

GRAND LAKE STORMWATER PLAN

BID SET

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Sub-Consultants

Horizontal Scale & Orientation

Legend

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
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	Dwn.	Chkd.	Dsgn. 26.04.17

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
COVER

2026001054 NTS
Project No. Horizontal Scale

Sheet 1 of 31

APRIL 2026

GENERAL NOTES

1.

ANY EXCAVATION SHALL BE DEWATERED TO THE EXTENT REQUIRED FOR CONSTRUCTION OPERATIONS TO PROCEED UNDER DRY CONDITIONS. DIKES, CHANNELS, FLUMES, DRAINS, SUMPS, PUMPING EQUIPMENT, AND OTHER TEMPORARY DIVERSION AND PROTECTIVE WORKS SHALL BE CONSTRUCTED, FURNISHED, INSTALLED, OPERATED, AND MAINTAINED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. ALL COSTS TO OBTAIN REQUIRED DEWATERING AND DISCHARGE PERMITS SHALL BE INCLUDED IN THE WORK.
2.

WATER SHALL BE USED AS A DUST CONTROL WHERE REQUIRED. THIS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE WORK.
3.

UNDER NO CIRCUMSTANCES WILL ANY EXCESS MATERIAL BE DISPOSED OF IN WETLANDS OR WATERWAYS. REMOVED CONCRETE AND ASPHALT WILL NOT BE DISPOSED OF IN ANY MANNER THAT WOULD ALLOW THIS MATERIAL TO COME IN CONTACT WITH GROUND WATER. THE CONTRACTOR SHALL SUBMIT A DISPOSAL PLAN TO THE ENGINEER FOR APPROVAL.
4.

UNLESS OTHERWISE SPECIFIED, REMOVALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR. REMOVALS SHALL BE DISPOSED OF OUTSIDE OF THE PROJECT LIMITS, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
5.

THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF THE WORK. ANY CONCRETE SUFFERING DAMAGE SUCH AS GRAFFITI, TACK COAT SPRAY, FOOTPRINTS, RAIN DAMAGE, ETC. WILL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S COST PRIOR TO FINAL ACCEPTANCE PAYMENT. IF ANY CONCRETE MUST BE REPLACED BECAUSE OF RAVELING AT THE JOINTS, RANDOM CRACKING, FOOTPRINTS, GRAFFITI, ETC. THE ENTIRE SLAB OR STONE MUST BE REPLACED AT THE CONTRACTOR'S EXPENSE.
6.

THE CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION DESIGNATED TO REMAIN FROM DAMAGE DURING CONSTRUCTION OPERATIONS. ANY MONUMENTS DISTURBED BY THE CONTRACTOR THAT ARE NOT DESIGNATED FOR RELOCATION SHALL BE RESET AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR AND ENGINEER SHALL NOTE THOSE MONUMENTS IN THE FIELD PRIOR TO CONSTRUCTION.
7.

THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. CONTRACTOR TO CALL FOR UTILITY LOCATOR AT LEAST 3 CALENDAR DAYS BEFORE EXCAVATION. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THEIR FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES. IN THE EVENT THAT THE CONTRACTOR UTILITY VERIFICATION RESULTS IN EXISTING STRUCTURES OR UTILITIES BEING IN CONFLICT WITH THE PROPOSED WORK , THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE UTILITY OWNER, ENGINEER, AND TOWN OF GRAND LAKE (TOWN). WORK SHALL NOT CONTINUE UNTIL ALL PARTIES AGREE ON A SUITABLE DESIGN REVISION THAT AVOIDS UTILITY CONFLICTS.
8.

THE CONTRACTOR SHALL COORDINATE WITH ALL AFFECTED UTILITY OWNERS TO ESTABLISH THE REQUIREMENTS AND METHODS TO ACCOMMODATE THE PROTECTION, TEMPORARY SUPPORT, ADJUSTMENT OR RELOCATION OF UTILITIES PRIOR TO THE START OF CONSTRUCTION.
9.

UTILITIES ARE NOT INDICATED ON PROFILE OR SECTION DRAWINGS. UTILITY INFORMATION SHOWN IN THESE PLANS IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING ALL DETERMINATIONS AS TO THE TYPE AND LOCATION OF ALL UNDERGROUND AND OTHER UTILITIES AS NECESSARY TO AVOID DAMAGE THERETO.
10.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING AND MAINTAINING IN CONTINUOUS OPERATION, ALL EXISTING STRUCTURES. NOT ALL POTENTIALLY IMPACTED STRUCTURES MAY BE SHOWN ON THE DRAWINGS AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ALL STRUCTURES INCLUDING BUT NOT LIMITED TO STREETS, CURB AND GUTTER, BRIDGE PIERS AND ABUTMENTS, CREEK BANK PROTECTION OF VARIOUS TYPES, CREEK DROP STRUCTURES, SIGNS, PEDESTRIAN WALKS, RETAINING WALLS AND FENCING. IN THE EVENT THAT A STRUCTURE OR UTILITY IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE TOWN IN WRITING AND MAKE REPAIRS PER TOWN SPECIFICATIONS.
11.

THE CONTRACTOR SHALL CONFIRM THE RECEIPT OF ALL NECESSARY PERMITS AND APPROVALS BEFORE THE START OF CONSTRUCTION.
12.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS OF THE TOWN UNLESS SPECIFICALLY DETAILED OTHERWISE ON THESE PLANS AND ASSOCIATED SPECIFICATIONS. ANY ELEMENT OF CONSTRUCTION WHICH IS NOT ADDRESSED EITHER BY THESE PLANS AND SPECIFICATIONS, OR BY THE STANDARDS OF THE TOWN, SHALL CONFORM TO THE STANDARD SPECIFICATIONS OF THE MILE HIGH FLOOD CONTROL DISTRICT AND COLORADO DEPARTMENT OF TRANSPORTATION.
13.

THE CONTRACTOR SHALL MAINTAIN AT THE SITE AT ALL TIMES ONE SIGNED COPY OF THE PROJECT DRAWINGS AND SPECIFICATIONS, ONE COPY OF THE STORMWATER MANAGEMENT PLAN AND ONE COPY OF ALL REQUIRED PERMITS.
14.

THE CONTRACTOR SHALL CONDUCT THEIR OPERATIONS IN SUCH A WAY THAT THE AREA OF DISTURBANCE IS MINIMIZED. ALL EXISTING TREES, SHRUBS AND VEGETATION SHALL BE PROTECTED UNLESS OTHERWISE NOTED ON THE DRAWINGS. NO TREES SHALL BE REMOVED WITHOUT APPROVAL FROM THE TOWN.
15.

FOR ALL SITE GRADING, SMOOTH, PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE. ALL FILL MATERIAL SHALL BE COMPACTED.
16.

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
17.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF DRAINAGE WATER FROM AREAS ADJACENT TO THE PROJECT SITES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ESTABLISHING MEANS AND METHODS OF GROUND AND SURFACE WATER CONTROL APPROPRIATE FOR CONSTRUCTION IN

ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DRAWINGS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND PERMITS.

18.

THE CONTRACTOR SHALL PREPARE AND MAINTAIN THE STORMWATER MANAGEMENT PLAN AND OBTAIN THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT THROUGH THE COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT AND ALL OTHER APPROPRIATE FEDERAL, STATE AND LOCAL PERMITS.
19.

CONTRACTOR SHALL BE RESPONSIBLE FOR AS-BUILT DRAWINGS TO BE SUBMITTED TO THE TOWN, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
20.

THE CONTRACTOR SHALL PROVIDE AND MAINTAIN DAILY ON-SITE GPS SURVEY CONTROL.
21.

CONTRACTOR SHALL FENCE OFF CRITICAL AREAS TO BE PROTECTED AT THE DISCRETION OF THE TOWN.
22.

THE CONTRACTOR WILL BE RESPONSIBLE FOR PLACING TRAFFIC CONTROL DEVICES SO THAT THE WORK ZONES ARE IN FULL COMPLIANCE WITH THE TOWN'S TRAFFIC CONTROL STANDARDS.
23.

CONSTRUCTION TOLERANCES:

23.1.

HORIZONTAL=PER PLAN

23.2.

VERTICAL=PER PLAN
24.

CHANGES TO THESE DESIGN PLANS SHALL NOT BE ALLOWED UNLESS APPROVED IN WRITING BY THE DESIGN ENGINEER.

EXISTING FEATURE LEGEND

CONTOUR MINOR (EX)	- - - - -
CONTOUR MAJOR (EX)	- - - - -
ANCHOR GUY	
CULVERT	
ELECTRIC LINE	
FIRE HYDRANT	
GAS LINE	
LANDSCAPE WALL	
PROPERTY LINE	
ROAD CENTER LINE	
ROAD EDGE	
SANITARY SEWER CLEANOUT	
SANITARY SEWER LINE	
SANITARY SEWER MANHOLE	
SPEED LIMIT SIGN	
TELEPHONE LINE	
TV BOX	
TV LINE	
UTILITY POLE	
WATER CURB STOP	
WATER LINE	
WATER TEE	
WOOD FENCE	

PROPOSED FEATURE LEGEND

CONTOUR MINOR (PR)	
CONTOUR MAJOR (PR)	
BIORETENTION MEDIA	
EROSION CONTROL BLANKET	
LIMITS OF CONSTRUCTION	
RIPRAP (VOID FILLED)	
SEED (RIPARIAN)	
SEED (UPLAND)	
WATER QUALITY AREA (PLAN)	
WATER QUALITY AREA (XSEC)	
STRUCTURE BACKFILL	



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Horizontal Scale & Orientation

Legend

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Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
GENERAL NOTES & LEGEND

2026001054	NTS
Project No.	Horizontal Scale

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2026/04/17 6:19 PM By: Lucababett

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Client/Project

TOWN OF GRAND LAKE/TWLA

GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone

BID SET

Sheet Name

TABLE OF CONTENTS

2026001054 NTS

Project No. Horizontal Scale



WATERVATION
130 W. Sackett Ave., Unit A
Salida, CO 81201
www.water-vation.com

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Horizontal Scale & Orientation

02040

Feet

Legend

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TOWN OF GRAND LAKE/TWLA

GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone

BID SET

Sheet Name

SITE OVERVIEW_SWALE - (1)

2026001054

1" = 20'

Project No.

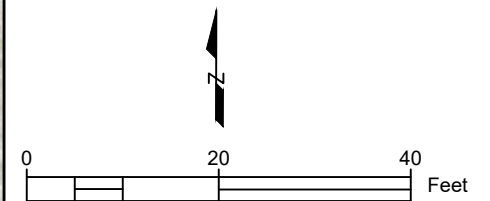
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ORIGINAL SHEET - ANSI B



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Sheet Name
SITE OVERVIEW_SWALE - (2)

2026001054 1" = 20'

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WATERVATION
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Salida, CO 81201
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Horizontal Scale & Orientation


0 20 40 Feet

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Project Milestone

BID SET

Sheet Name

SITE OVERVIEW_BIORETENTION B-1

2026001054	1" = 20'
Project No.	Horizontal Scale

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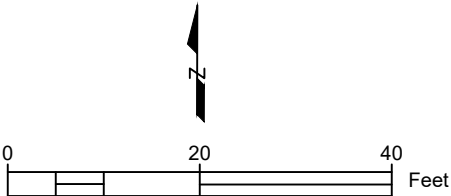
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ORIGINAL SHEET - ANSI B

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TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

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Project Milestone
BID SET

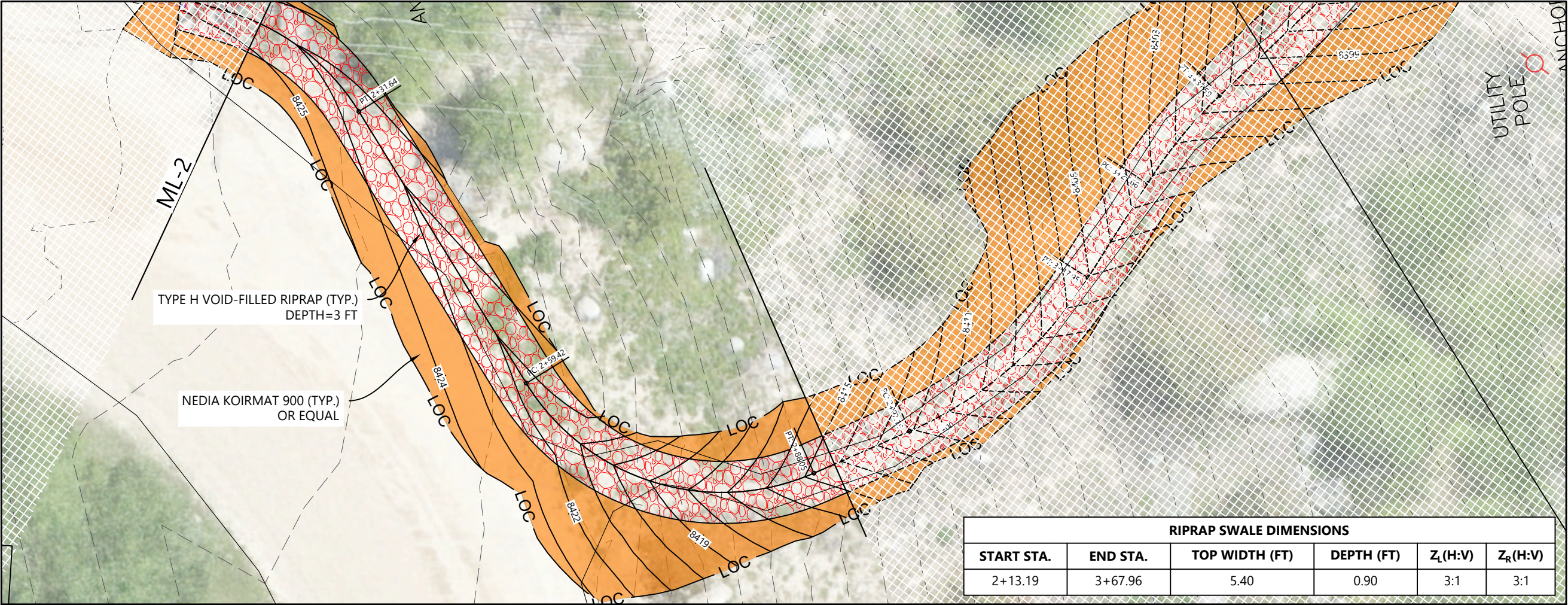
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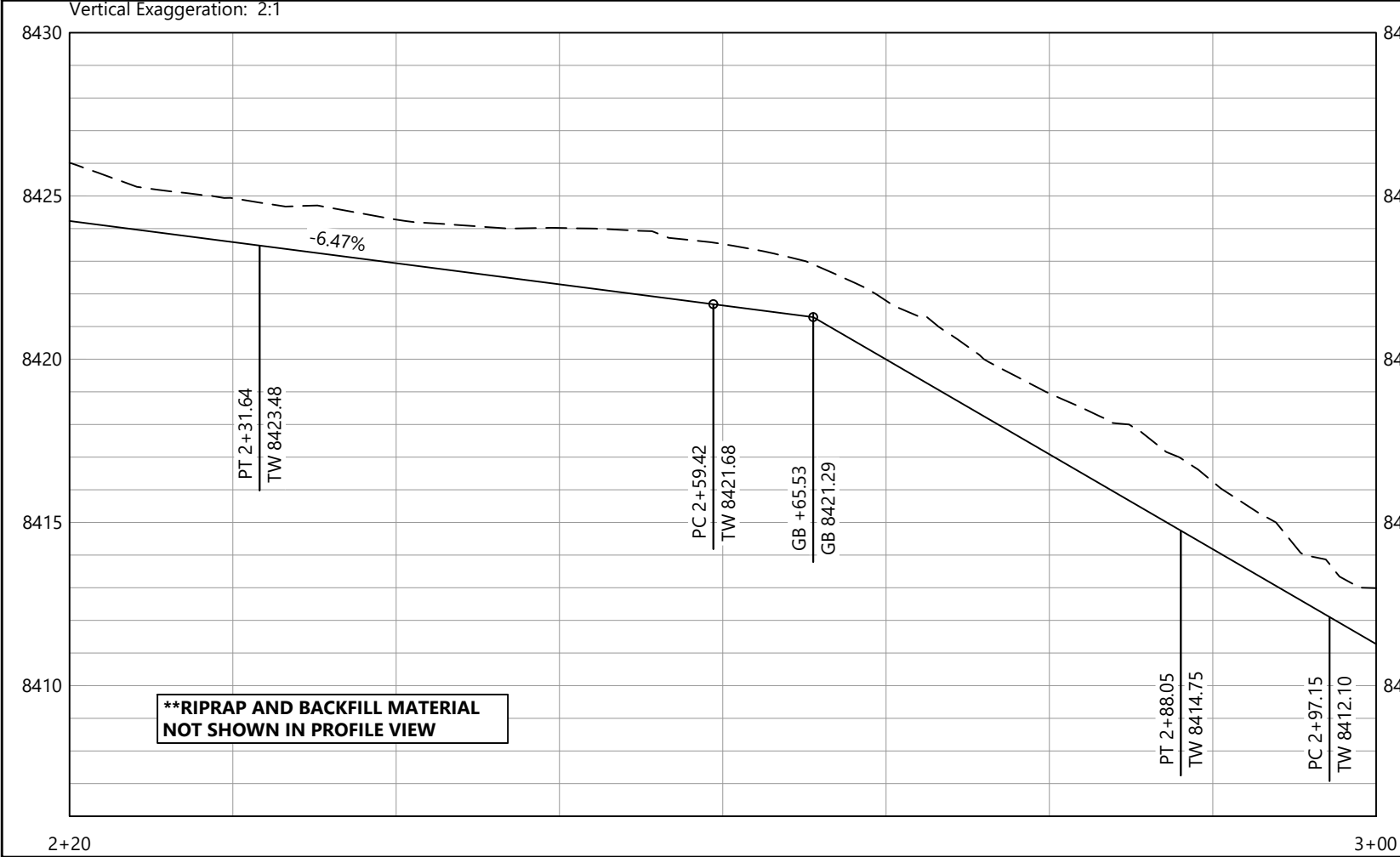
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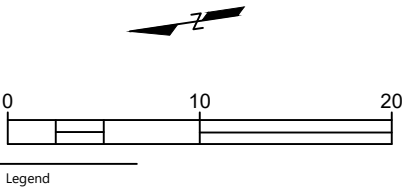
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START STA.	END STA.	TOP WIDTH (FT)	DEPTH (FT)	Z _L (H:V)	Z _R (H:V)
2+13.19	3+67.96	5.40	0.90	3:1	3:1



