00 TO STA 1+49.38

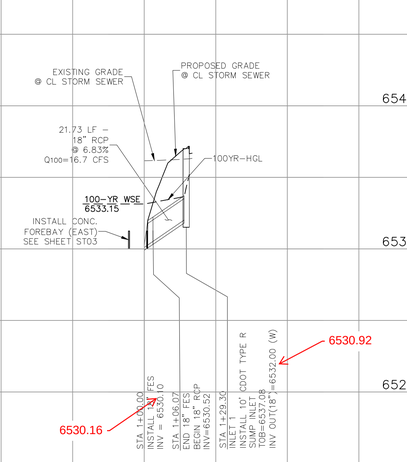
18" STORM SEWER
STA 1+00.00 TO STA 1+29.30

1" = 50'

0 25 50 100
Scale in Feet



24" RCP OUTFALL



18" STORM SEWER

AS-BUILT
ENGINEERING RECORD DRAWINGS

EPC 3/17/2021

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER APPROVAL DATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

DWIRE STORAGE YARD
STORM SEWER PLAN AND PROFILE

PROJECT NO. 43-117
DESIGNED BY: GT
DRAWN BY: JWP
CHECKED BY: GT
SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'
DATE: 11-16-20
SHEET 5 OF 6
ST05

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485
CIVIL CONSULTANTS, INC.

FOR AND ON BEHALF OF MVE CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS:

NO.	DATE:	BY:	DESCRIPTION:	APRV'D. BY:	DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

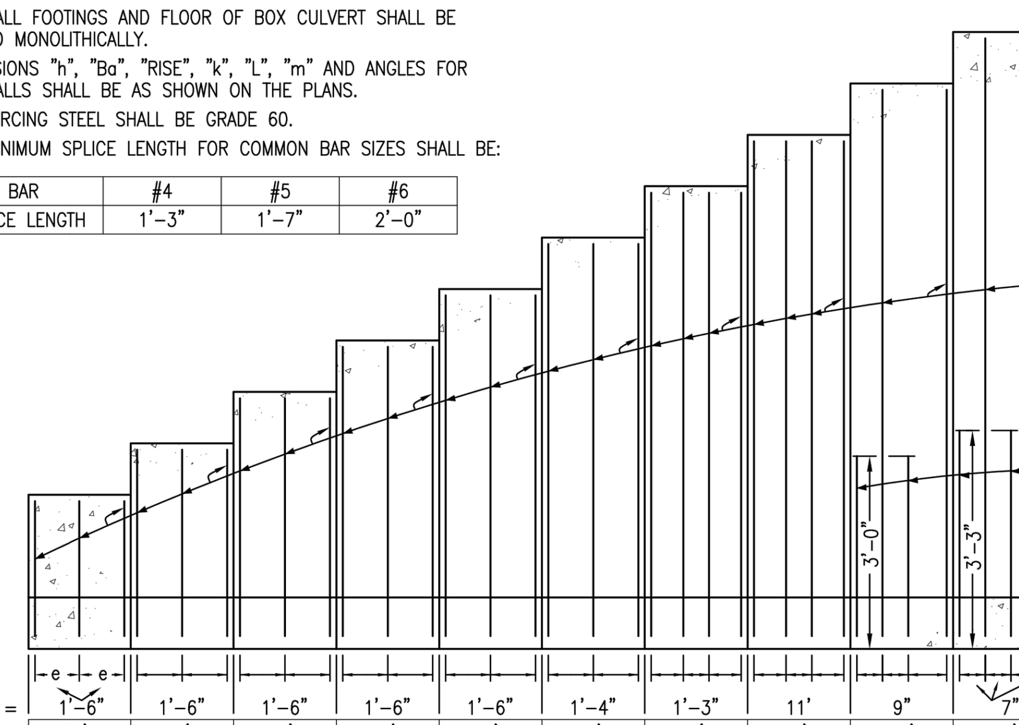
CAUTION

File: Q:\43117A-Dwire Yard\Dwire Yard\dwg\Const Dwg\ST05.dwg Plotstamp: 11/16/2020 3:01 PM

GENERAL NOTES

1. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN.
2. WINGWALL FOOTINGS AND FLOOR OF BOX CULVERT SHALL BE PLACED MONOLITHICALLY.
3. DIMENSIONS "h", "Ba", "RISE", "k", "L", "m" AND ANGLES FOR WINGWALLS SHALL BE AS SHOWN ON THE PLANS.
4. REINFORCING STEEL SHALL BE GRADE 60.
5. THE MINIMUM SPLICE LENGTH FOR COMMON BAR SIZES SHALL BE:

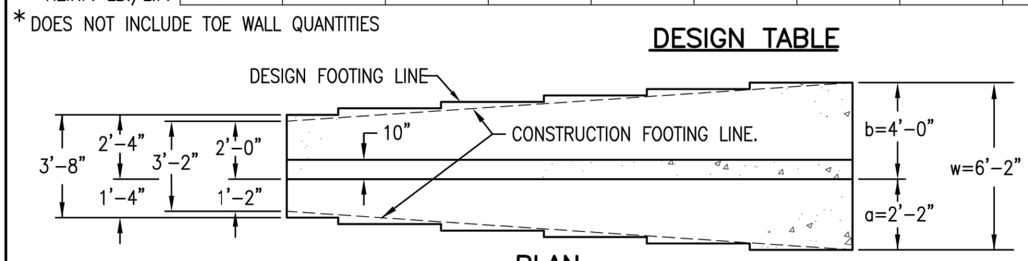
BAR	#4	#5	#6
SPLICE LENGTH	1'-3"	1'-7"	2'-0"



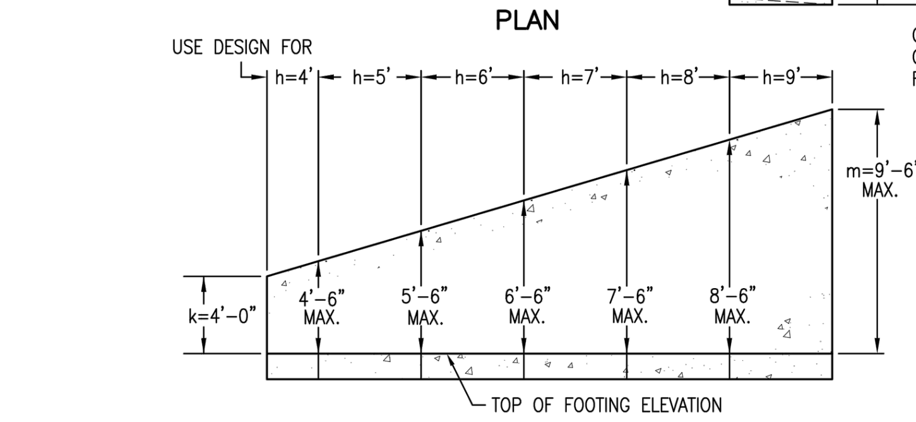
e =	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	1'-4"	1'-3"	11'	9"	7"	CTRS.
h =	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	
a =	1'-0"	1'-2'	1'-4"	1'-6'	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	
b =	1'-8"	2'-0"	2'-4'	2'-8'	3'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"	
w =	2'-8"	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	
c & d BARS	#4@1'-6"	#4@1'-6"	#4@1'-6"	#4@1'-6"	#4@1'-6"	#4@1'-4"	#5@1'-3"	#5@11"	#6@9"	#6@7"	CTRS.
* CONC.CU.YD./L.F.	0.161	0.210	0.259	0.308	0.358	0.407	0.457	0.506	0.556	0.604	
* REINF. LB./L.F.	8.0	9.3	10.7	12.1	14.3	16.4	23.0	28.6	41.8	54.6	