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Sheet Name
PLAN & PROFILE_SWALE - (4)

2026001054 1" = 10'
Project No. Horizontal Scale

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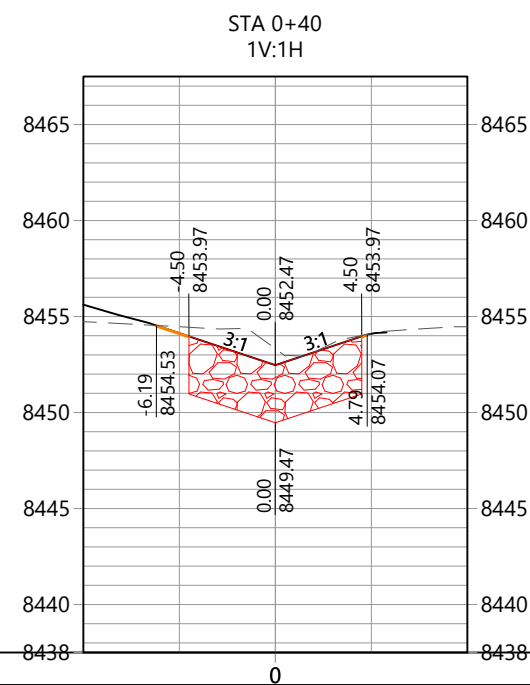
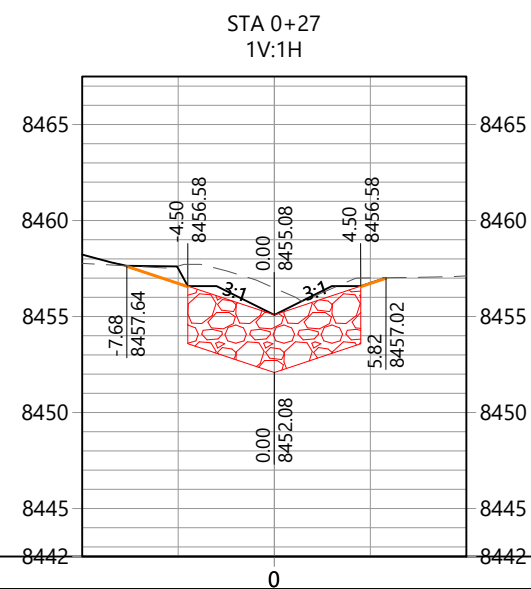
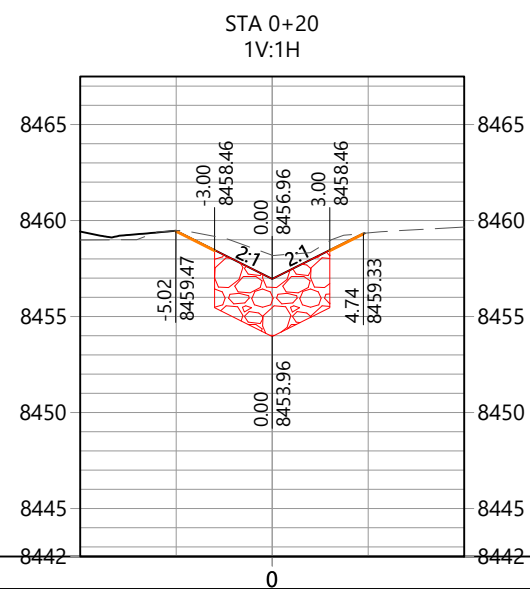
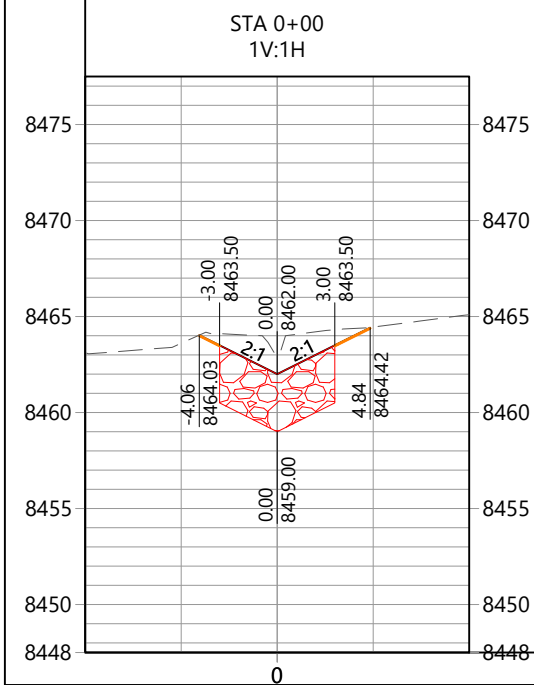
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Permit-Seal

GRAND LAKE, CO

Sheet Name
XSEC_SWALE - (1)

Project No.	Horizontal Scale
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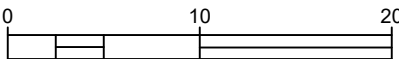


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Horizontal Scale & Orientation



Legend

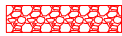
STRUCTURE BACKFILL



NEDIA KOIR MAT 900 (OR EQ.)



TYPE H VOID FILLED RIPRAP



RCP CULVERT (DIA. = 12")



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TOWN OF GRAND LAKE/TWLA
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Project Milestone

BID SET

Sheet Name

XSEC_SWALE - (2)

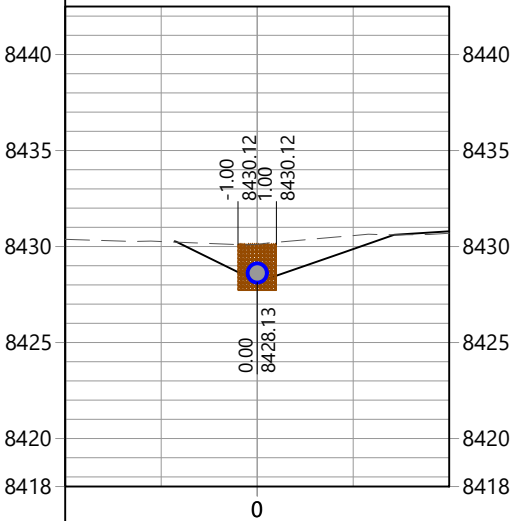
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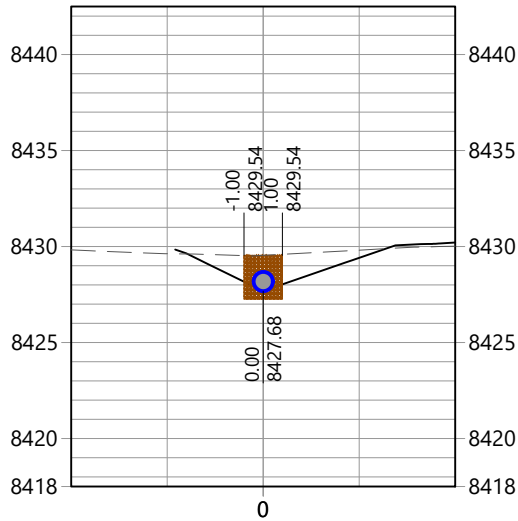
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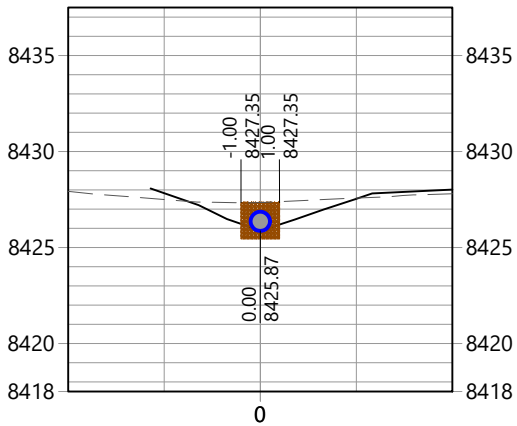
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1V:1H



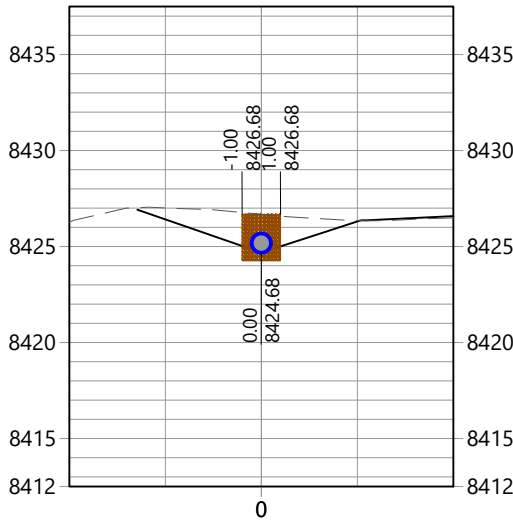
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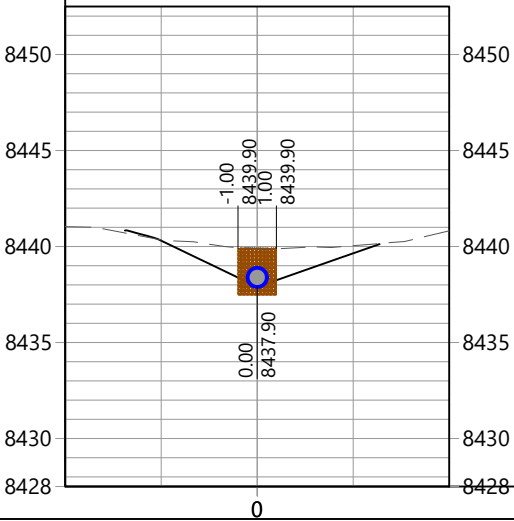
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1V:1H



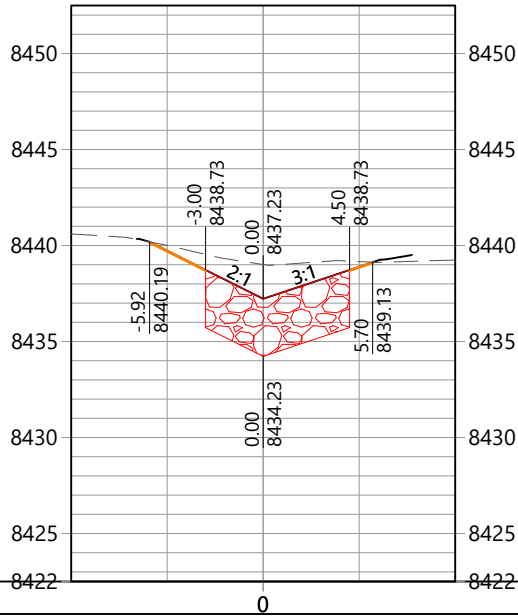
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1V:1H



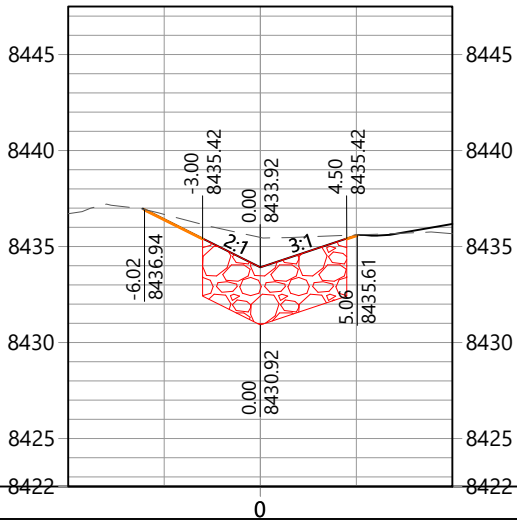
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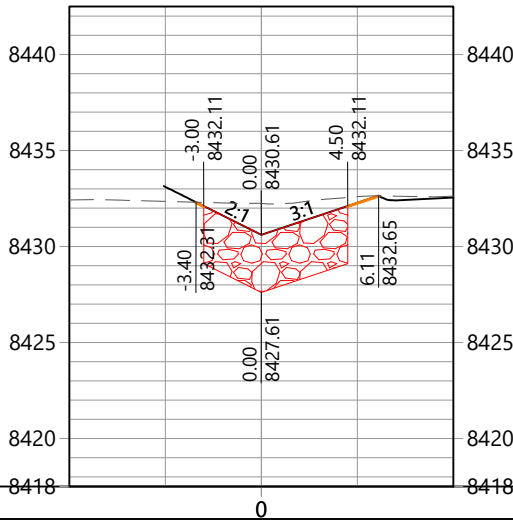
STA 1+20
1V:1H



STA 1+40
1V:1H



STA 1+60
1V:1H

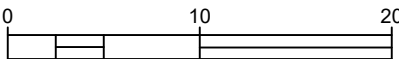


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Horizontal Scale & Orientation



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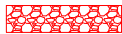
STRUCTURE BACKFILL



NEDIA KOIR MAT 900 (OR EQ.)



TYPE H VOID FILLED RIPRAP



RCP CULVERT (DIA. = 12")



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Client/Project

TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone

BID SET

Sheet Name

XSEC_SWALE - (3)

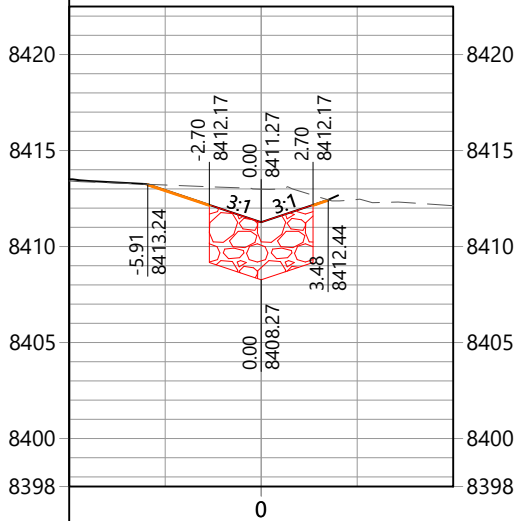
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1" = 10'

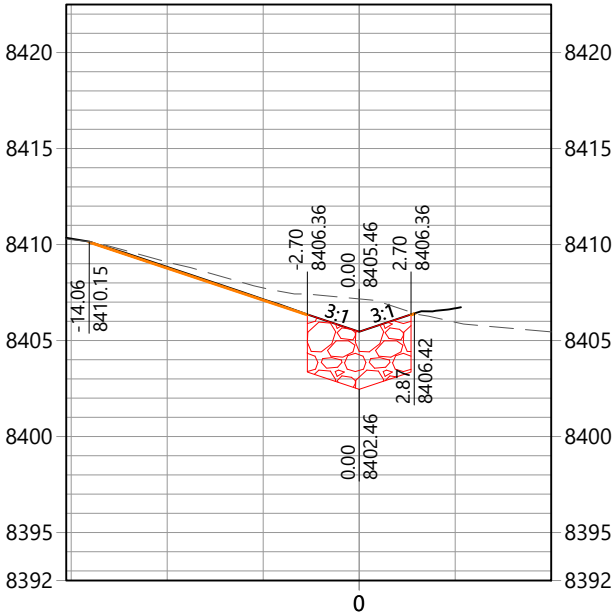
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Horizontal Scale

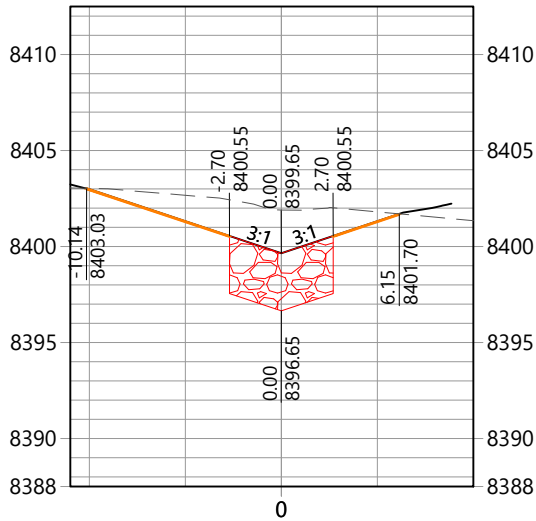
STA 3+00
1V:1H



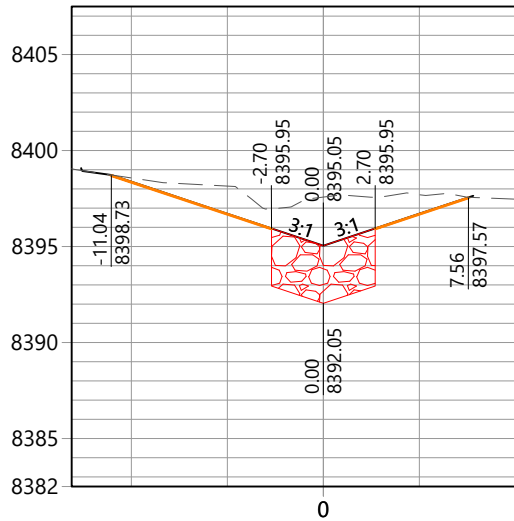
STA 3+20
1V:1H



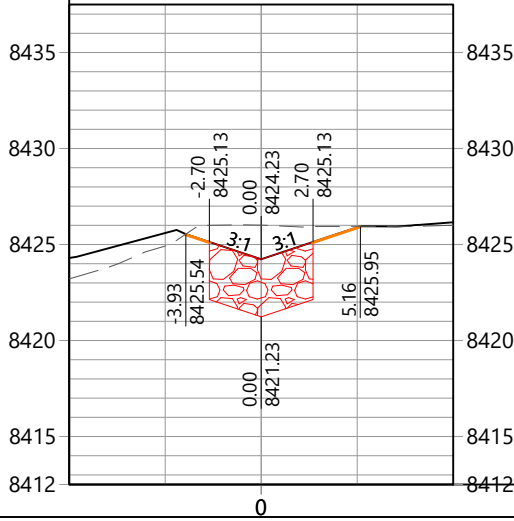
STA 3+40
1V:1H



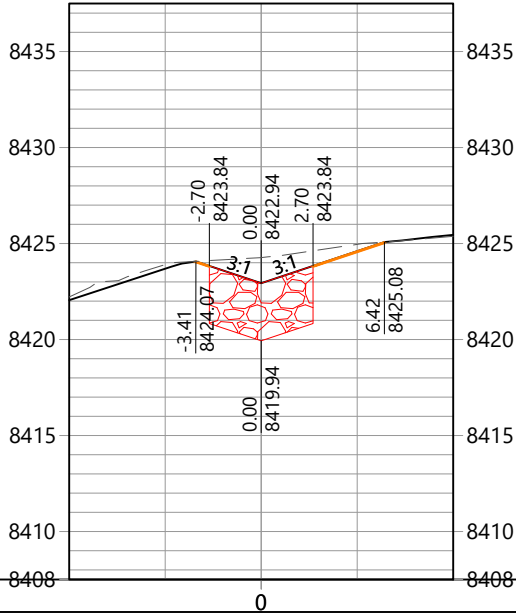
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1V:1H



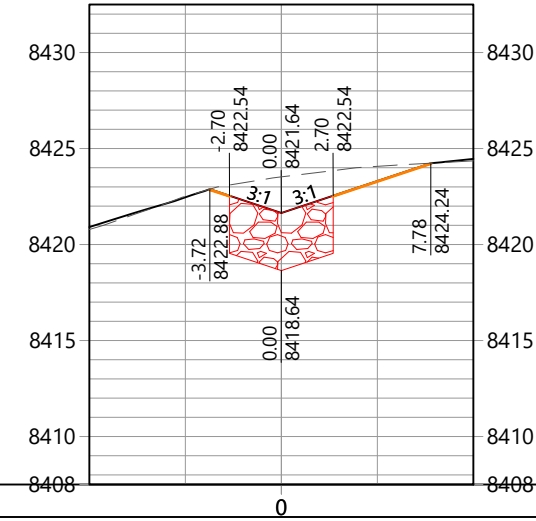
STA 2+20
1V:1H



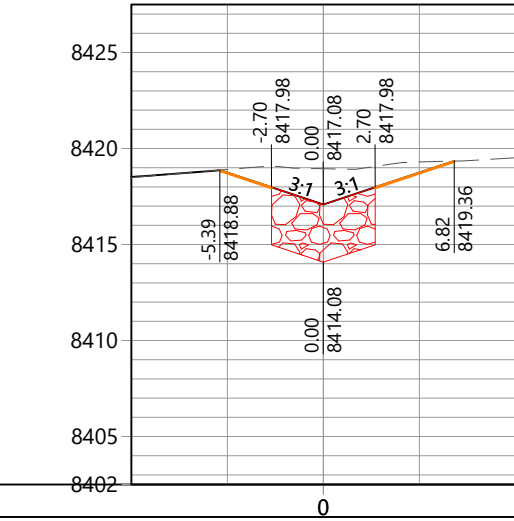
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1V:1H



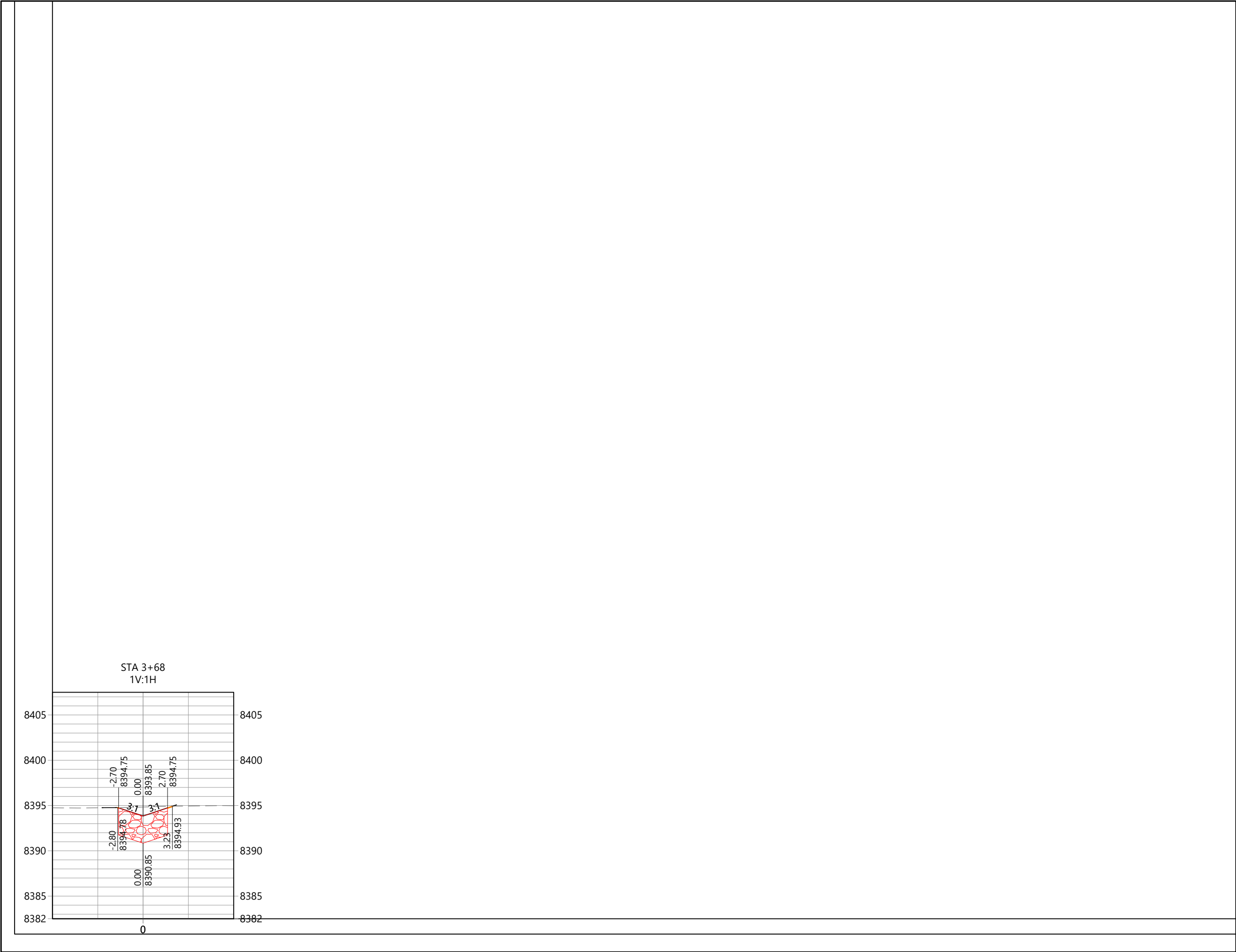
STA 2+60
1V:1H



STA 2+80
1V:1H



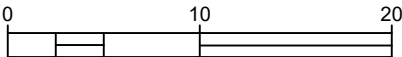
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2026/04/17 6:28 PM By: Lucas Babett



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Sub-Consultants

Horizontal Scale & Orientation



Legend

- STRUCTURE BACKFILL
- NEDIA KOIR MAT 900 (OR EQ.)
- TYPE H VOID FILLED RIPRAP
- RCP CULVERT (DIA. = 12'')

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	----
	Dwn.	Chkd.	Dsgn.

Permit-Seal

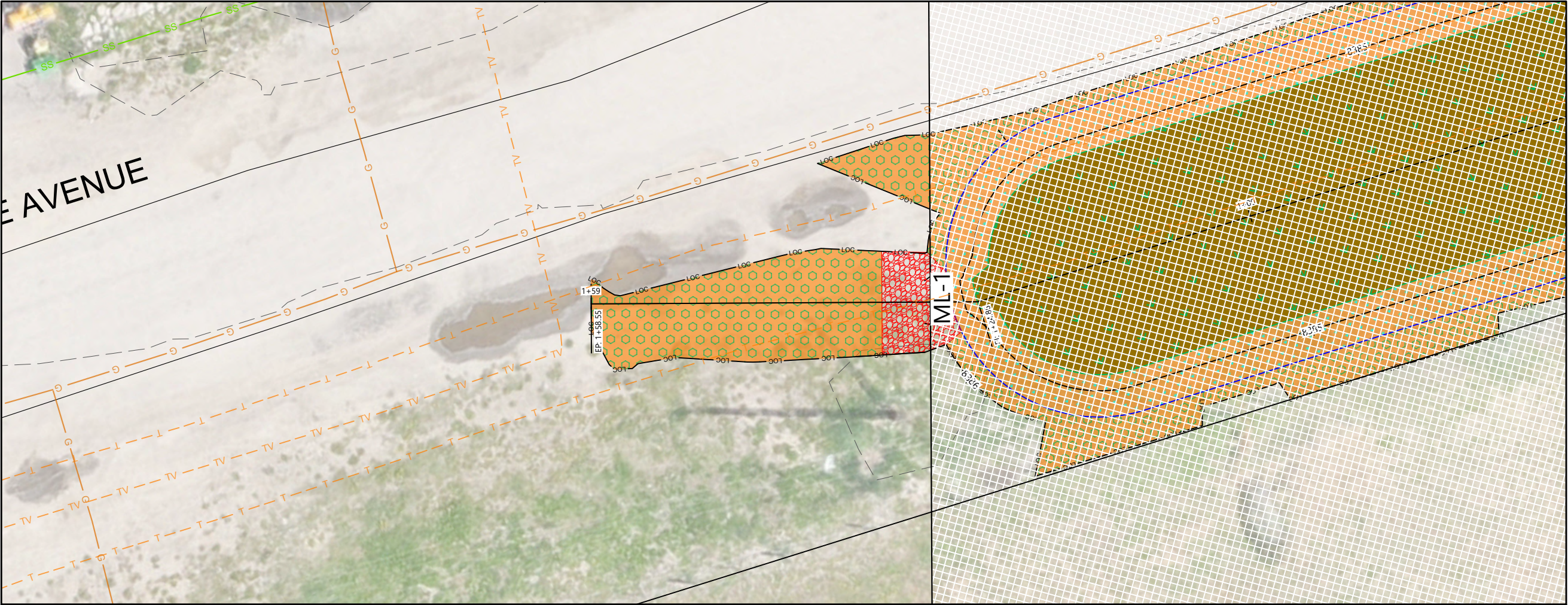
Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
XSEC_SWALE - (4)

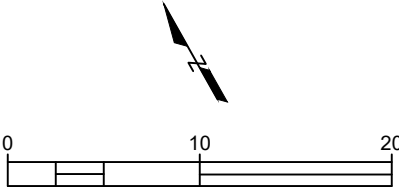
2026001054 1" = 10'
Project No. Horizontal Scale



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Sub-Consultants

Horizontal Scale & Orientation



Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- MEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- MEDIA S300B (OR EQ.) W/ UPLAND SEED

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

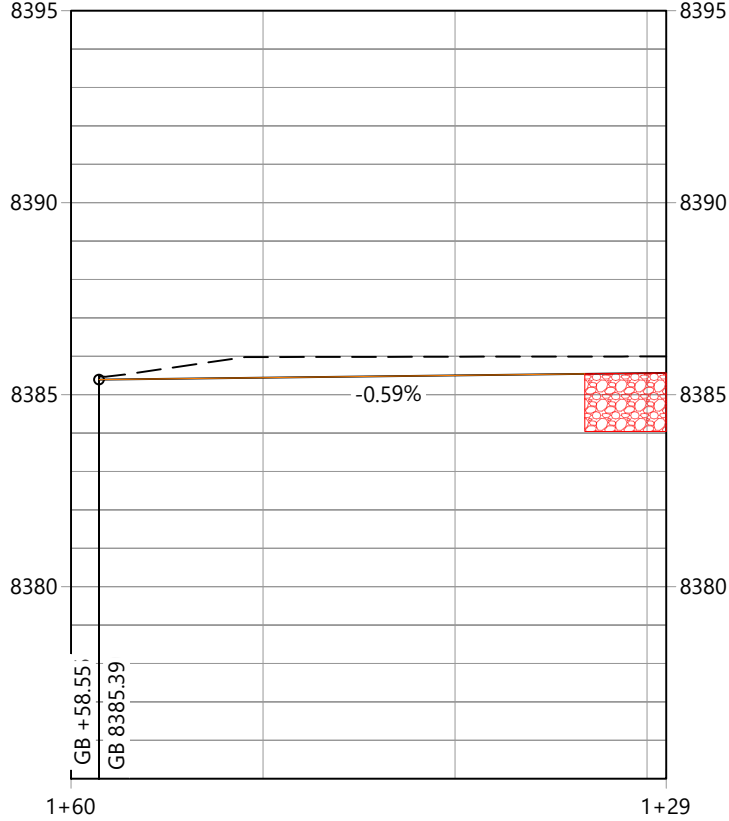
Project Milestone
BID SET

Sheet Name
PLAN & PROFILE_B-1 - (1)

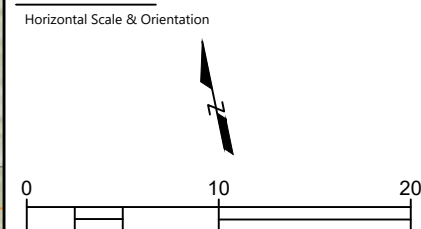
2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 16 of 31