* DOES NOT INCLUDE TOE WALL QUANTITIES

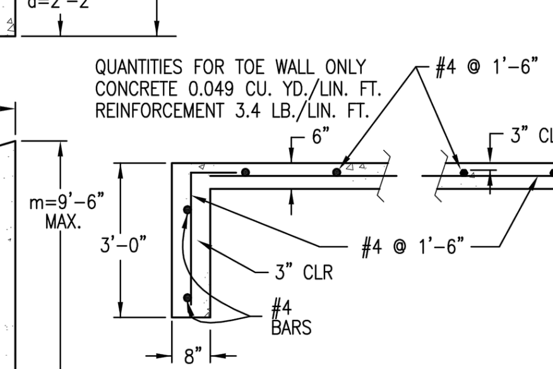
DESIGN TABLE



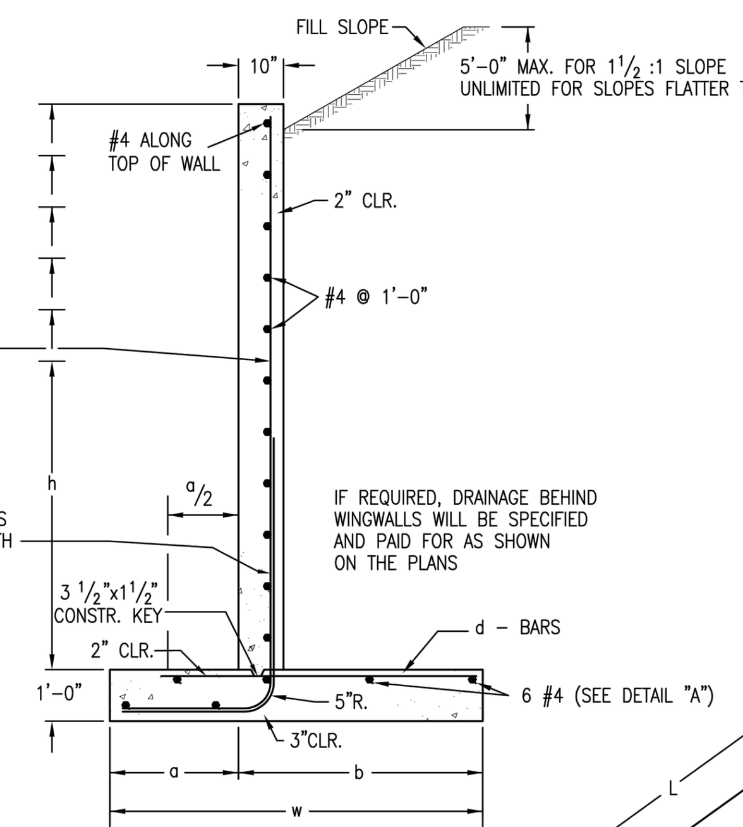
PLAN



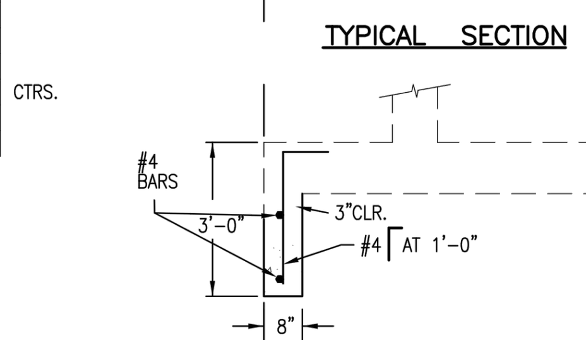
DESIGN EXAMPLE



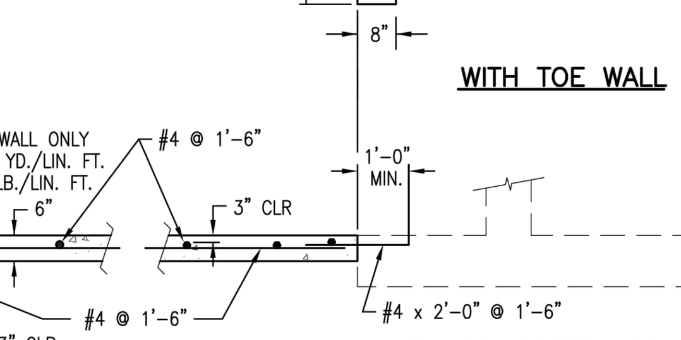
APRON TOE WALL



TYPICAL SECTION

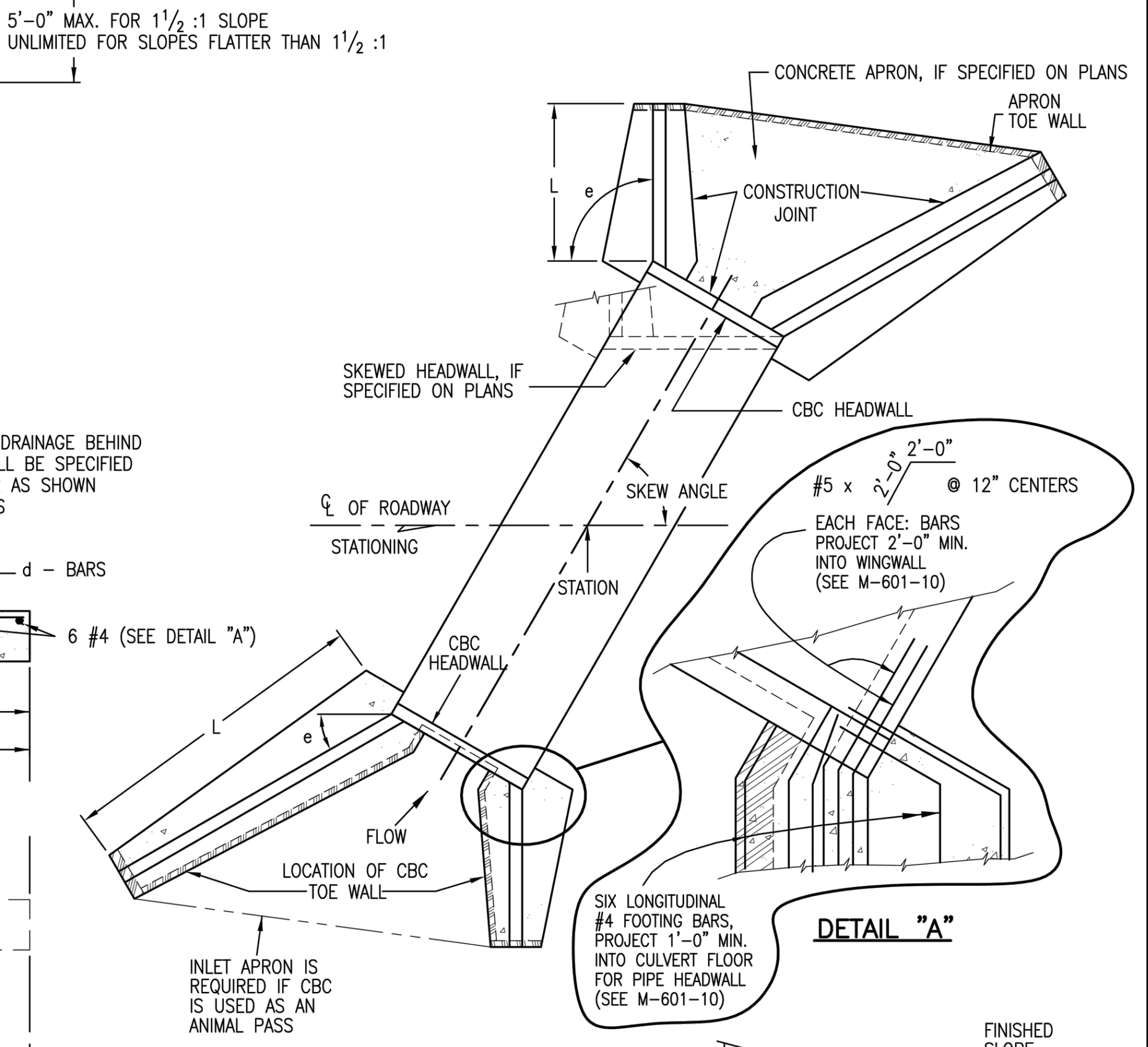


WITH TOE WALL



WITH CONCRETE APRON

REINFORCEMENT 0.89 LB./SQ. FT.



TYPICAL CULVERT LAYOUT

DESIGN DATA:

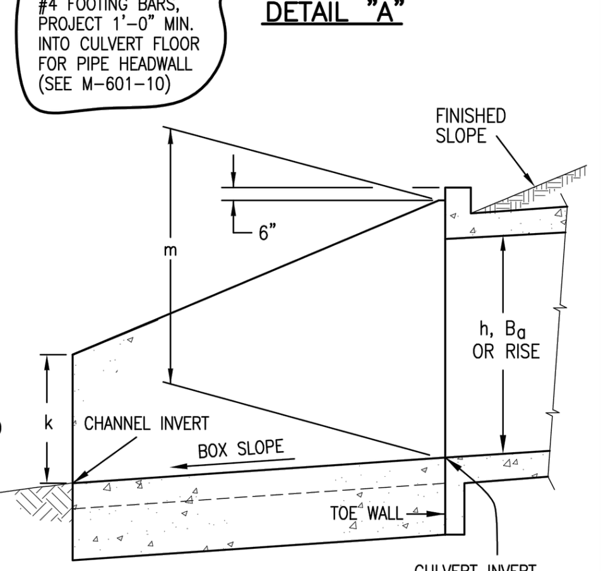
UNIT STRESSES: f_s = 24,000 PSI
f_c = 1,200 PSI
n = 9

EQUIVALENT FLUID PRESSURE = 36 LBS./CU. FT.
MAXIMUM TOE PRESSURE = 1 TON/SQ. FT.

ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE CONCRETE IS POURED.

WINGWALL AND APRON CONCRETE SHALL BE:
CONCRETE CLASS B, OR D (BOX CULVERT) FOR CBC's.
CONCRETE CLASS B, OR D (WALL) FOR PIPES.

LIVE LOAD SURCHARGE HAS NOT BEEN CONSIDERED. WALLS WITHIN h/2 OF THE EDGE OF THE ROADWAY SHOULDER WILL REQUIRE A SPECIAL DESIGN IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.



BOX ELEVATION

m = h, Ba OR RISE + (1'-4")
UNLESS OTHERWISE SHOWN ON PLANS

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Last Modification Date: 07/04/06	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 6010200101.dwg	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

R-X R-X R-X R-X

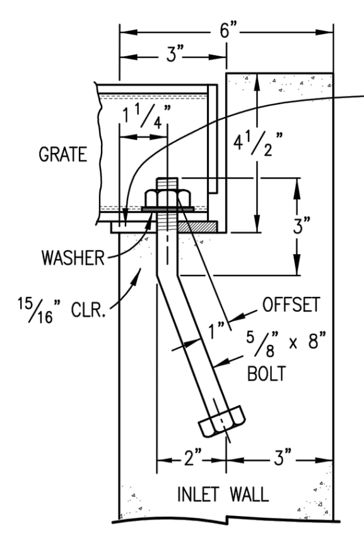
Sheet Revisions	
Date:	Comments

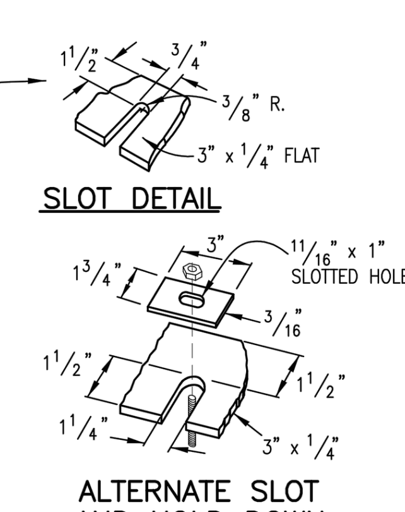
Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757-9083
Fax: (303) 757-9820
Project Development Branch SRJ/LTA