B-1 CL-PV2
VERTICAL EXAGGERATION: 2:1



Sub-Consultants



Legend



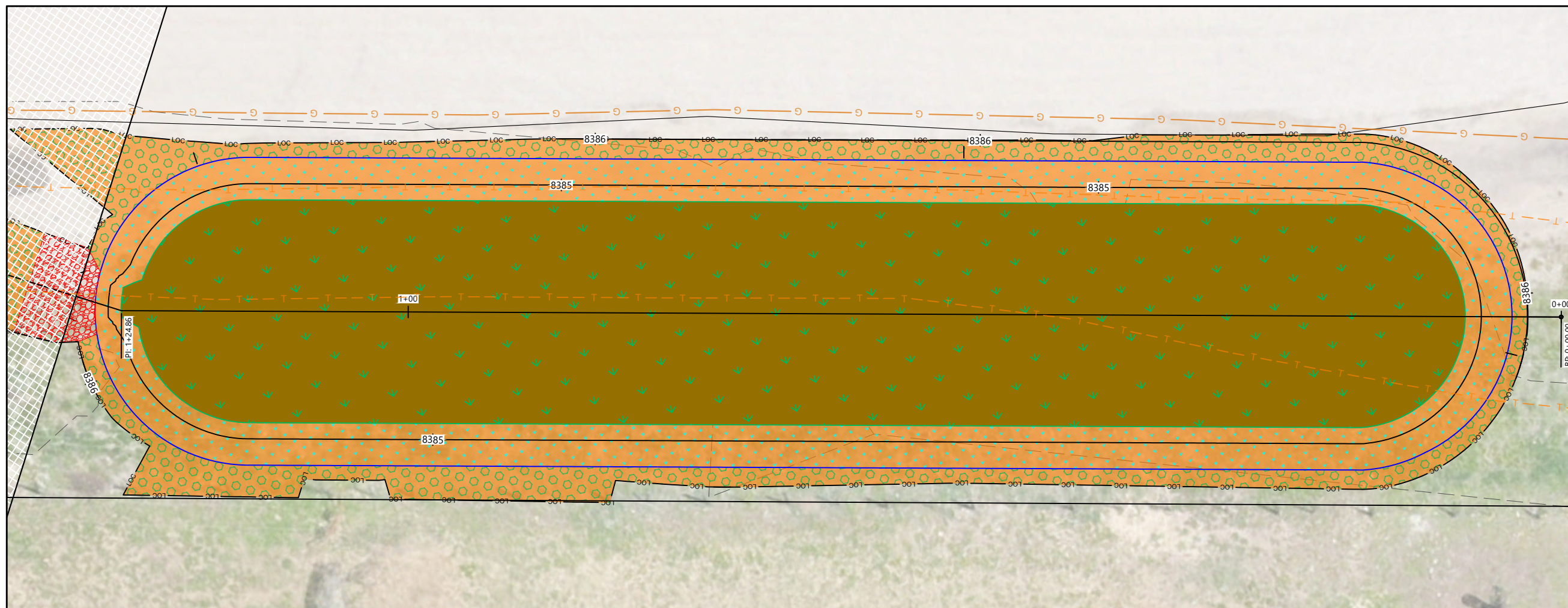


Revision	By	Appd.	YY.MM.D
Issued	By	Appd.	YY.MM.D
File Name:	----	----	----
	Dwn.	Chkd.	Dsgn.
			26.04.17
			YY.MM.D

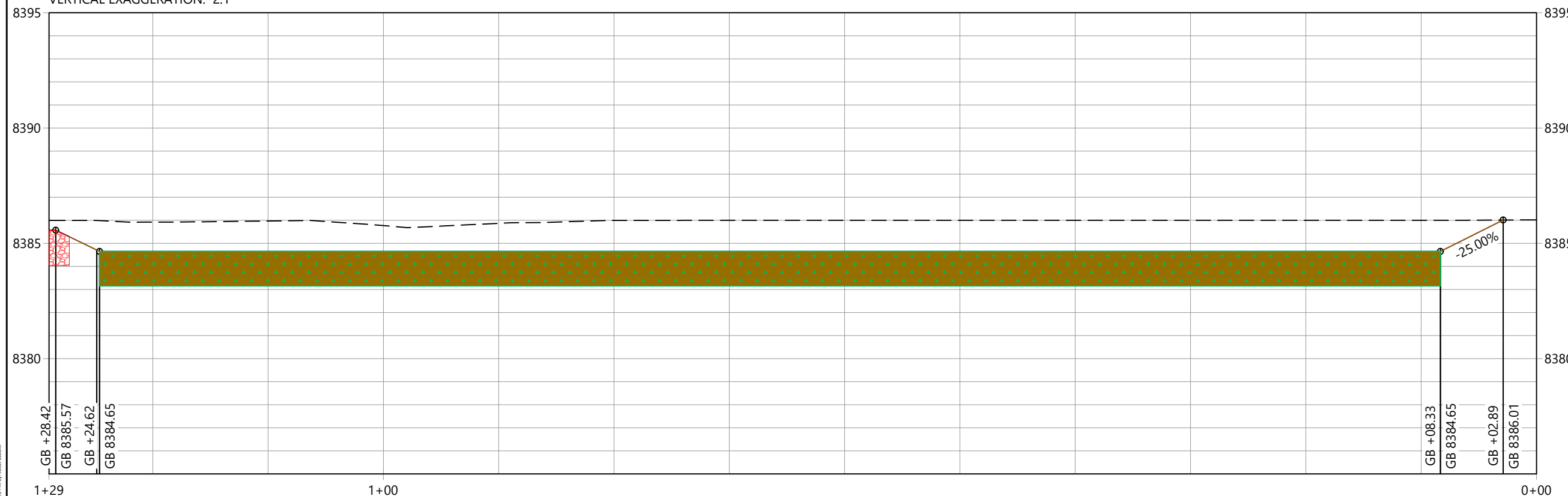
2026001054 1" = 10'

Project No. _____ Horizontal Scale _____

Sheet 17 of 31



B-1 CL-PV1
VERTICAL EXAGGERATION: 2:1

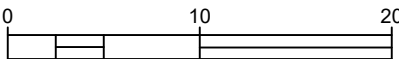


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Sub-Consultants

Horizontal Scale & Orientation



Legend

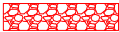
BIORETENTION GROWING MEDIA



ECB (NEDIA S300B OR EQ.)



TYPE L VOID FILLED RIPRAP



WATER QUALITY W.S.E.



Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	----
	Dwn.	Chkd.	Dsgn.
Permit-Seal			26.04.17

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

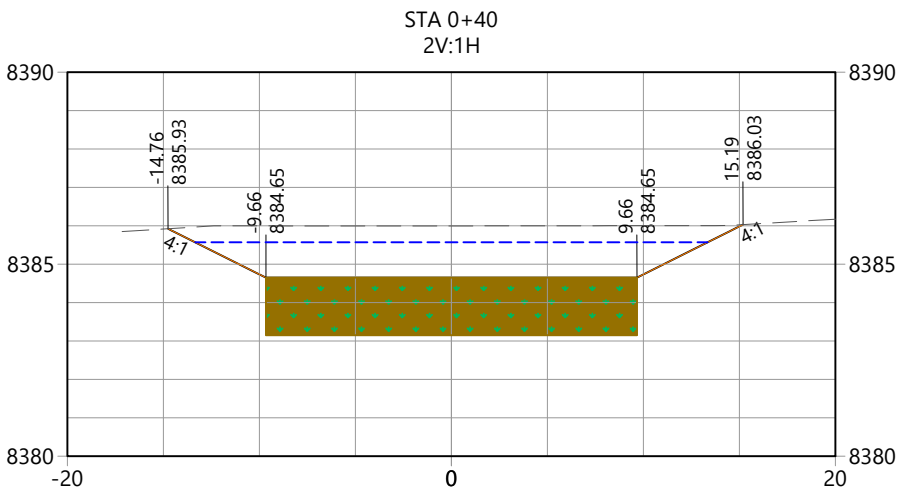
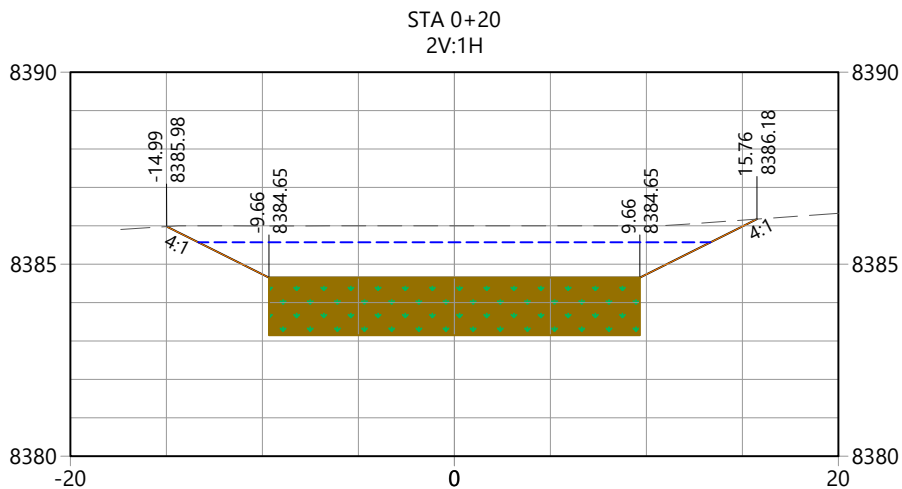
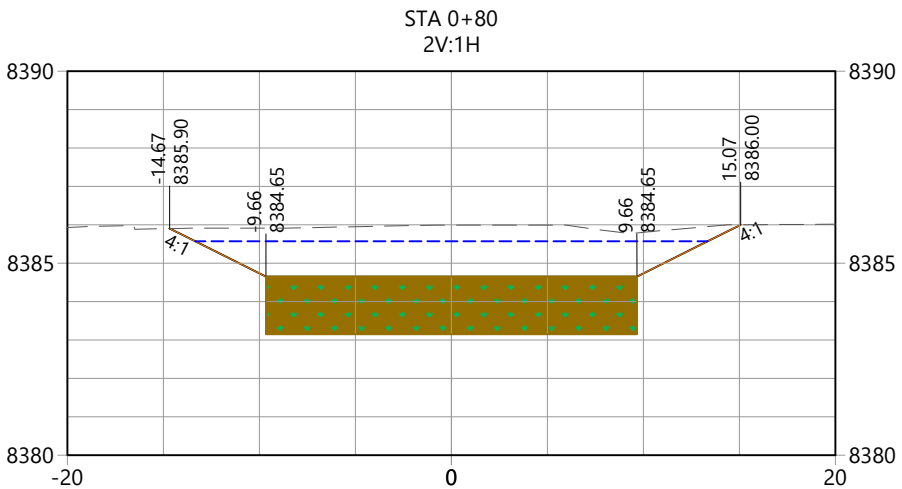
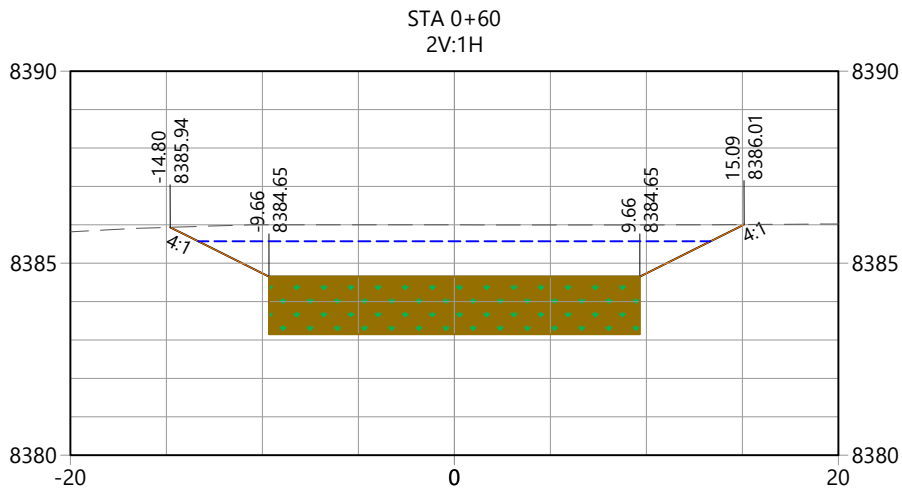
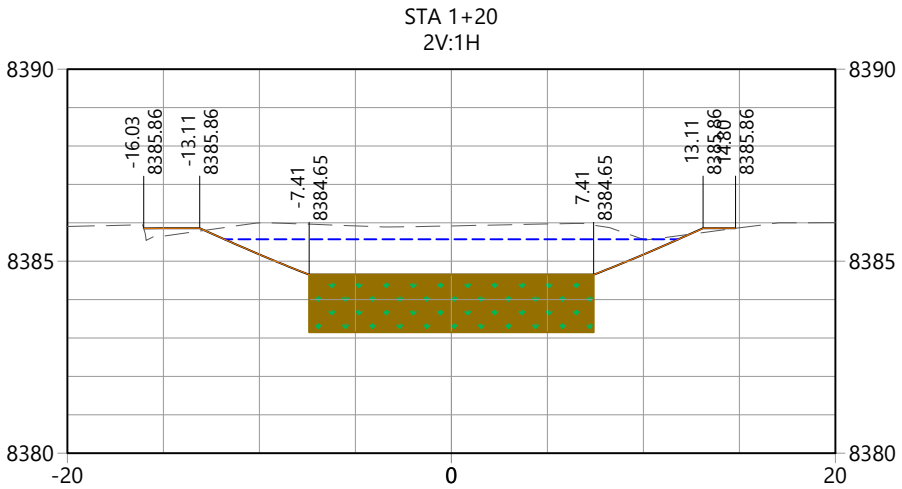
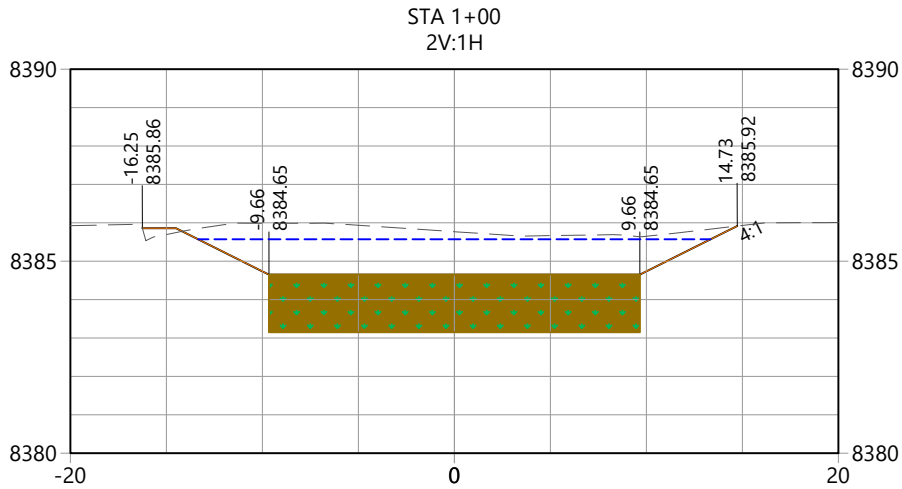
Project Milestone
BID SET

Sheet Name
XSEC_B-1 - (1)

2026001054 1" = 10'

Project No. Horizontal Scale

Sheet 18 of 31



Sub-Consultants

Horizontal Scale & Orientation



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Issued	By	Appd.	YY.MM.DD

File Name:	----	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

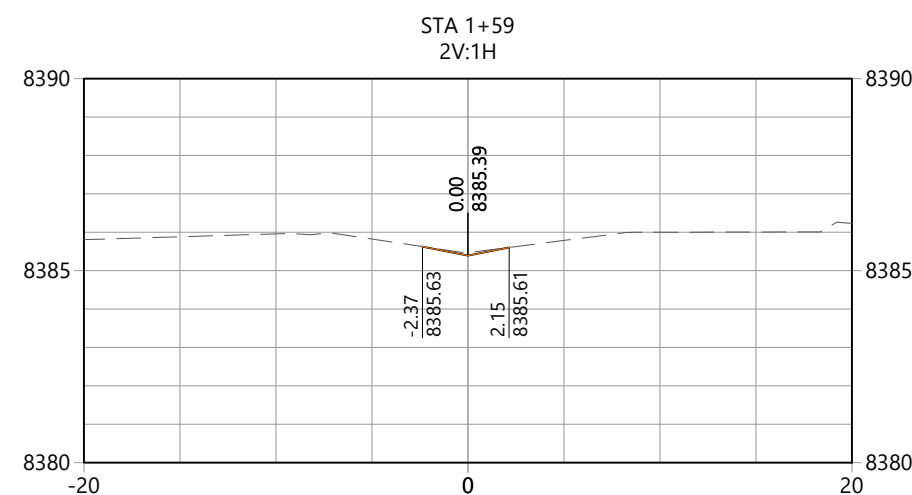
GRAND LAKE, CO

BID SET

2026001054 1" = 10'

Project No.	Horizontal Scale
-------------	------------------

Sheet 19 of 31



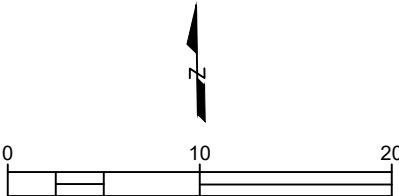
PARCEL A
BLOCK 11

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Sub-Consultants

Horizontal Scale & Orientation

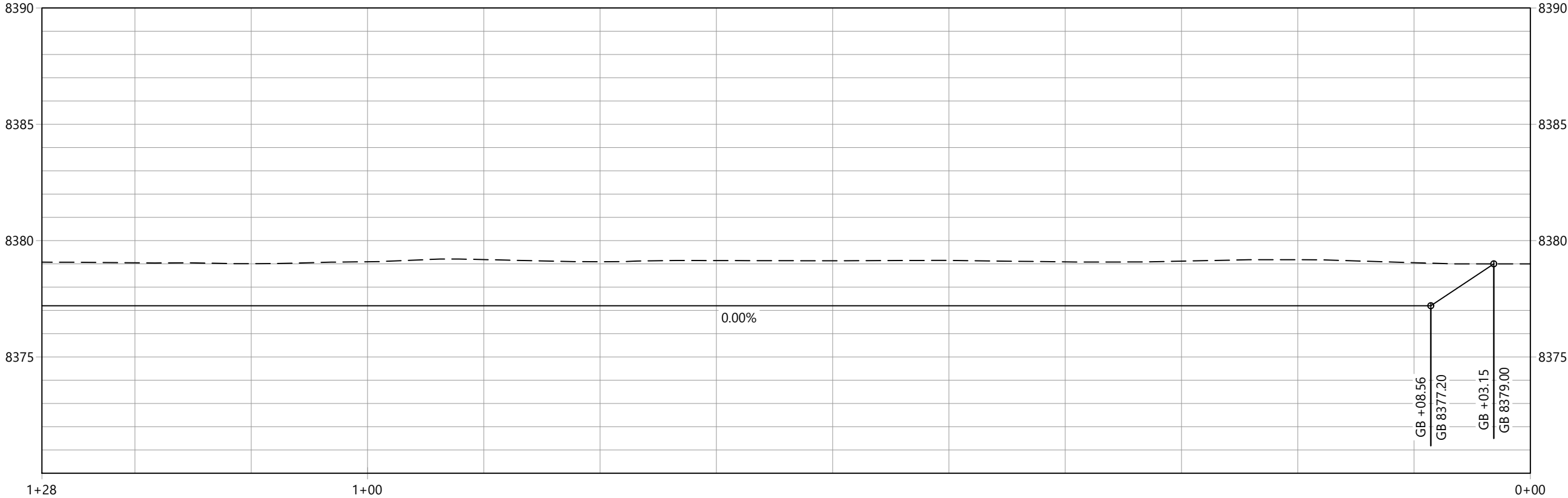


Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- NEDIA S300B (OR EQ.) W/ UPLAND SEED

REFERENCE SHEETS 23 AND 24
FOR DITCH AND CULVERT PLAN & PROFILE

VERTICAL EXAGGERATION: 2:1



Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.
Permit-Seal			

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

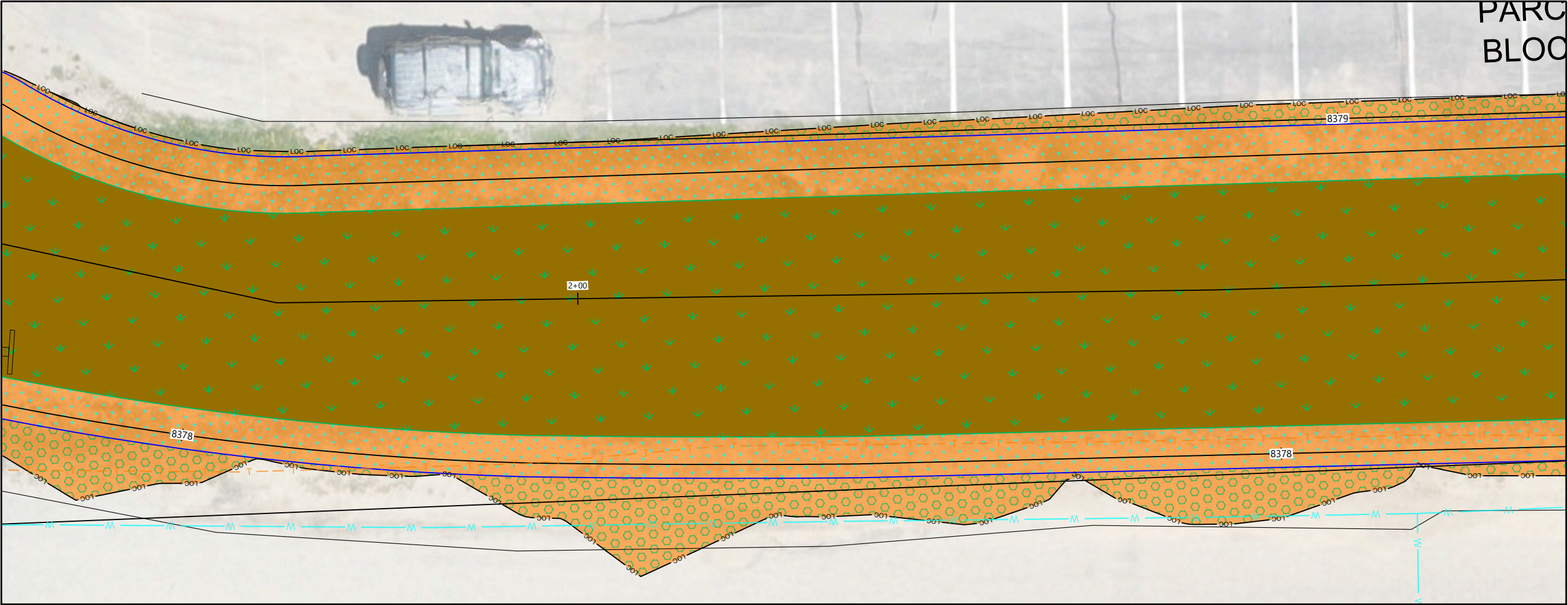
GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
PLAN & PROFILE_B-3 - (1)

2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 20 of 31



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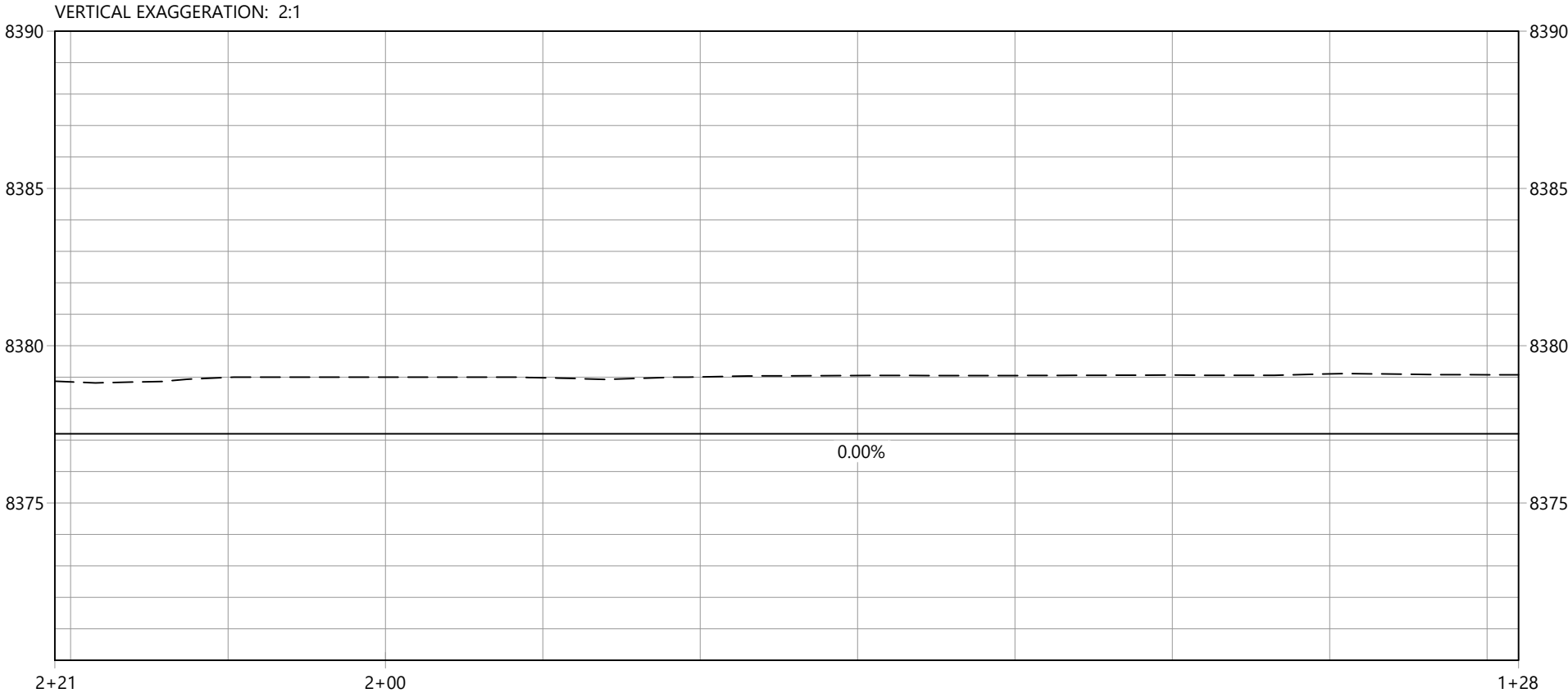
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Sub-Consultants

Horizontal Scale & Orientation

Legend

BIORETENTION GROWING MEDIA W/ PLANTINGS
TYPE L VOID FILLED RIPRAP
WATER QUALITY W.S.E.
NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
NEDIA S300B (OR EQ.) W/ UPLAND SEED



Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
Permit-Seal	Dwn.	Chkd.	Dsgn.

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

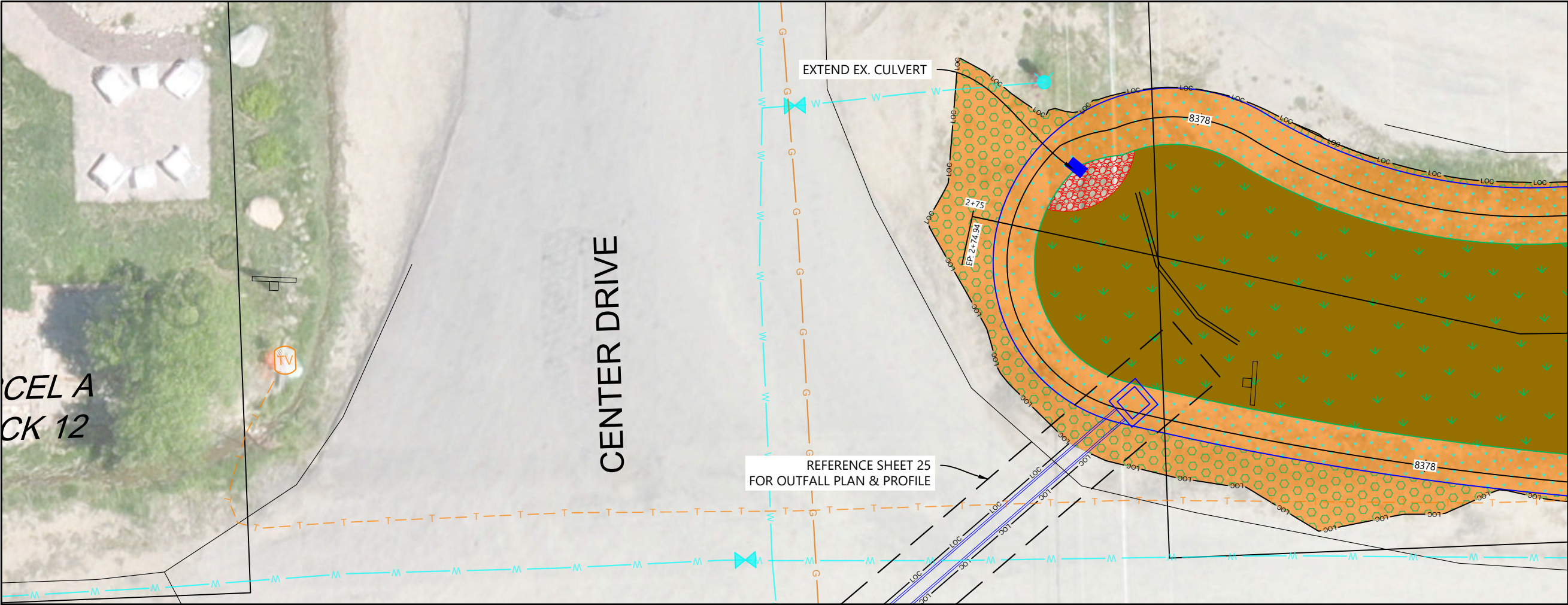
GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
PLAN & PROFILE_B-3 - (2)

2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 21 of 31



CEL A
CK 12

CENTER DRIVE

EXTEND EX. CULVERT

REFERENCE SHEET 25
FOR OUTFALL PLAN & PROFILE

2+75

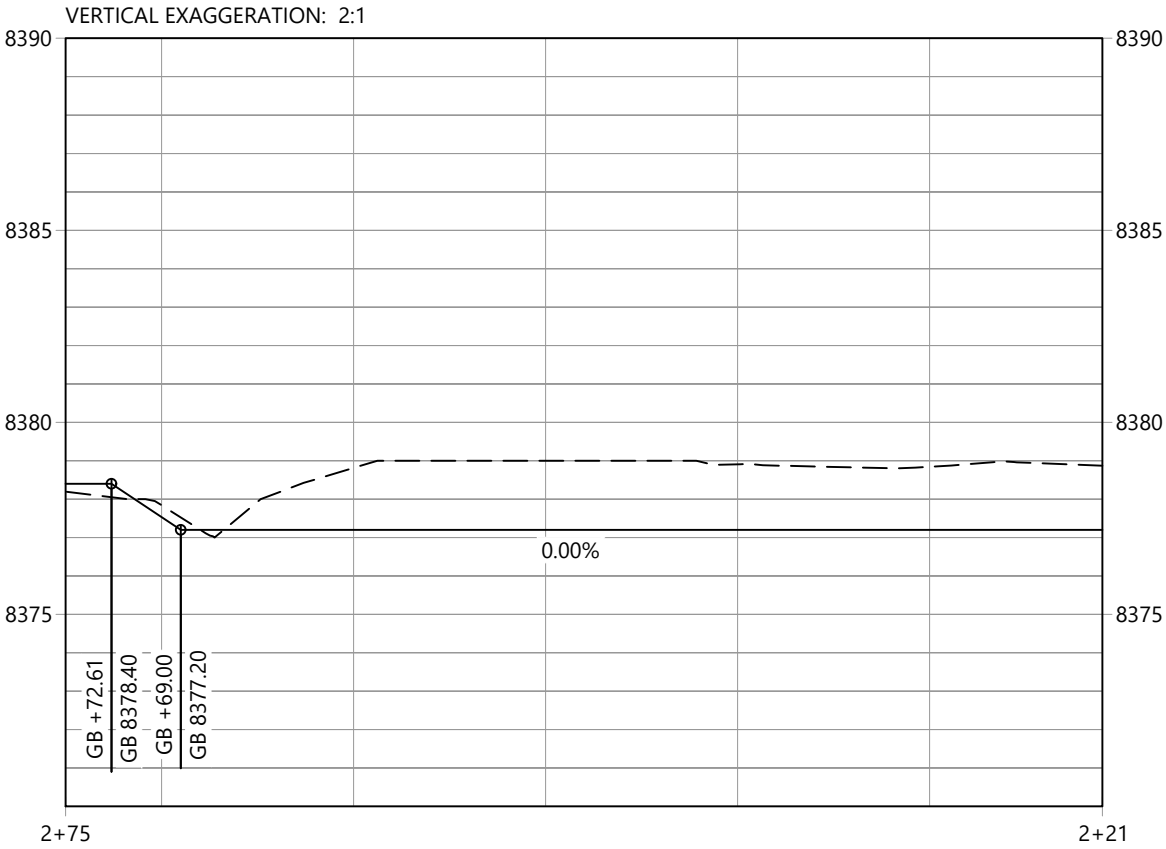
EP - 2+74.94

8378

8378

2+21

2+75

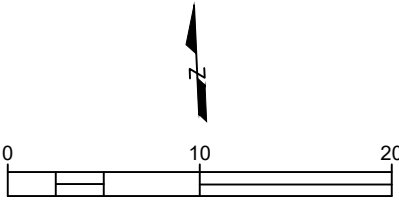


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Sub-Consultants

Horizontal Scale & Orientation



Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- NEDIA S300B (OR EQ.) W/ UPLAND SEED