WINGWALLS FOR PIPE OR BOX CULVERTS

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-601-20
Sheet No. 1 of 1

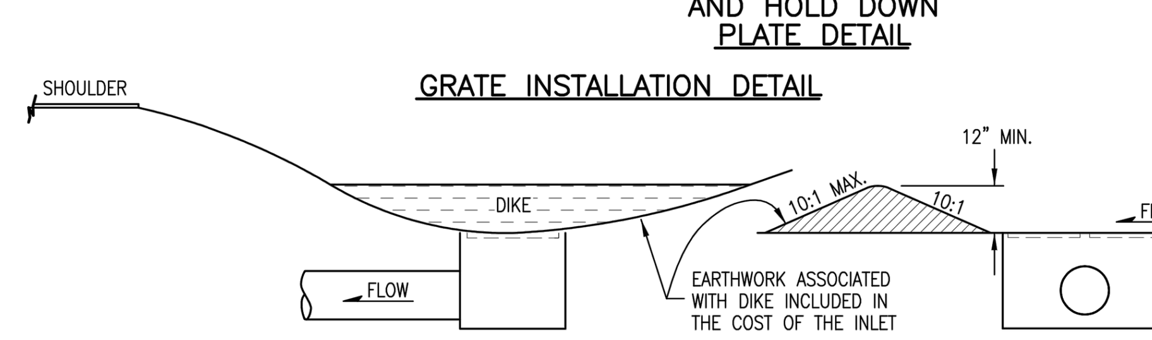




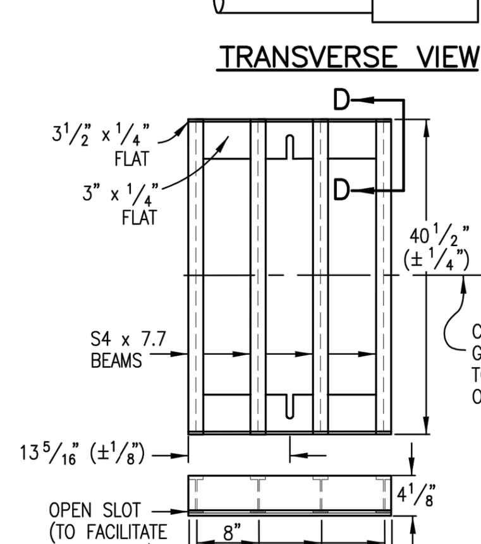
SLOT DETAIL

ALTERNATE SLOT AND HOLD DOWN PLATE DETAIL

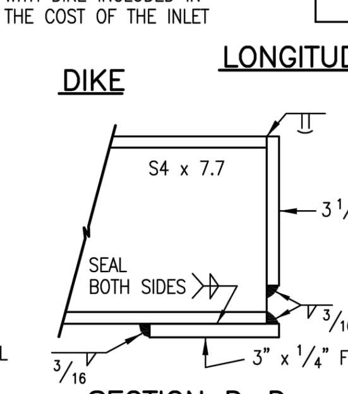
GRATE INSTALLATION DETAIL



TRANSVERSE VIEW — DIKE — LONGITUDINAL VIEW



STANDARD INLET GRATE

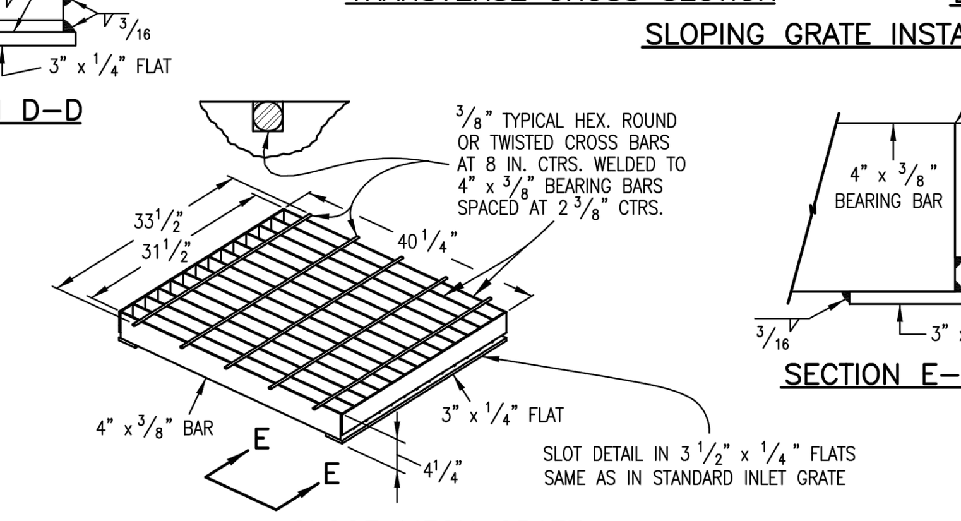


SECTION D–D

TWO STEEL GRATE PER INLET QUANTITIES

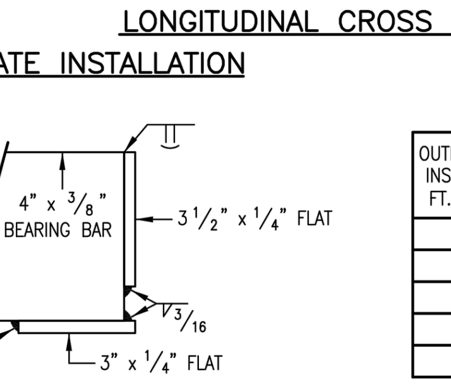
NO. PIECES	DESCRIPTION	LENGTH	LBS PER FT.	WEIGHT (LBS.)
8	S4 x 7.7 BEAM	40"	7.70	206
4	3 1/2" x 1/4" FLAT	26 5/8"	2.98	26
4	3" x 1/4" FLAT	26 5/8"	2.55	24

TOTAL LBS. – 256



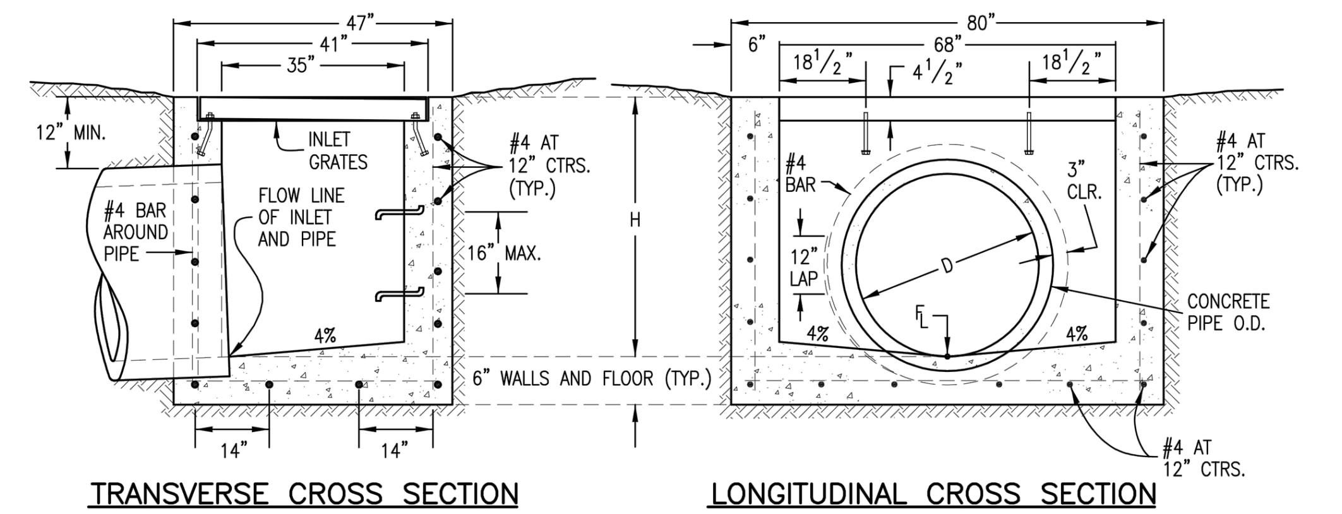
CLOSE MESH GRATE

USE FOR PEDESTRIAN AND BICYCLE AREAS ONLY.



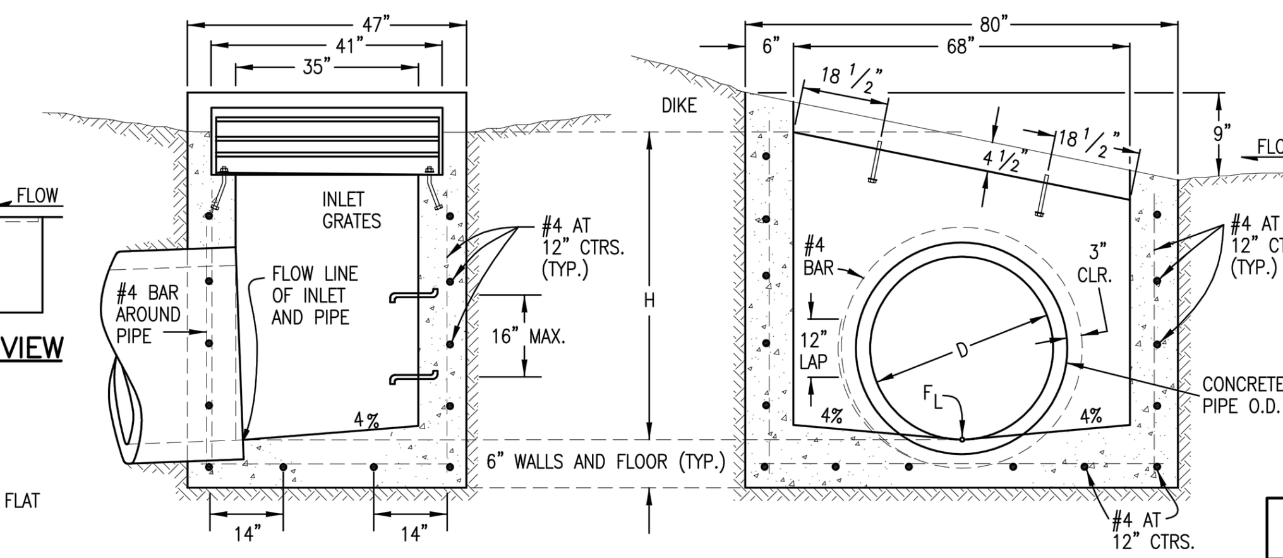
SECTION E–E

OUTLET PIPE INSIDE DIA. FT. – "D"	MIN. "H" FT.
1.5	3.0
2.0	3.5
2.5	4.0
3.0	4.5
3.5	5.0



TRANSVERSE CROSS SECTION — LONGITUDINAL CROSS SECTION

LEVEL GRATE INSTALLATION

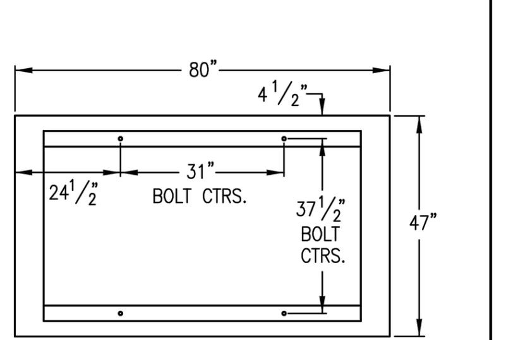


TRANSVERSE CROSS SECTION — LONGITUDINAL CROSS SECTION

SLOPING GRATE INSTALLATION

GENERAL NOTES

1. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
2. SEE PLANS FOR SIZE AND LOCATION OF PIPE.
3. STRUCTURAL STEEL FOR GRATES AND GRATE INSTALLATION HARDWARE SHALL BE GALVANIZED AND SHALL BE IN ACCORDANCE WITH SUBSECTION 712.06.
4. STANDARD INLET GRATES SHALL BE USED ON ALL TYPE D INLETS UNLESS CLOSE MESH GRATES ARE SPECIFIED ON THE PLANS.
5. STEPS SHALL BE PROVIDED WHEN INLET DIMENSION "H" IS EQUAL TO OR GREATER THAN 3 FT.-6 IN. AND SHALL CONFORM WITH AASHTO M 199.
6. REINFORCING BARS SHALL BE EPOXY COATED AND DEFORMED #4, AND SHALL HAVE A 2 IN. MINIMUM CLEARANCE. CUT OR BEND BARS AROUND PIPE AS REQUIRED.



PLAN VIEW
(SHOWING ANCHOR BOLT LAYOUT)

"H" FT.	CONCRETE CU. YDS. ▼	STEEL LBS. ▼	CIRCULAR PIPE RANGE INSIDE DIA., IN. – "D"
3.0	1.5	127	18
3.5	1.7	149	18–24
4.0	1.9	157	18–30
4.5	2.0	179	18–36
5.0	2.2	187	18–42
5.5	2.4	208	18–42
6.0	2.6	215	18–42
6.5	2.8	236	18–42
7.0	2.9	243	18–42
7.5	3.1	264	18–42
8.0	3.3	271	18–42
8.5	3.5	292	18–42
9.0	3.6	299	18–42
9.5	3.8	320	18–42
10.0	4.0	327	18–42

▼ CONCRETE AND STEEL QUANTITIES ARE FOR ONE ENTIRE INLET BEFORE DEDUCTION FOR VOLUME OCCUPIED BY PIPE. WEIGHT OF STEEL INCLUDES A RING FOR THE MAXIMUM PIPE DIAMETER.

QUANTITIES FOR ONE INLET

Computer File Information	
Creation Date: 07/04/06	Initials: SJR
Last Modification Date: 07/04/06	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 6040110101.dwg	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

R-X R-X R-X R-X

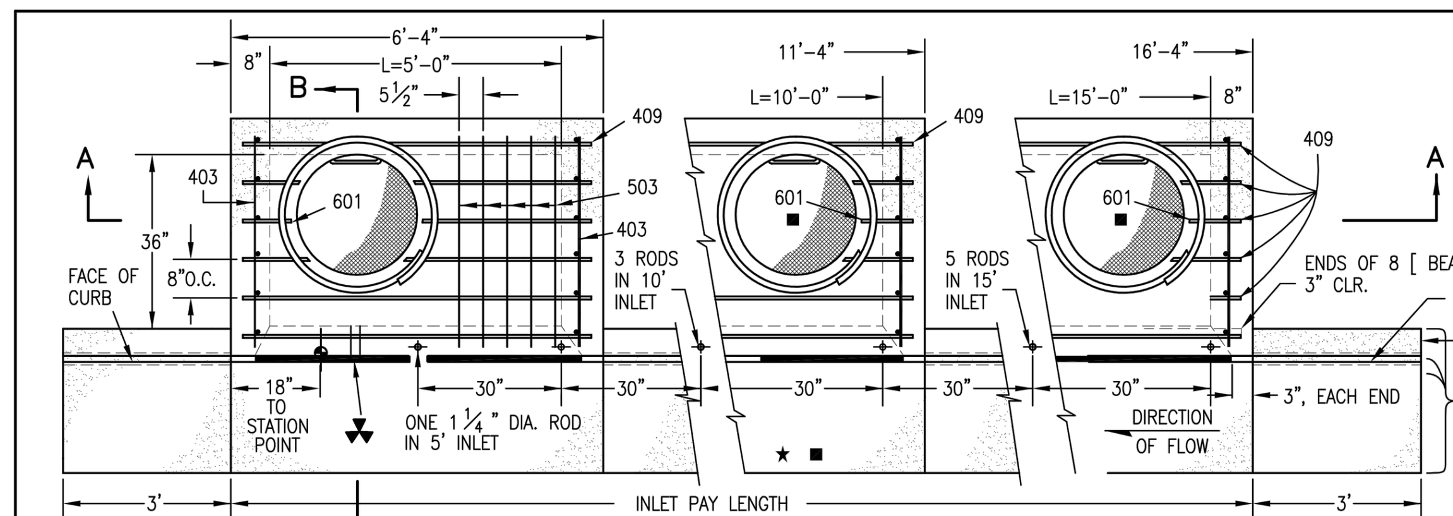
Sheet Revisions	
Date:	Comments

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757-9083
Fax: (303) 757-9820
Project Development Branch SRJ/LTA

INLET, TYPE D

Issued By: Project Development Branch on July 04, 2006

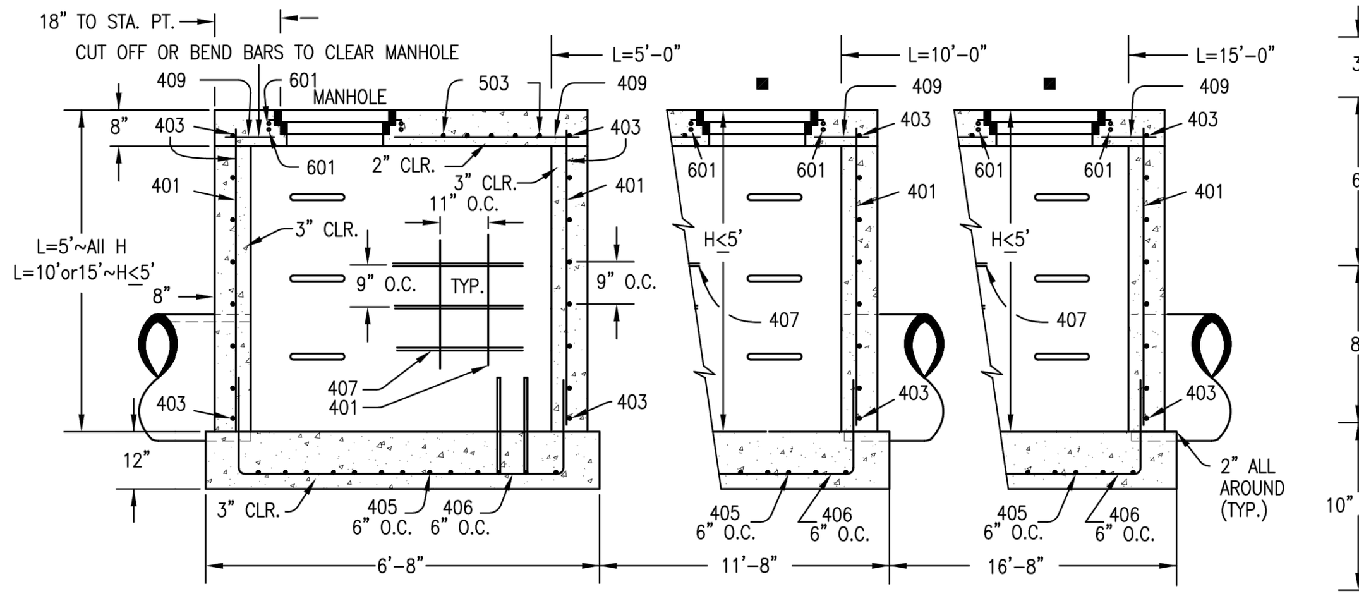
STANDARD PLAN NO.
M-604-11
Sheet No. 1 of 1



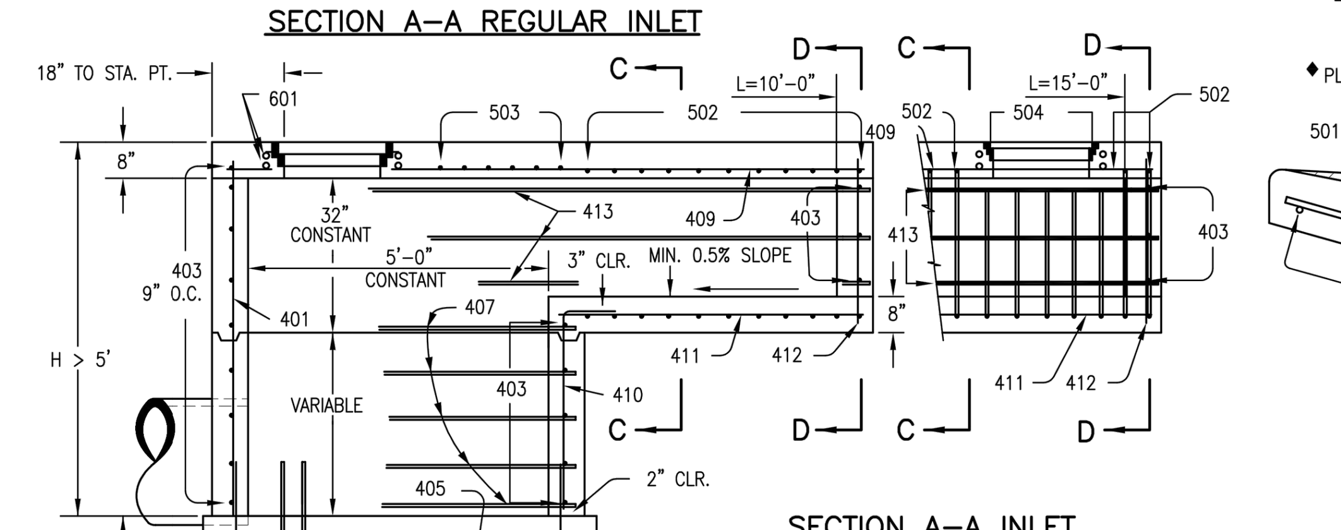
PLAN VIEW

★ FOR LENGTH (L) GREATER THAN 5 FT. PROVIDE MAINTENANCE ACCESS AT BOTH ENDS.