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

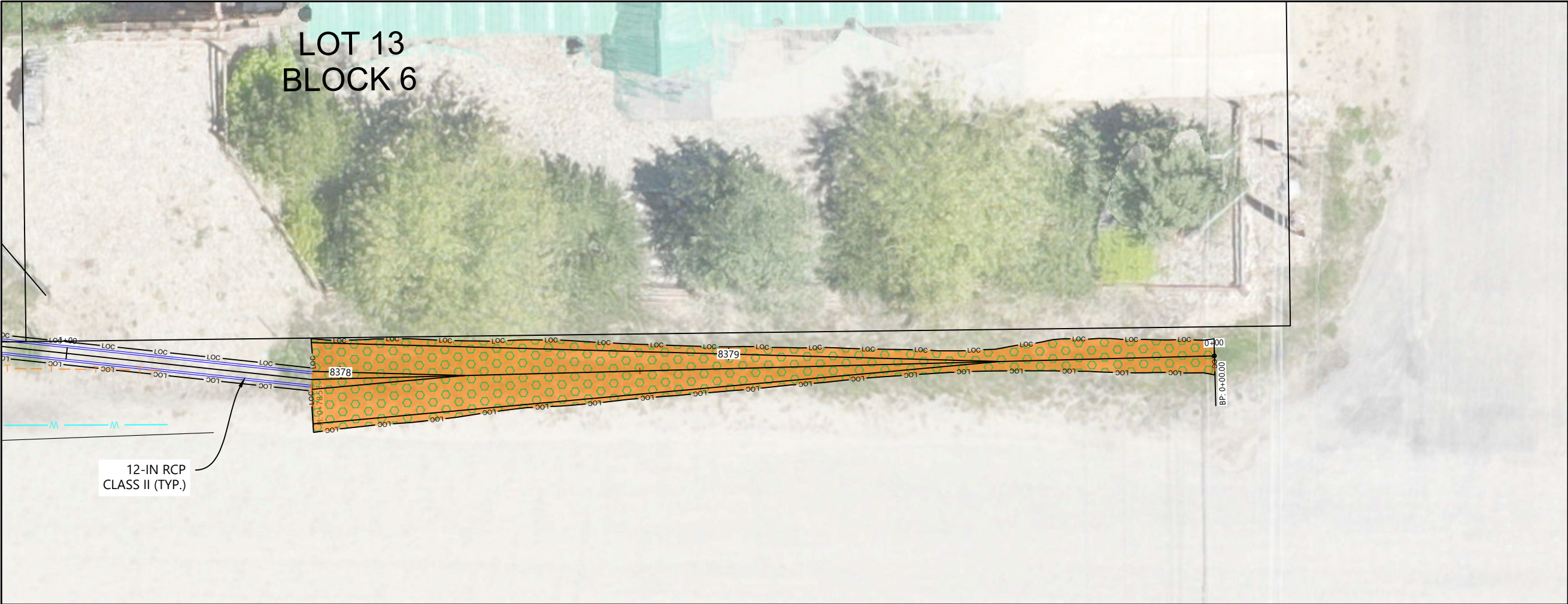
GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
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Project No. Horizontal Scale

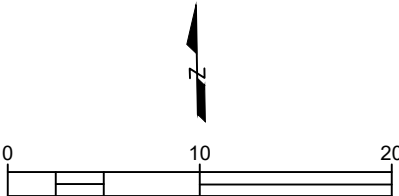
Sheet 22 of 31



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Sub-Consultants

Horizontal Scale & Orientation



Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- NEDIA S300B (OR EQ.) W/ UPLAND SEED

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.

Permit-Seal

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

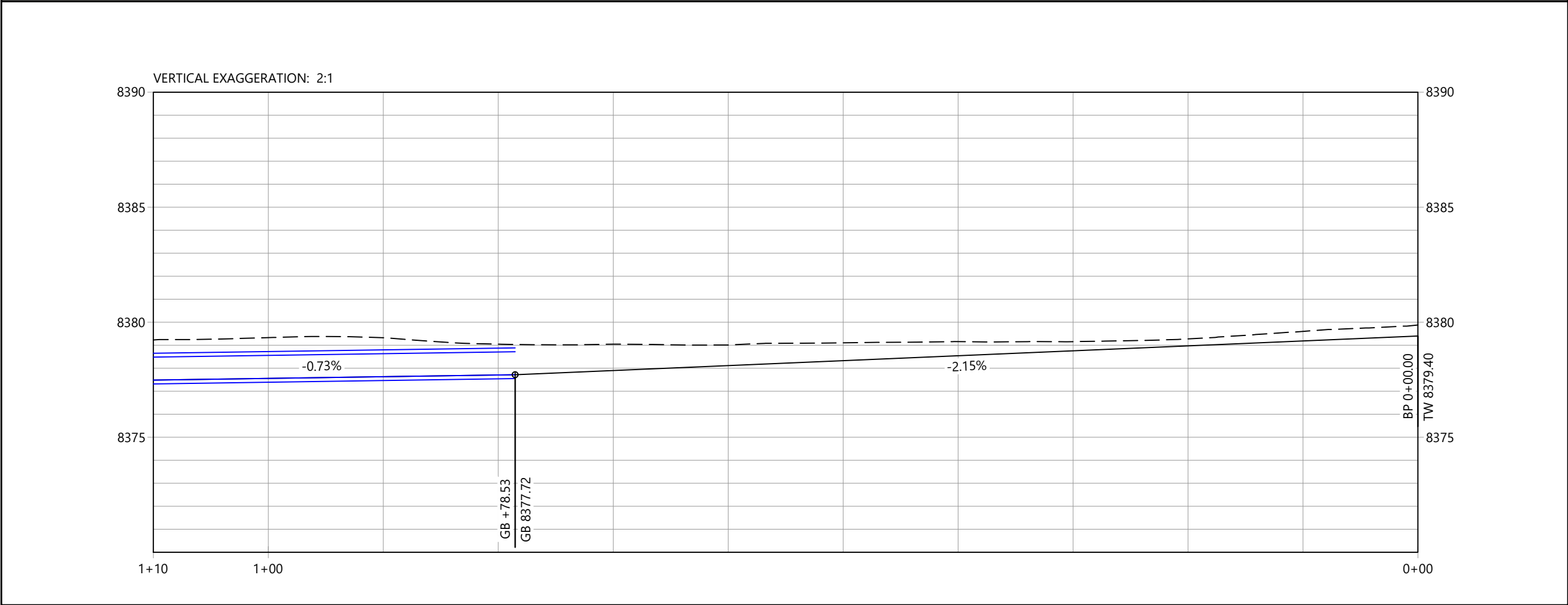
GRAND LAKE, CO

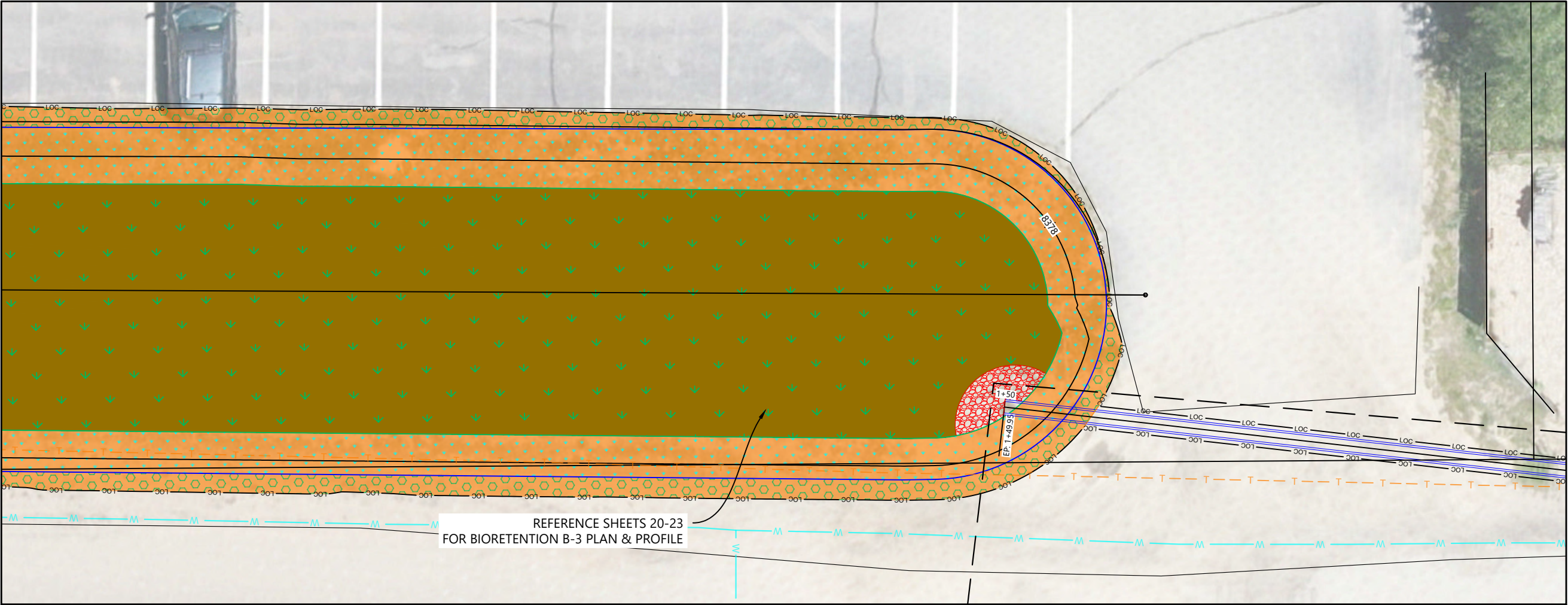
Project Milestone
BID SET

Sheet Name
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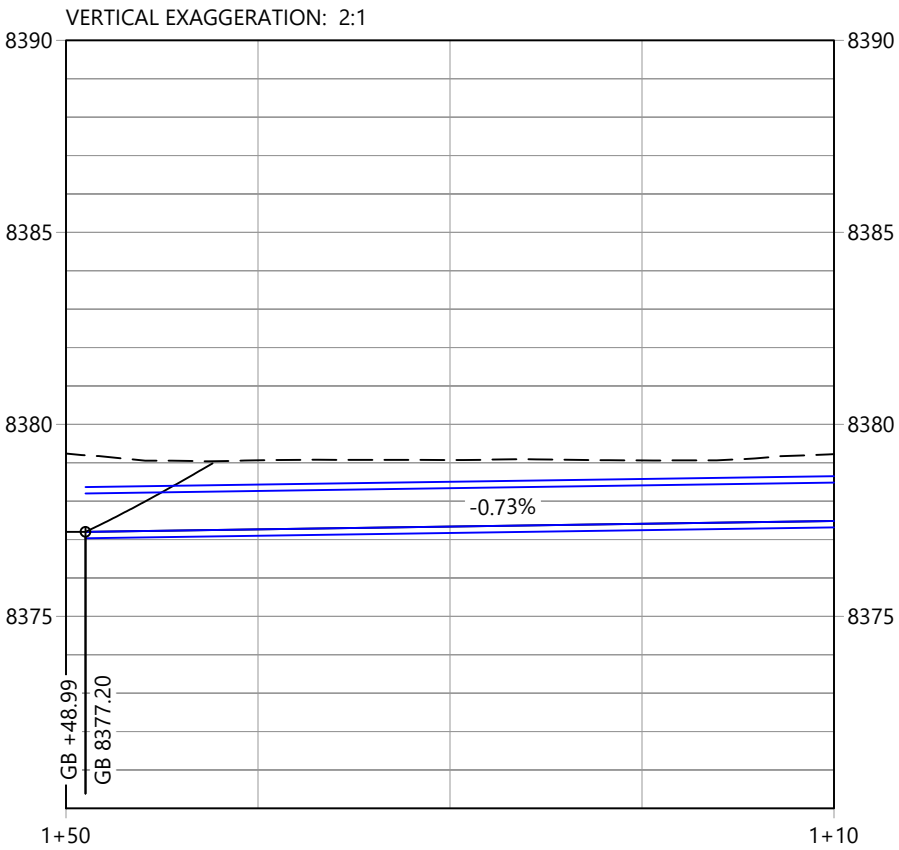
2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 23 of 31





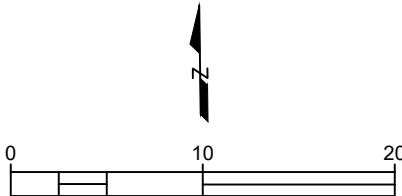
REFERENCE SHEETS 20-23
FOR BIORETENTION B-3 PLAN & PROFILE



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Sub-Consultants

Horizontal Scale & Orientation



Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- NEDIA S300B (OR EQ.) W/ UPLAND SEED

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.

Permit-Seal

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

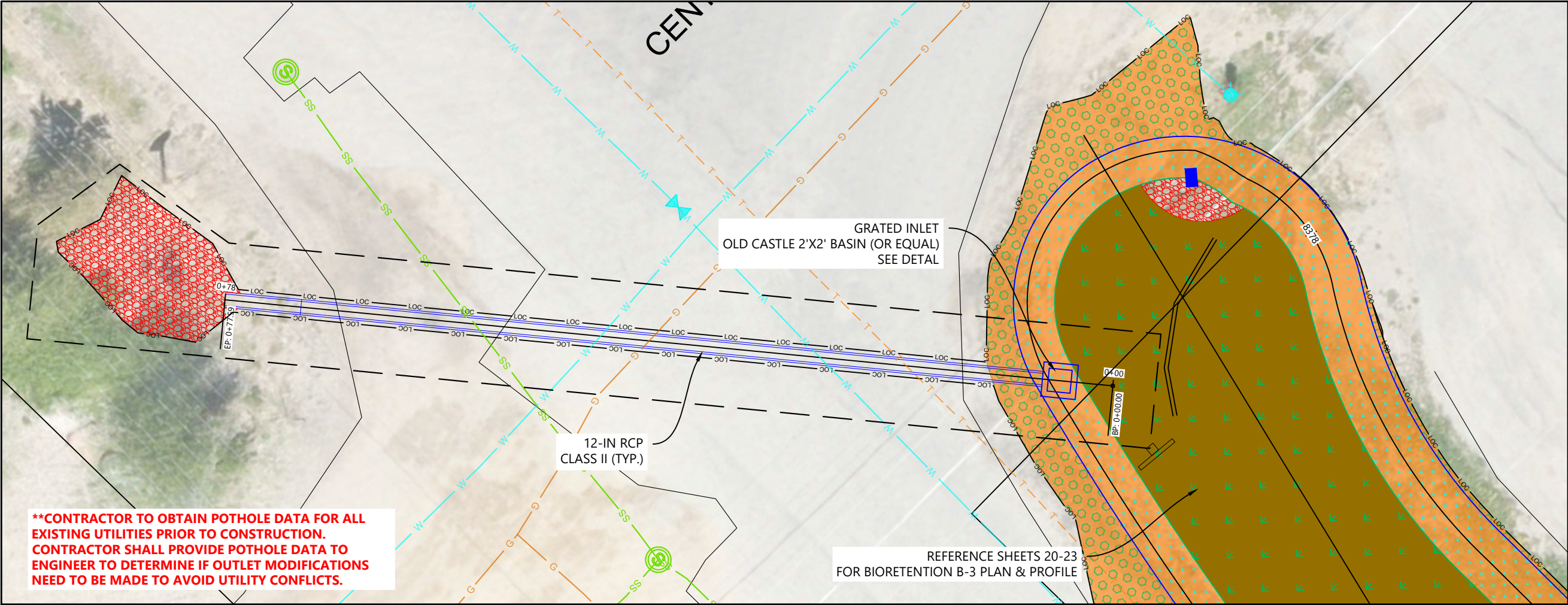
GRAND LAKE, CO

Project Milestone
BID SET

Sheet Name
PLAN & PROFILE_DITCH - (2)