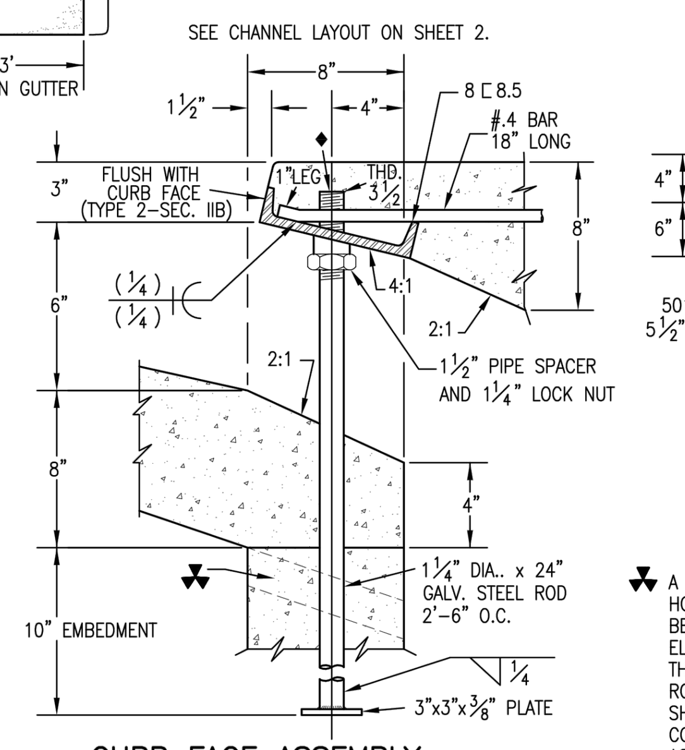
■ ADDITIONAL MANHOLE RING AND COVER REQUIRED WHEN L=10 FT. OR MORE. CUT REINFORCEMENT BAR ACCORDINGLY.



SECTION A–A REGULAR INLET

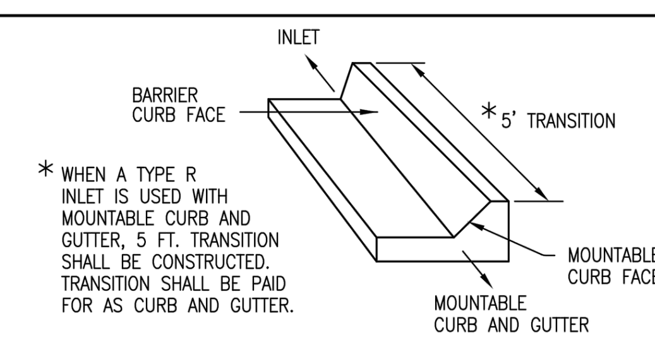


SECTION A–A INLET WITH DROP BOX~H>5 FT.



CURB FACE ASSEMBLY

◆ PLACE ENTIRE ASSEMBLY BEFORE POURING CONCRETE.



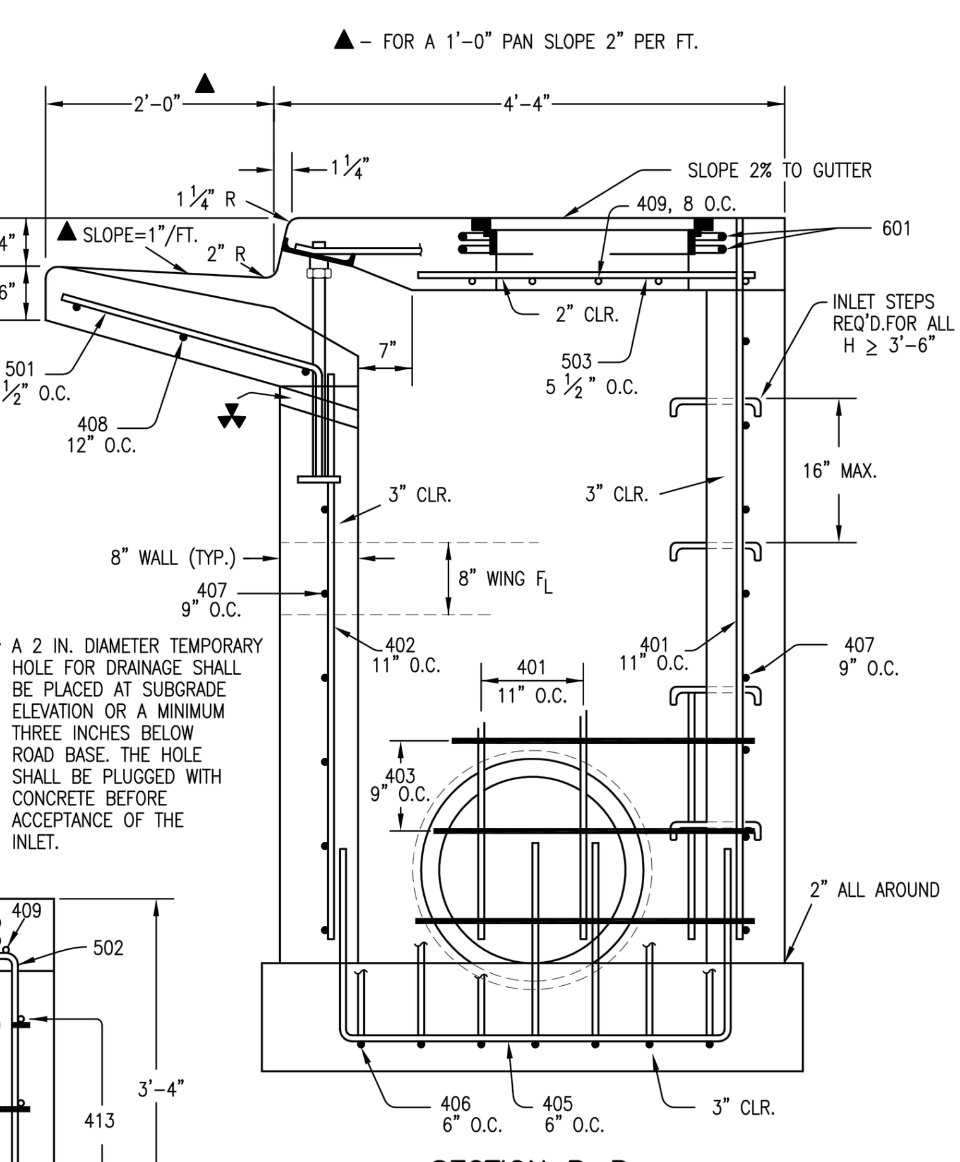
* WHEN A TYPE R INLET IS USED WITH MOUNTABLE CURB AND GUTTER, 5 FT. TRANSITION SHALL BE CONSTRUCTED. TRANSITION SHALL BE PAID FOR AS CURB AND GUTTER.

TRANSITION CURB

GENERAL NOTES:

SEE SHEET 2.

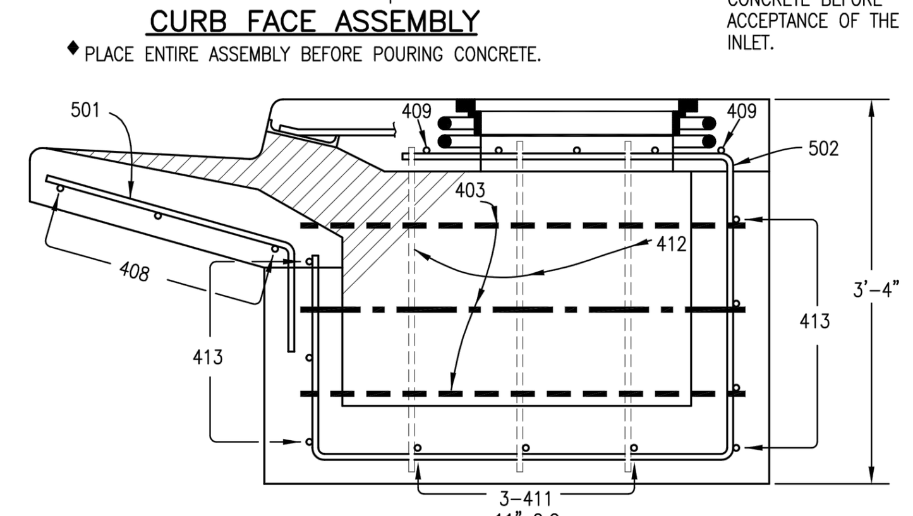
▲ – FOR A 1'-0" PAN SLOPE 2" PER FT.



SECTION B–B END VIEW

▲▲ A 2 IN. DIAMETER TEMPORARY HOLE FOR DRAINAGE SHALL BE PLACED AT SUBGRADE ELEVATION OR A MINIMUM THREE INCHES BELOW ROAD BASE. THE HOLE SHALL BE PLUGGED WITH CONCRETE BEFORE ACCEPTANCE OF THE INLET.

NOTE: MANHOLE RING AND COVER, STATION POINT AND OUTFLOW PIPE SHALL BE LOCATED AT THE SAME END OF THE INLET.



SECTIONS C–C & D–D (DOTTED BARS ARE IN SECTION D–D)

Computer File Information	
Creation Date: 07/04/06	Initials: SJR
Last Modification Date: 07/04/06	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 6040120102.dwg	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

R-X R-X R-X R-X

Sheet Revisions	
Date:	Comments

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Project Development Branch SRJ/LTA

CURB INLET TYPE R

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-604-12
Sheet No. 1 of 2

MARK	BAR # OR SIZE	O.C. SPACING	TYPE	ALL INLETS L = 5 FT. NO. REQ'D.	LENGTH	INLETS: H ≤ 5 FT. L = 10 FT. NO. REQ'D.	LENGTH	L = 15 FT. NO. REQ'D.	LENGTH	INLETS: H > 5 FT. L = 10 FT. NO. REQ'D.	LENGTH	L = 15 FT. NO. REQ'D.	LENGTH
401	4	11"	II	15	*	21	*	26	*	11	*	11	*
402	4	11"	II	7	*	13	*	18	*	7	*	7	*
403	4	9"	II	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"
405	4	6"	VI	11	6'-10"	21	6'-10"	31	6'-10"	11	6'-10"	11	6'-10"
406	4	6"	VIII	7	8'-10"	7	13'-10"	7	18'-10"	7	8'-10"	7	8'-10"
407	4	9"	II	*	5'-10"	*	10'-10"	*	15'-10"	*	5'-10"	*	5'-10"
408	4	12"	II	3	6'-10"	3	11'-10"	3	16'-0"	3	11'-10"	3	16'-0"
409	4	8"	II	6	5'-10"	6	10'-10"	6	15'-10"	6	10'-10"	6	15'-10"
410	4	11"	VII							3	*	3	*
411	4	11"	II							3	5'-2"	3	10-2"
412	4	11"	II							3	2'-9"	3	2'-9"
413	4	9"	II							7	10'-10"	7	15'-10"
501	5	5½"	IV	11	3'-4"	22	3'-4"	33	3'-4"	22	3'-4"	33	3'-4"
502	5	5½"	III							11	11'-5"	17	11'-5"
503	5	5½"	II	5	3'-6"	16	3'-6"	27	3'-6"	6	3'-6"	6	3'-6"
504	5	5½"	IX									5	8'-4"
601	6	2½"	V	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"	4	8'-10"
■8[8.5				1	5'-10"	1	10'-10"	1	15'-10"	1	10'-10"	1	15'-10"
				2 BARS, 1 RODS	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——

* VARIABLE REFER TO TABLE TWO.
■ INCLUDE #4, 18 IN. BARS (SEE CHANNEL LAYOUT).

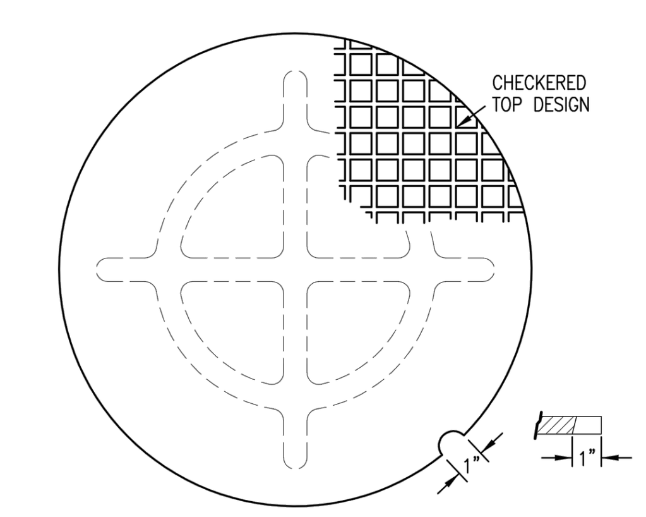
REGULAR INLETS — DROP BOX INLETS

TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

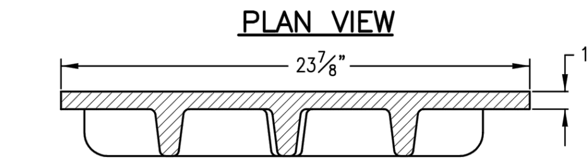
"H"	LENGTH 401	LENGTH 402	LENGTH 410	NO. REQ'D. REGULAR 403	NO. REQ'D. REGULAR 407	NO. REQ'D. DROP BOX 403	NO. REQ'D. DROP BOX 407	L = 5 FT. CONC. CU. YDS.	L = 5 FT. STEEL LBS.	L = 10 FT. CONC. CU. YDS.	L = 10 FT. STEEL LBS.	L = 15 FT. CONC. CU. YDS.	L = 15 FT. STEEL LBS.
3'-0"	2'-8"	1'-8"		10	7			3.2	285	5.3	497	7.4	706
3'-6"	3'-2"	2'-2"		10	7			3.4	305	5.7	528	7.9	747
4'-0"	3'-8"	2'-8"		12	9			3.7	326	6.0	559	8.4	786
4'-6"	4'-2"	3'-2"		12	9			3.9	334	6.4	571	8.8	803
5'-0"	4'-8"	3'-8"		14	11			4.1	354	6.7	602	9.3	844
5'-6"	5'-2"	4'-2"	3'-5"	16	13	15	6	4.4	375	6.0	607	7.4	850
6'-0"	5'-8"	4'-8"	3'-11"	16	13	16	6	4.6	382	6.2	616	7.6	860
6'-6"	6'-2"	5'-2"	4'-5"	18	15	18	8	4.8	402	6.4	637	7.8	880
7'-0"	6'-8"	5'-8"	4'-11"	20	17	19	10	5.0	423	6.6	654	8.0	897
7'-6"	7'-2"	6'-2"	5'-5"	20	17	20	10	5.3	430	6.9	664	8.3	907
8'-0"	7'-8"	6'-8"	5'-11"	22	19	22	12	5.5	451	7.1	684	8.5	927
8'-6"	8'-2"	7'-2"	6'-5"	24	21	23	14	5.7	471	7.3	702	8.7	944
9'-0"	8'-8"	7'-8"	6'-11"	24	21	24	14	6.0	479	7.6	711	9.0	954
9'-6"	9'-2"	8'-2"	7'-5"	26	23	26	16	6.2	499	7.8	732	9.2	974
10'-0"	9'-8"	8'-8"	7'-11"	28	25	27	18	6.4	520	8.0	749	9.4	992
10'-6"	10'-2"	9'-2"	8'-5"	28	25	28	18	6.7	527	8.3	759	9.7	1001
11'-0"	10'-8"	9'-8"	8'-11"	30	27	30	20	6.9	547	8.5	779	9.9	1022

NOTES: FOR L=5 FT., L=10 FT., AND L=15 FT.
REGULAR INLETS: TOTAL QUANTITIES NEEDED ARE OUTSIDE THE HEAVY BLACK LINE.
DROP BOX INLETS: TOTAL QUANTITIES NEEDED ARE INSIDE THE HEAVY BLACK LINE.
STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL CHANNEL.

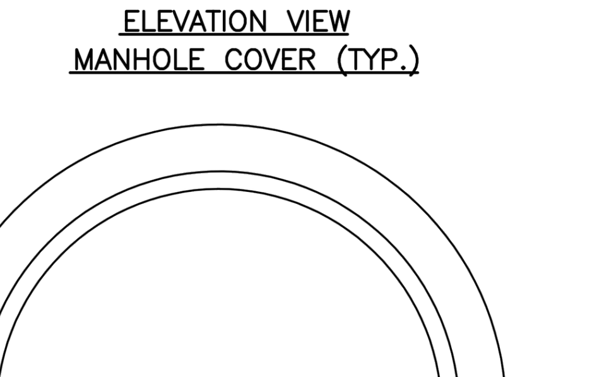
TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"



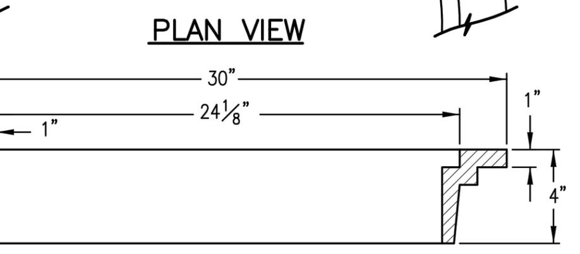
PLAN VIEW



ELEVATION VIEW
MANHOLE COVER (TYP.)



PLAN VIEW

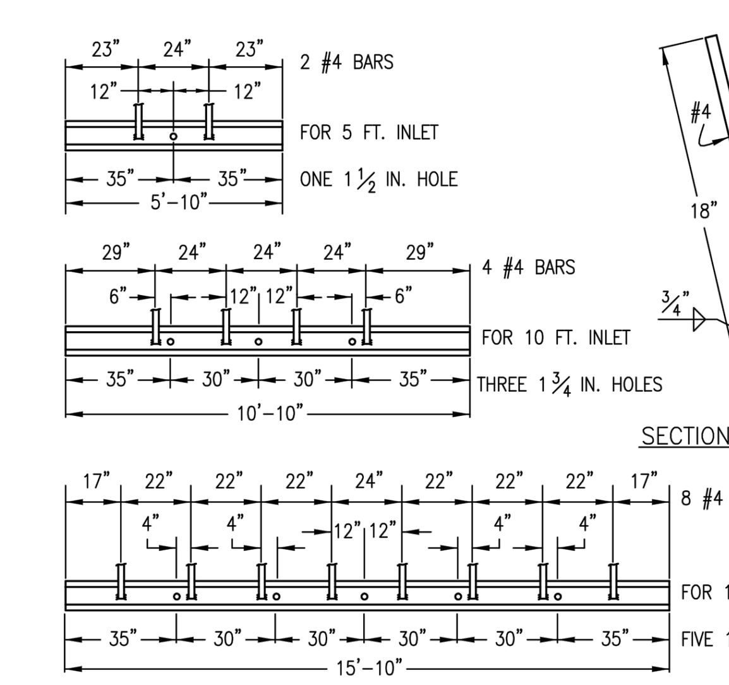


ELEVATION VIEW
MANHOLE RING (TYP.)

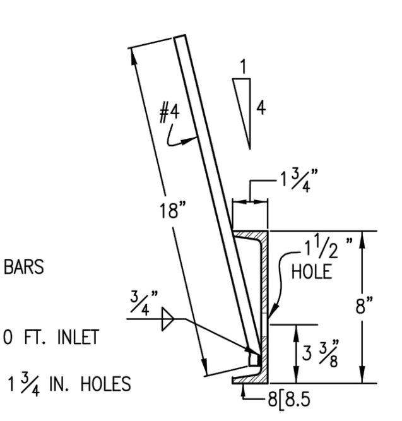
WEIGHTS: COVER = 125 LBS.
+ RING = 135 LBS.
TOTAL = 260 LBS.

GENERAL NOTES

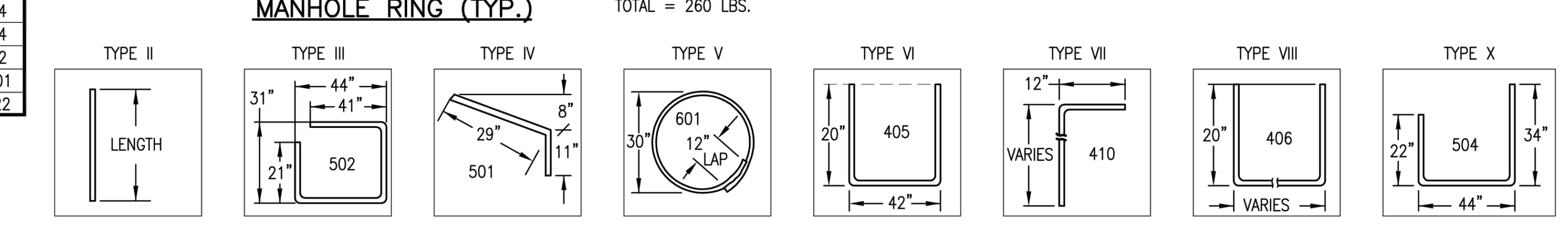
1. CONCRETE SHALL BE CLASS B. INLET MAY BE CAST-IN-PLACE OR PRECAST.
2. CONCRETE WALLS SHALL BE FORMED ON BOTH SIDES AND SHALL BE 8 IN. THICK.
3. INLET STEPS SHALL BE IN CONFORMANCE WITH AASHTO M 199.
4. CURB FACE ASSEMBLY SHALL BE GALVANIZED AFTER WELDING.
5. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN. CURB AND GUTTER CORNERS SHALL BE FINISHED TO MATCH THE EXISTING CURB AND GUTTER BEYOND THE TRANSITION GUTTER.
6. REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A 2 IN. MINIMUM CLEARANCE. ALL REINFORCING BARS SHALL BE EPOXY COATED.
7. DIMENSIONS AND WEIGHTS OF TYPICAL MANHOLE RING AND COVER ARE NOMINAL.
8. MATERIAL FOR MANHOLE RINGS AND COVERS SHALL BE GRAY OR DUCTILE CAST IRON IN ACCORDANCE WITH SUBSECTION 712.06.
9. SINCE PIPE ENTRIES INTO THE INLET ARE VARIABLE, THE DIMENSIONS SHOWN ARE TYPICAL. ACTUAL DIMENSIONS AND QUANTITIES FOR CONCRETE AND REINFORCEMENT SHALL BE AS REQUIRED IN THE WORK. QUANTITIES INCLUDE VOLUMES OCCUPIED BY PIPES.
10. STRUCTURAL STEEL SHALL BE GALVANIZED AND SHALL BE IN ACCORDANCE WITH SUBSECTION 712.06.