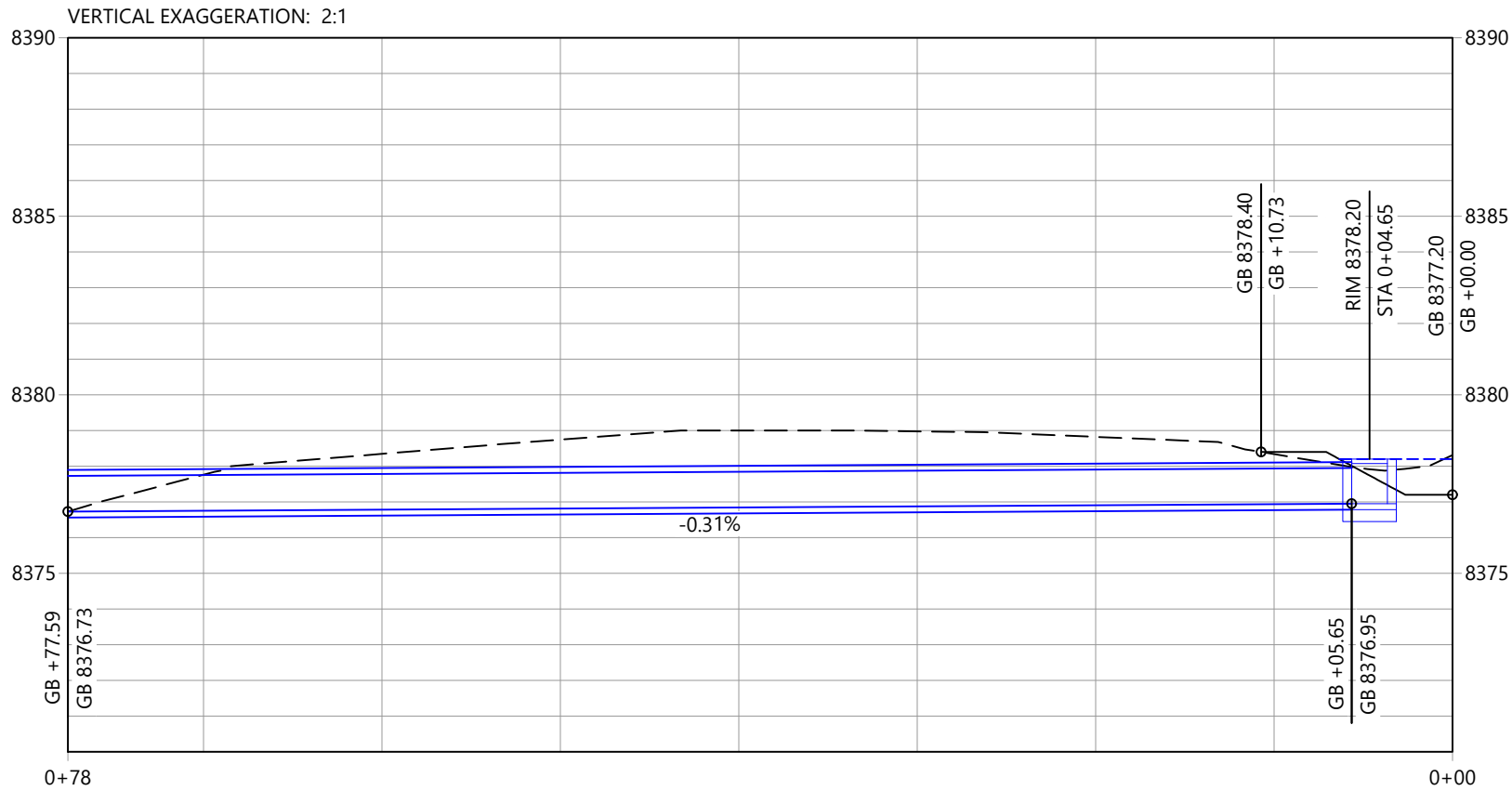
2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 24 of 31



****CONTRACTOR TO OBTAIN POTHOLE DATA FOR ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL PROVIDE POTHOLE DATA TO ENGINEER TO DETERMINE IF OUTLET MODIFICATIONS NEED TO BE MADE TO AVOID UTILITY CONFLICTS.**

REFERENCE SHEETS 20-23
FOR BIORETENTION B-3 PLAN & PROFILE

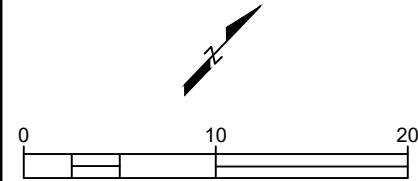


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Sub-Consultants

Horizontal Scale & Orientation



Legend

- BIORETENTION GROWING MEDIA W/ PLANTINGS
- TYPE L VOID FILLED RIPRAP
- WATER QUALITY W.S.E.
- NEDIA S300B (OR EQ.) W/ RIPARIAN SEED
- NEDIA S300B (OR EQ.) W/ UPLAND SEED

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.

Permit-Seal

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

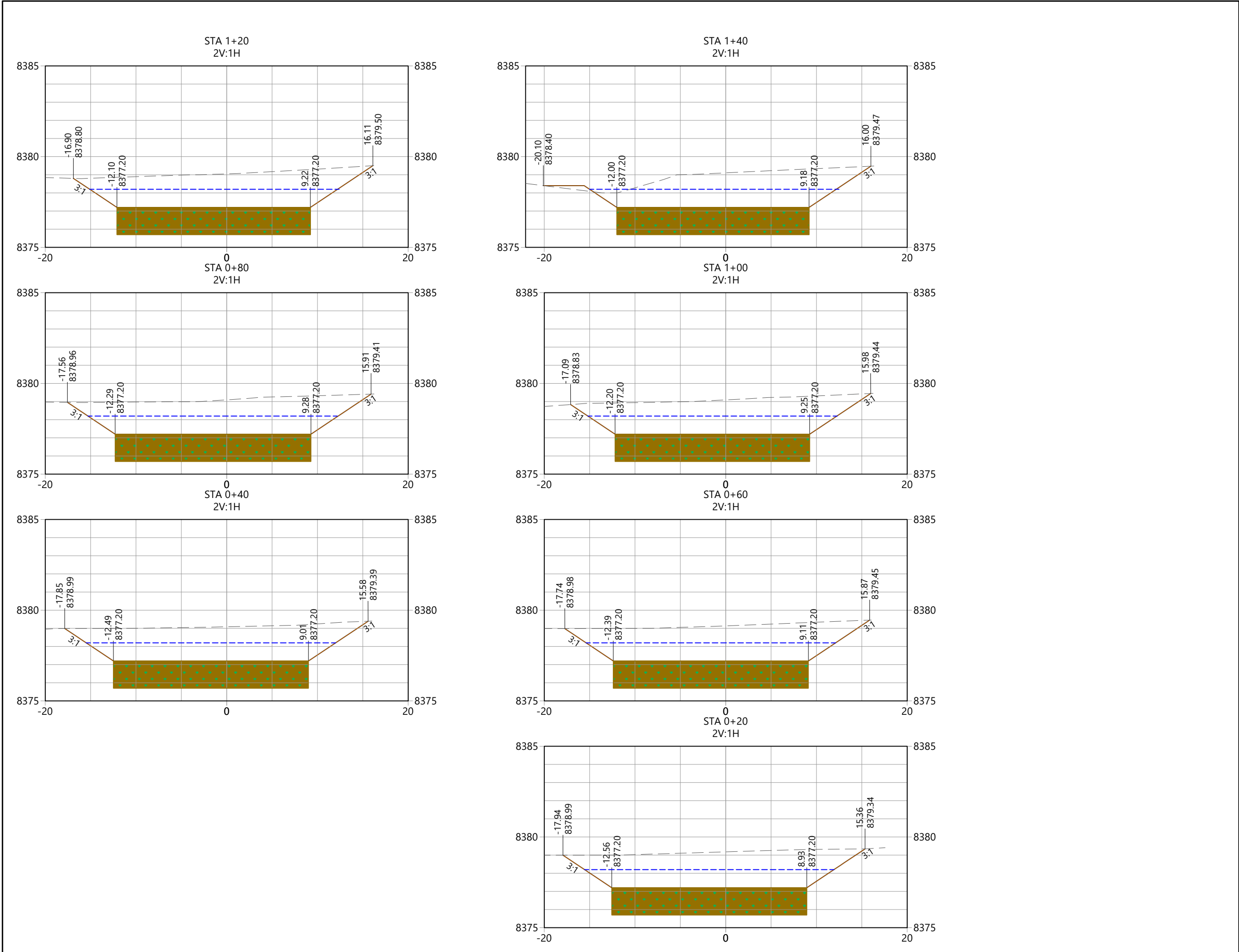
Project Milestone
BID SET

Sheet Name
PLAN & PROFILE_OUTFALL - (1)

2026001054 1" = 10'
Project No. Horizontal Scale

Sheet 25 of 31

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2026/04/17 6:02 PM By: Lucas Babett



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Sub-Consultants

Horizontal Scale & Orientation

0 10 20

Legend

BIORETENTION GROWING MEDIA

ECB (NEDIA S300B OR EQ.)

TYPE L VOID FILLED RIPRAP

WATER QUALITY W.S.E.

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn.
Permit-Seal			

Client/Project

TOWN OF GRAND LAKE/TWLA

GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone

BID SET

Sheet Name

XSEC_B-3 - (1)

2026001054 1" = 10'

Project No. Horizontal Scale

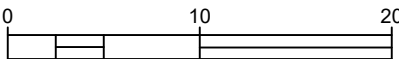
Sheet 26 of 31

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Sub-Consultants

Horizontal Scale & Orientation



Legend

BIORETENTION GROWING MEDIA

ECB (NEDIA S300B OR EQ.)

TYPE L VOID FILLED RIPRAP

WATER QUALITY W.S.E.

Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project

TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone

BID SET

Sheet Name

XSEC_B-3 - (2)

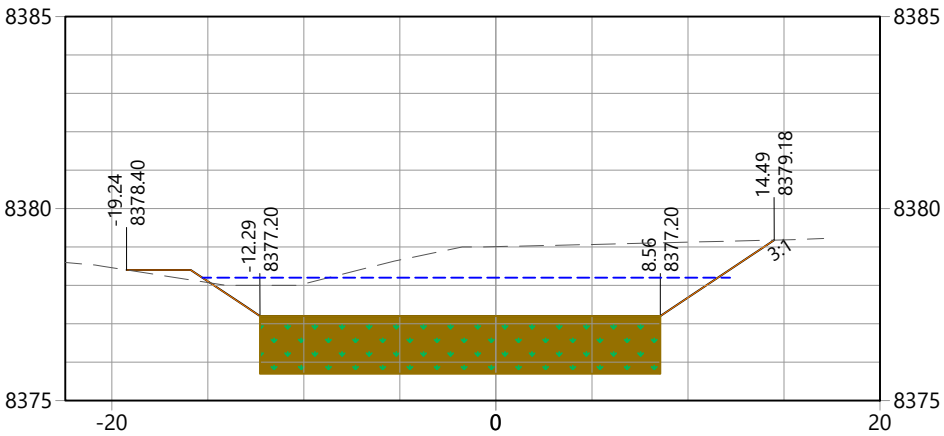
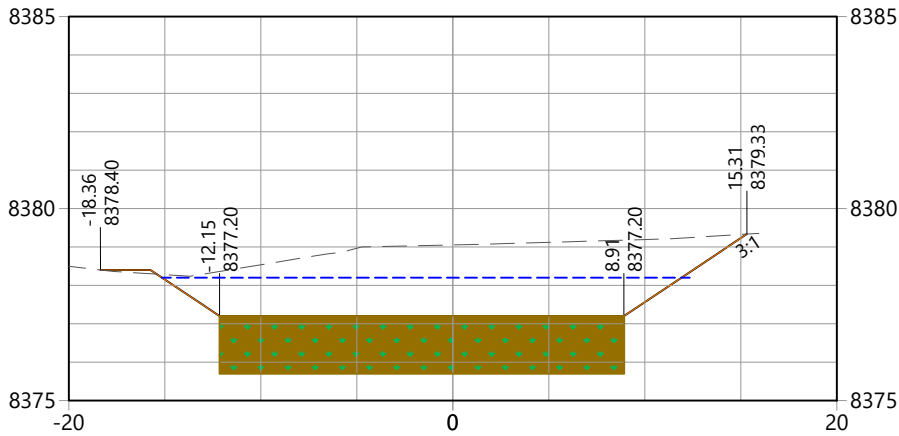
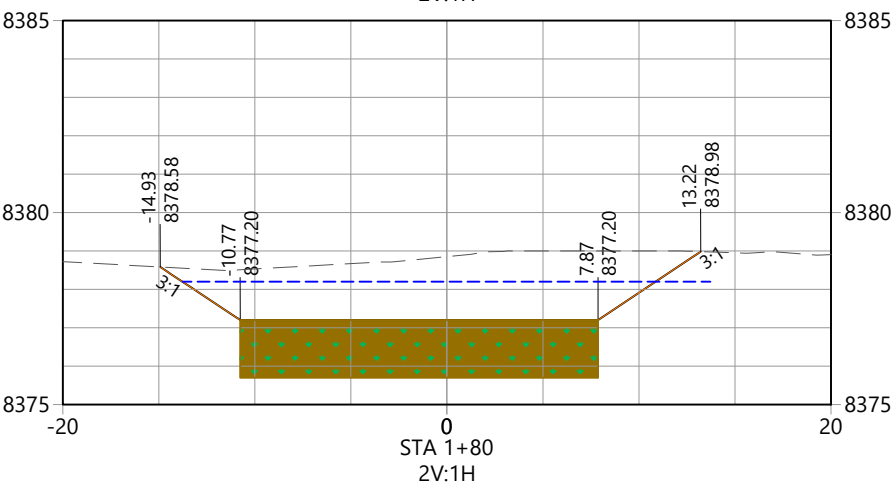
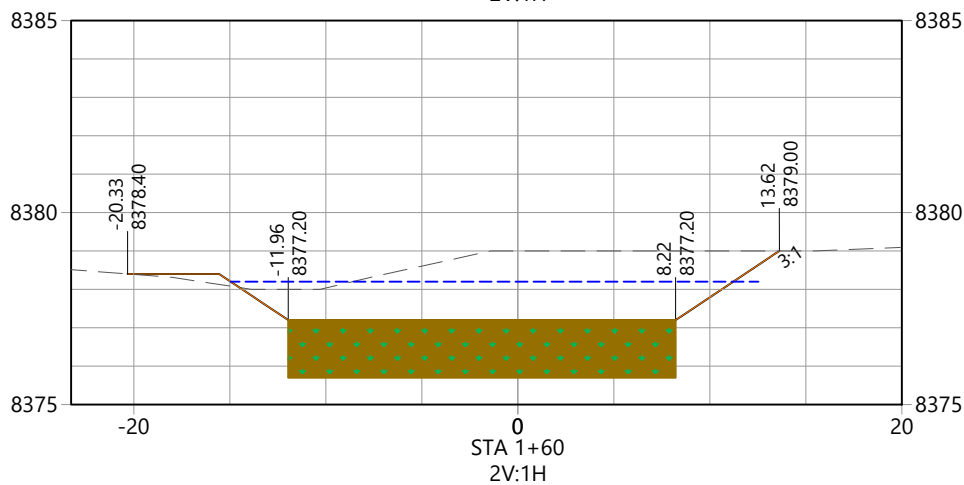
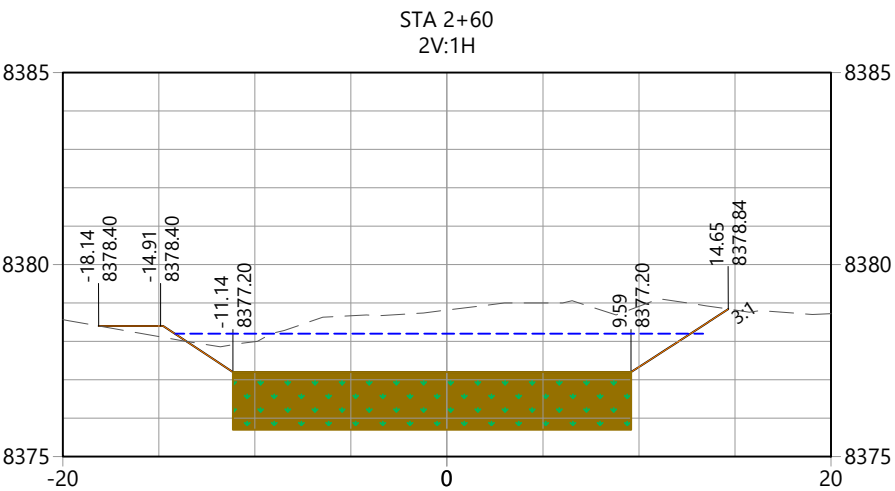
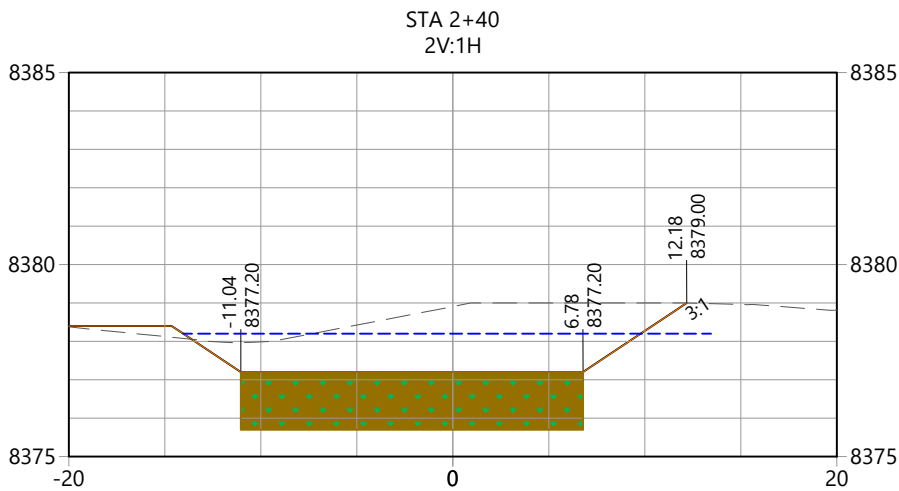
2026001054