CHANNEL LAYOUT DETAILS
SEE CURB FACE ASSEMBLY ON SHEET 1.



SECTION AT HOLE (TYP.)



BAR BENDING DIAGRAMS ~ (DIMENSIONS ARE OUT–TO–OUT OF BAR)

Computer File Information	
Creation Date: 07/04/06	Initials: SJR
Last Modification Date: 07/04/06	Initials: LTA
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Drawing File Name: 6040120202.dwg	
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CURB INLET TYPE R

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-604-12
Sheet No. 2 of 2

AS-BUILT
ENGINEERING RECORD DRAWINGS

EPC 3/17/2021

DWIRE STORAGE YARD
STANDARD DETAILS

DATE: 11/16/2020
ST05
SHEET 5 OF 5

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJECT NO. 43–117
DESIGNED BY: CMN
DRAWN BY: CMN
CHECKED BY: VAS

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
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CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

COLORADO REGISTERED PROFESSIONAL ENGINEER
VIRGIL A. SANCHEZ
37160
1-29-21

[illegible]

REVISIONS: NO.	DATE:	BY:	DESCRIPTION:	APPR'D. BY:	DATE:

CAUTION
THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

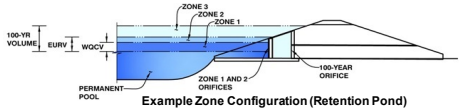
File: O:\43117A-Dwire Yard\Dwire Yard\dwg\Const Dwg\ST04.dwg Plotstamp: 1/20/2020 2:09 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: DWIRE Storage Yard

Basin ID: FSD Pond 1 (As-built)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB		6527.26
Watershed Area =	19.36	acres	**6527.5**
Watershed Length =	1,535	ft	
Watershed Length to Centroid =	768	ft	
Watershed Slope =	0.021	ft/ft	
Watershed Imperviousness =	72.20%	percent	6532.00
Percentage Hydrologic Soil Group A =	0.0%	percent	6533.00
Percentage Hydrologic Soil Group B =	100.0%	percent	6534.00
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	6535.00
Target WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.453	acre-feet	0.453	acre-feet
Excess Urban Runoff Volume (EURV) =	1.518	acre-feet	1.518	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.391	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.867	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.267	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.732	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	3.149	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.640	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	4.697	acre-feet		inches
Approximate 2-yr Detention Volume =	1.206	acre-feet		
Approximate 5-yr Detention Volume =	1.603	acre-feet		
Approximate 10-yr Detention Volume =	2.016	acre-feet		
Approximate 25-yr Detention Volume =	2.164	acre-feet		
Approximate 50-yr Detention Volume =	2.250	acre-feet		
Approximate 100-yr Detention Volume =	2.402	acre-feet		

Define Zones and Basin Geometry

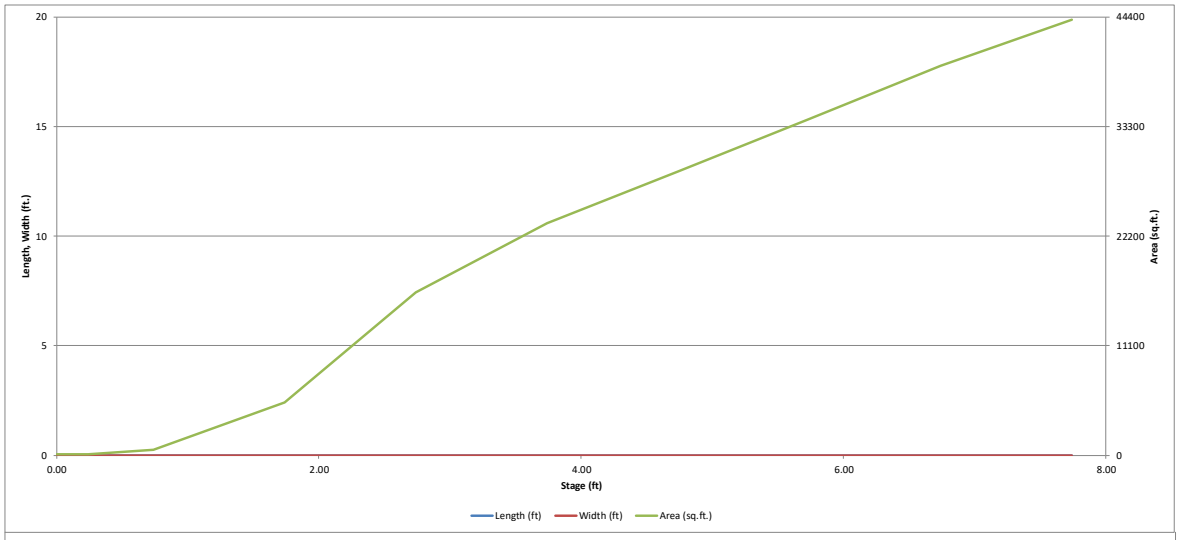
Zone 1 Volume (WQCV) =	0.453	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.065	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.884	acre-feet
Total Detention Basin Volume =	2.402	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

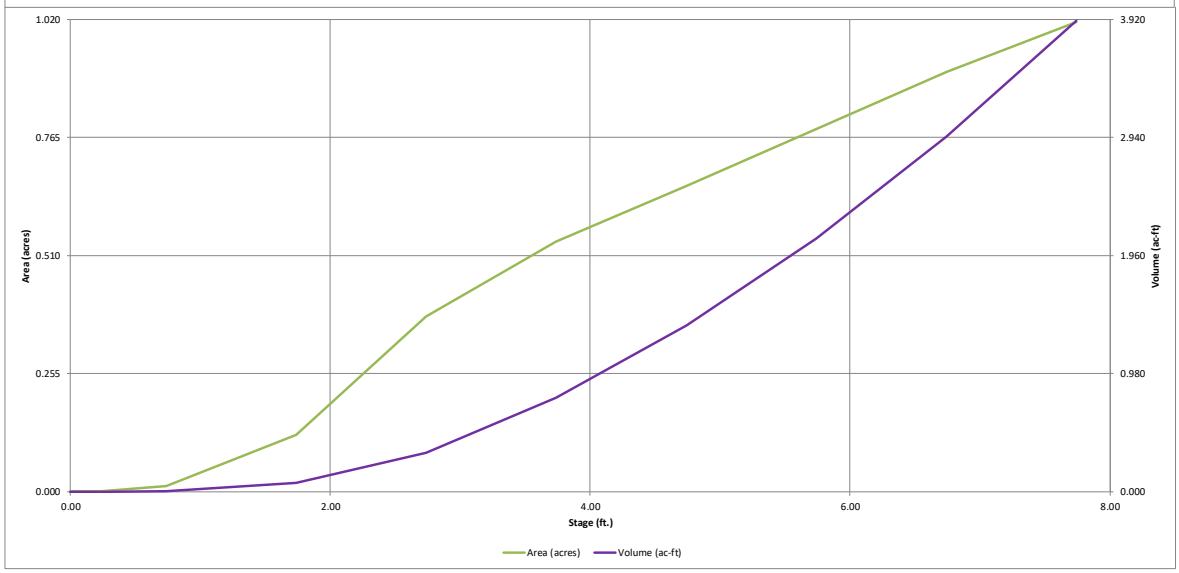
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	93	0.002		
	--	0.24	--	--	--	93	0.002	22	0.001
	--	0.74	--	--	--	562	0.013	186	0.004
	--	1.74	--	--	--	5,349	0.123	3,142	0.072
	--	2.74	--	--	--	16,478	0.378	14,055	0.323
	--	3.74	--	--	--	23,514	0.540	34,051	0.782
	--	4.74	--	--	--	28,762	0.660	60,189	1.382
	--	5.74	--	--	--	34,100	0.783	91,620	2.103
	--	6.74	--	--	--	39,462	0.906	128,401	2.948
	--	7.74	--	--	--	44,188	1.014	170,226	3.908

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)



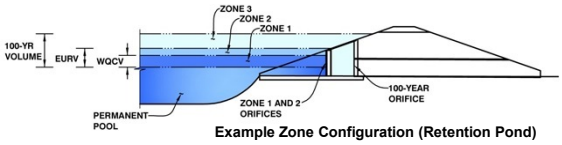


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: DWIRE Storage Yard

Basin ID: FSD Pond 1 (As-built)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.07	0.453	Orifice Plate
Zone 2 (EURV)	4.95	1.065	Orifice Plate
Zone 3 (100-year)	6.12	0.884	Weir&Pipe (Restrict)
Total (all zones)		2.402	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	N/A	ft^2
Depth at top of Zone using Orifice Plate =	4.95	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	N/A	inches	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.65	3.20					
Orifice Area (sq. inches)	1.91	1.91	6.25					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.00	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	5.00	N/A	feet
Overflow Weir Front Edge Length =	8.00	N/A	feet	Overflow Weir Slope Length =	3.50	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	12.48	N/A	
Horiz. Length of Weir Sides =	3.50	N/A	feet	Overflow Grate Open Area w/o Debris =	19.60	N/A	ft^2
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area	Overflow Grate Open Area w/ Debris =	9.80	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.30	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.57	N/A	ft^2
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.58	N/A	feet
Restrictor Plate Height Above Pipe Invert =	12.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.57	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	6.50	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.78	feet
Spillway Crest Length =	25.00	feet	Stage at Top of Freeboard =	8.28	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.01	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	3.91	acre-ft

Calculated Parameters for Spillway

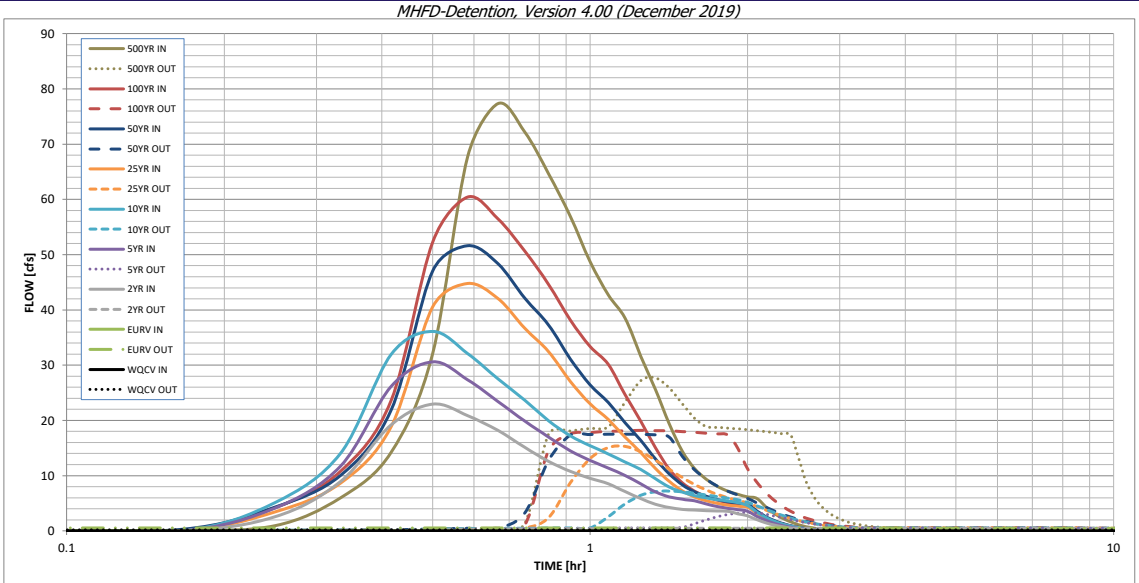
Routed Hydrograph Results

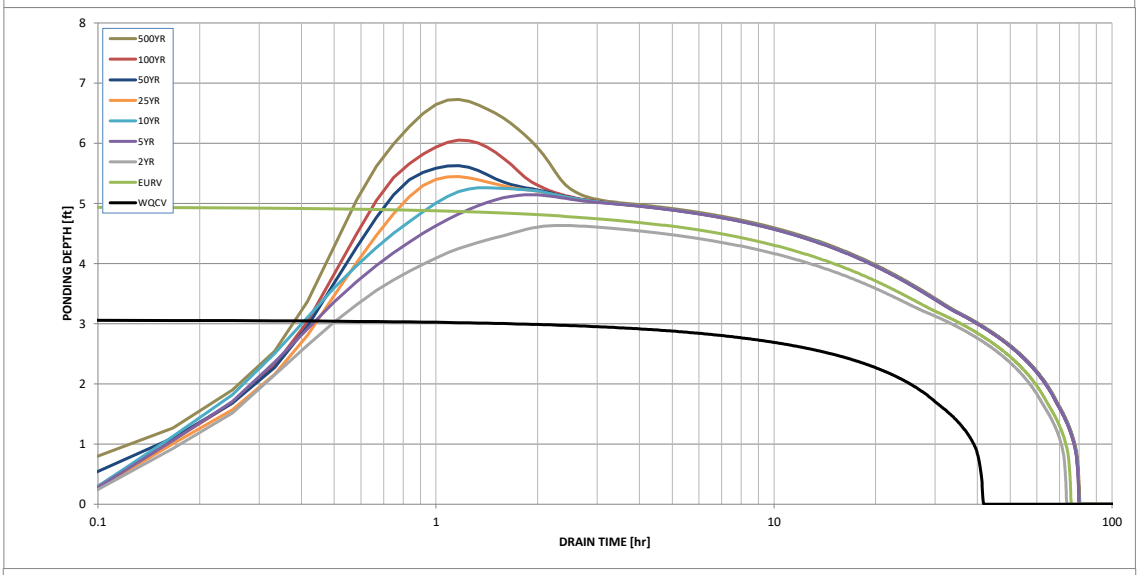
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

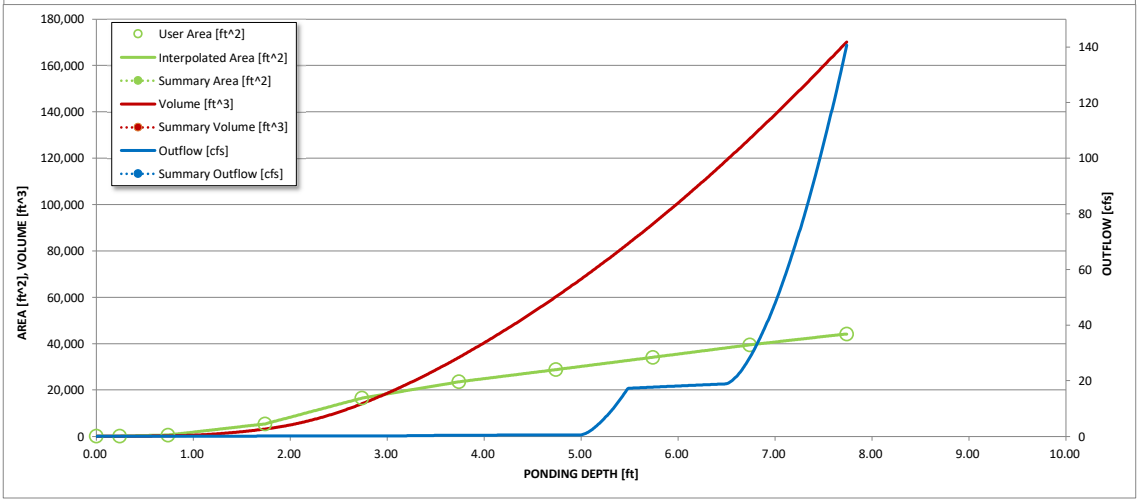
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.453	1.518	1.391	1.867	2.267	2.732	3.149	3.640	4.697
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.391	1.867	2.267	2.732	3.149	3.640	4.697
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.8	5.1	7.8	14.1	17.7	22.6	31.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.27	0.40	0.73	0.91	1.17	1.63
Peak Inflow Q (cfs) =	N/A	N/A	22.9	30.6	36.1	44.8	51.6	60.4	77.4
Peak Outflow Q (cfs) =	0.2	0.5	0.5	3.3	7.2	15.3	17.5	18.2	27.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.9	1.1	1.0	0.8	0.9
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.3	0.7	0.9	0.9	0.9
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	67	66	70	68	67	66	64	62
Time to Drain 99% of Inflow Volume (hours) =	**40**	72	70	76	75	75	74	73	72
Maximum Ponding Depth (ft) =	3.07	4.95	4.64	5.15	5.26	5.44	5.63	6.05	6.73
Area at Maximum Ponding Depth (acres) =	0.43	0.69	0.65	0.71	0.72	0.75	0.77	0.82	0.90
Maximum Volume Stored (acre-ft) =	0.456	1.523	1.310	1.656	1.742	1.874	2.010	2.352	2.930

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.03	0.92
	0:15:00	0.00	0.00	2.54	4.15	5.13	3.44	4.28	4.18	5.97
	0:20:00	0.00	0.00	8.95	11.71	14.04	8.64	10.04	10.77	14.20
	0:25:00	0.00	0.00	19.18	26.13	31.94	18.82	21.83	23.58	32.07
	0:30:00	0.00	0.00	22.93	30.59	36.11	40.54	47.02	52.26	67.64
	0:35:00	0.00	0.00	20.86	27.37	32.12	44.77	51.61	60.40	77.36
	0:40:00	0.00	0.00	18.19	23.43	27.53	42.07	48.36	56.49	72.18
	0:45:00	0.00	0.00	15.10	19.86	23.65	36.65	42.12	50.62	64.66
	0:50:00	0.00	0.00	12.58	16.99	19.93	32.45	37.28	44.60	56.93
	0:55:00	0.00	0.00	10.76	14.49	17.21	27.05	31.10	38.15	48.74
	1:00:00	0.00	0.00	9.52	12.77	15.42	22.98	26.45	33.37	42.69
	1:05:00	0.00	0.00	8.52	11.38	13.92	20.15	23.22	30.11	38.54
	1:10:00	0.00	0.00	7.12	10.05	12.46	16.98	19.58	24.65	31.65
	1:15:00	0.00	0.00	5.85	8.51	11.11	14.19	16.38	19.87	25.61
	1:20:00	0.00	0.00	4.84	7.05	9.42	11.30	13.03	15.07	19.40
	1:25:00	0.00	0.00	4.23	6.18	7.94	8.97	10.33	11.19	14.43
	1:30:00	0.00	0.00	3.92	5.72	7.02	7.25	8.34	8.71	11.28
	1:35:00	0.00	0.00	3.75	5.44	6.40	6.16	7.06	7.22	9.36
	1:40:00	0.00	0.00	3.66	4.86	5.95	5.46	6.24	6.23	8.08
	1:45:00	0.00	0.00	3.60	4.41	5.64	4.98	5.67	5.56	7.20
	1:50:00	0.00	0.00	3.54	4.08	5.42	4.66	5.30	5.09	6.59
	1:55:00	0.00	0.00	3.08	3.84	5.11	4.44	5.03	4.75	6.16
	2:00:00	0.00	0.00	2.71	3.55	4.60	4.29	4.85	4.55	5.89
	2:05:00	0.00	0.00	2.02	2.63	3.40	3.20	3.61	3.38	4.37
	2:10:00	0.00	0.00	1.46	1.89	2.43	2.29	2.59	2.43	3.14
	2:15:00	0.00	0.00	1.05	1.36	1.74	1.65	1.86	1.76	2.27
	2:20:00	0.00	0.00	0.74	0.95	1.24	1.17	1.32	1.26	1.63
	2:25:00	0.00	0.00	0.51	0.65	0.86	0.81	0.92	0.88	1.13
	2:30:00	0.00	0.00	0.34	0.44	0.59	0.56	0.63	0.61	0.78
	2:35:00	0.00	0.00	0.22	0.29	0.39	0.38	0.43	0.41	0.53
	2:40:00	0.00	0.00	0.12	0.18	0.23	0.23	0.26	0.25	0.32
	2:45:00	0.00	0.00	0.06	0.09	0.11	0.12	0.14	0.13	0.17
	2:50:00	0.00	0.00	0.02	0.03	0.04	0.05	0.05	0.05	0.06
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00