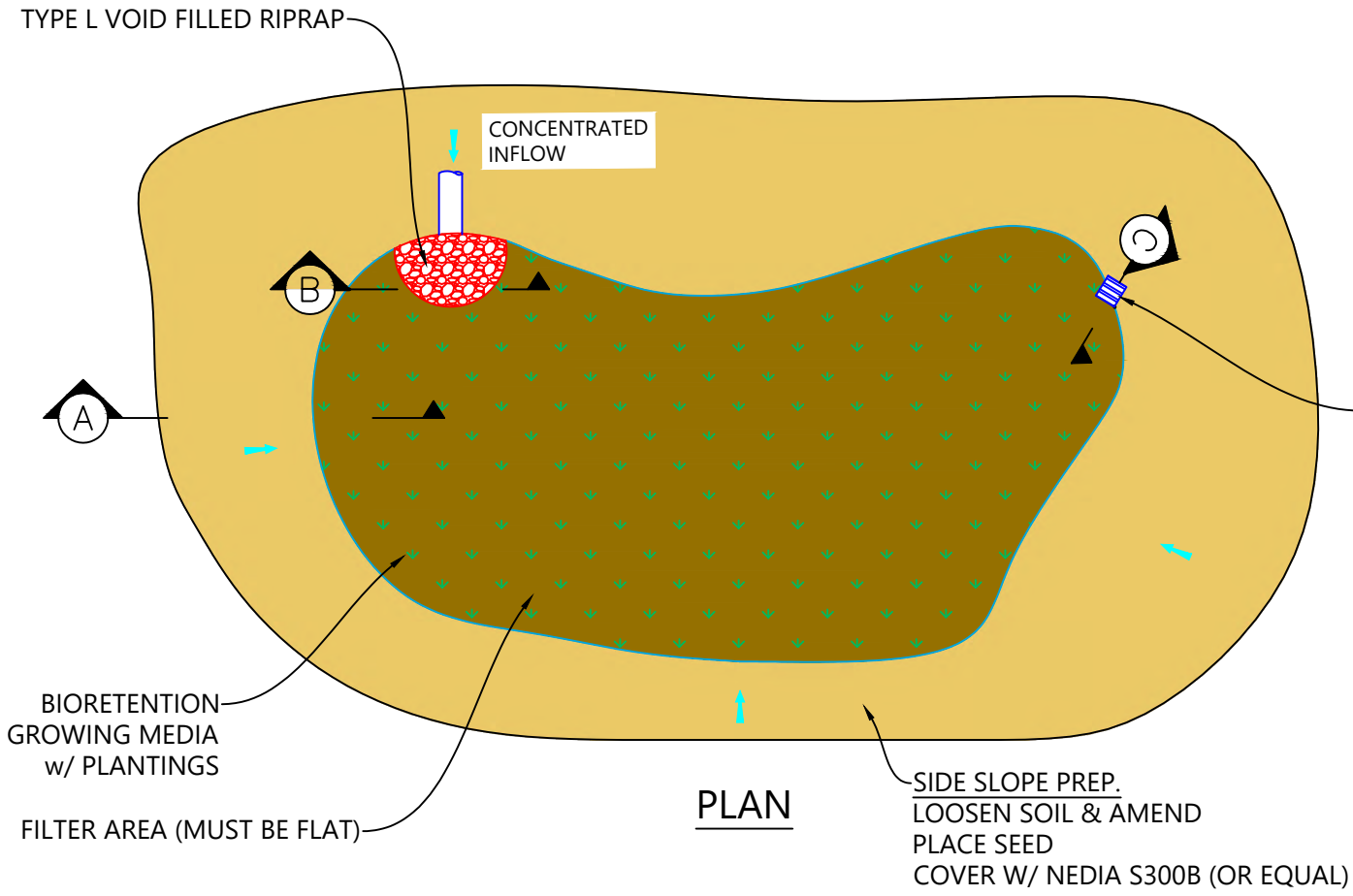
1" = 10'

Project No.

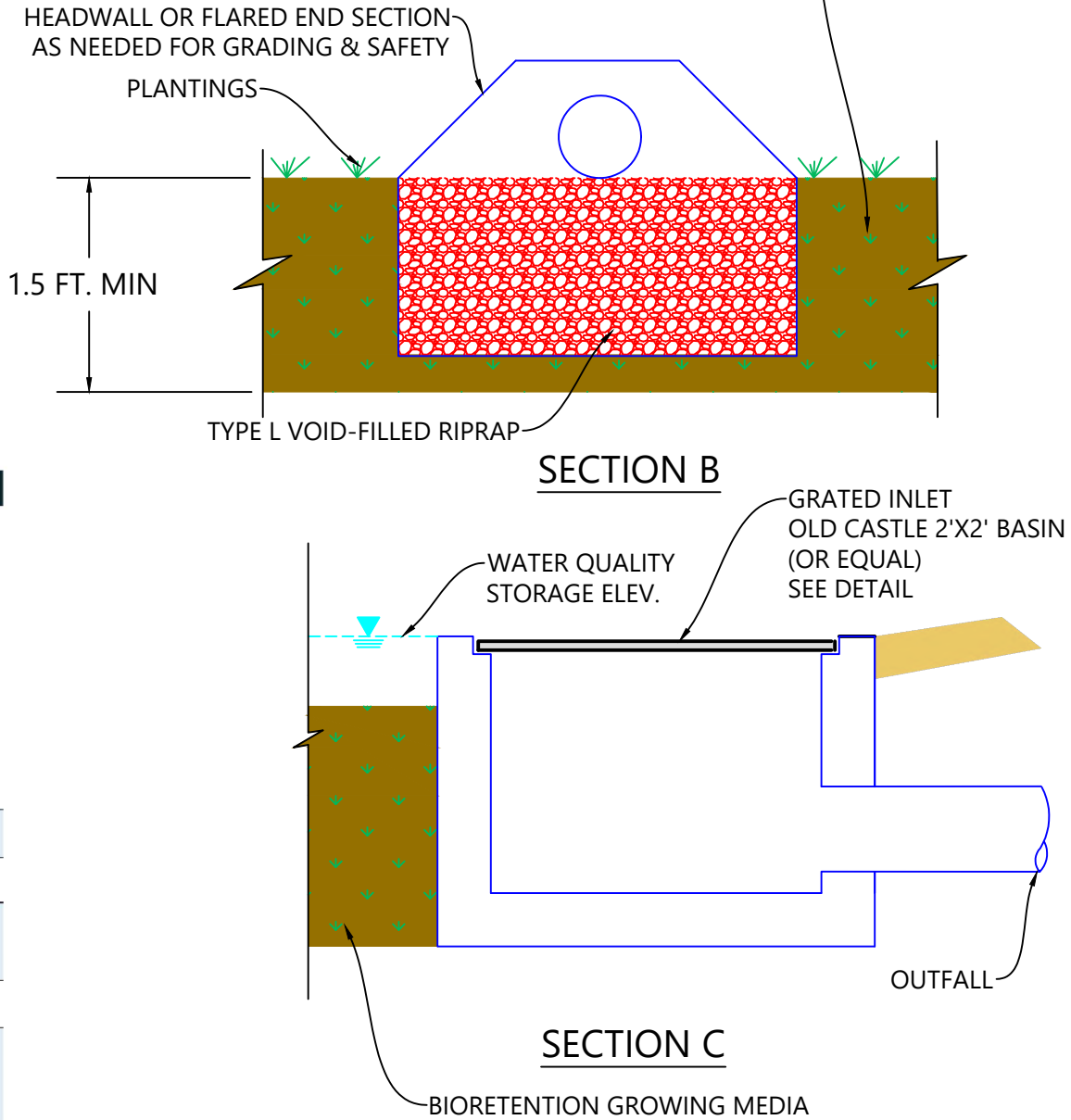
Horizontal Scale

Sheet 27 of 31





BIO RETENTION GROWING MEDIA		
SOIL PARAMETERS	TEST NAME	BIORETENTION MEDIA PROPERTIES
Texture/Gradation	ASTM D7928 Sedimentation (Hydrometer) Method	<u>Particle Size Distribution:</u> 70-80% Sand (0.05-2.0 mm diameter) 5-25% Silt (0.002-0.05 mm diameter) 5-15% Clay (<0.002 mm diameter) <u>Notes:</u> Sand, silt and clay percentages are by dry weight. Particle sizes are based on the USDA soil classification system. Distribution is measured after gravel > 2 mm is removed from sample. Media should have no more than 25% material > 2 mm. Equivalent sieve sizes for the upper and lower limit of sand are #10 and #240, respectively.
Organic Matter	ASTM D2974	1-5% by dry weight
pH	ASA/AASHTO	6.0 - 8.5
Salinity/Salts (EC) dS/m or mmhos/cm	Saturated Paste	<3
Nitrate Nitrogen (ppm)	ASA2 33-3	<30
Phosphorus (ppm)	Use Olsen when pH>6.2, otherwise use Mehlich-3	Olsen: <20 or Mehlich-3: <30



TYPICAL BIORETENTION DETAIL

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Horizontal Scale & Orientation

Legend

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File Name:			26.04.17
	Dwn.	Chkd.	Dsgn.

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 GRAND LAKE STORMWATER PLAN

GRAND LAKE, CO

Project Milestone
 BID SET

Sheet Name
 DETAILS - BIORETENTION

2026001054 NTS
 Project No. Horizontal Scale

RIPRAP OR SOIL RIPRAP
NOT STEEPER THAN 2.5H:1V

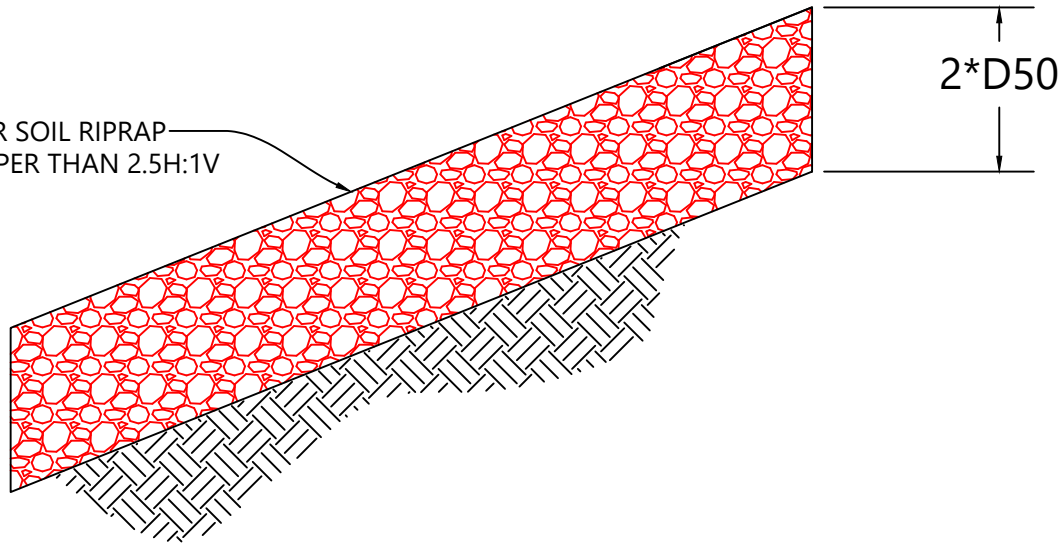


TABLE 3. VOID-FILLED RIPRAP PLACEMENT AND GRADATION			
RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D ₅₀ * (INCHES)
TYPE L	70 - 100	15	9
	50 - 70	12	
	35 - 50	9	
	2 - 10	3	
TYPE H	70 - 100	30	18
	50 - 70	24	
	35 - 50	18	
	2 - 10	6	
*D ₅₀ = MEAN ROCK SIZE			

VOID FILLED RIPRAP PLACEMENT AND GRADATION

NOTES:

1. ELEVATION TOLERANCES FOR THE SOIL RIPRAP SHALL BE 0.10 FEET. THICKNESS OF SOIL RIPRAP SHALL BE NO LESS THAN THICKNESS SHOWN AND NO MORE THAN 2-INCHES GREATER THAN THE THICKNESS SHOWN.
2. VOID FILLED RIPRAP MATERIAL MIX SHALL BE MIXED ON-SITE PRIOR TO PLACEMENT.

MIX REQUIREMENTS FOR TYPE M AND H VOID-FILLED RIPRAP (D ₅₀ = 12 TO 18 INCH)		
APPROPRIATE PROPORTIONS (BY VOLUME)	MATERIAL TYPE	MATERIAL DESCRIPTION
6 PARTS	RIPRAP	D ₅₀ = 12-INCH (TYPE M) OR D ₅₀ = 18-INCH (TYPE H), SEE TABLE 3
2 PART	VOID-FILL MATERIAL	7-INCH MINUS CRUSHED ROCK SURGE (100% PASSING 7-INCH SIEVE, 80-100% PASSING 6-INCH SIEVE, 35-50% PASSING 3-INCH SIEVE, 10-20% PASSING 1½-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	VTC (VEHICLE TRACKING CONTROL) ROCK (CRUSHED ROCK WITH 100% PASSING 4-INCH SIEVE, 50-70% PASSING 3-INCH SIEVE, 0-10% PASSING 2-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	4-INCH MINUS PIT RUN SURGE (ROUND RIVER ROCK AND SAND, WELL GRADED, 90-100% PASSING 4-INCH SIEVE, 70-80% PASSING 1½-INCH SIEVE, 40-60% PASSING ¾-INCH SIEVE, 10-30% PASSING #16 SIEVE)
1 PART	VOID-FILL MATERIAL	TYPE II BEDDING (CRUSHED ROCK WITH 100% PASSING 3-INCH SIEVE, 20-90% PASSING ¾-INCH SIEVE, 0-20% PASSING #4 SIEVE, 0-3% PASSING #200 SIEVE)
½ TO 1 PART	VOID-FILL MATERIAL	NATIVE TOPSOIL

MIX REQUIREMENTS FOR TYPE VL AND L VOID-FILLED RIPRAP (D ₅₀ = 6 TO 9 INCH)		
APPROPRIATE PROPORTIONS (BY VOLUME)	MATERIAL TYPE	MATERIAL DESCRIPTION
6 PARTS	RIPRAP	D ₅₀ = 6 INCH (TYPE VL) OR D ₅₀ = 9 INCH (TYPE L), SEE TABLE 3
1 PART	VOID-FILL MATERIAL	VTC (VEHICLE TRACKING CONTROL) ROCK (CRUSHED ROCK WITH 100% PASSING 4-INCH SIEVE, 50-70% PASSING 3-INCH SIEVE, 0-10% PASSING 2-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	4-INCH MINUS PIT RUN SURGE (ROUND RIVER ROCK AND SAND, WELL GRADED, 90-100% PASSING 4-INCH SIEVE, 70-80% PASSING 1½-INCH SIEVE, 40-60% PASSING ¾-INCH SIEVE, 10-30% PASSING #16 SIEVE)
1 PART	VOID-FILL MATERIAL	TYPE II BEDDING (CRUSHED ROCK WITH 100% PASSING 3-INCH SIEVE, 20-90% PASSING ¾-INCH SIEVE, 0-20% PASSING #4 SIEVE, 0-3% PASSING #200 SIEVE)
½ TO 1 PART	VOID-FILL MATERIAL	NATIVE TOPSOIL

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Horizontal Scale & Orientation

Legend

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Issued	By	Appd.	YY.MM.DD
File Name:	----	----	26.04.17
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Client/Project
TOWN OF GRAND LAKE/TWLA
GRAND LAKE STORMWATER PLAN

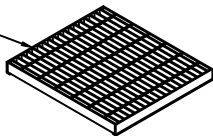
GRAND LAKE, CO

Project Milestone
BID SET

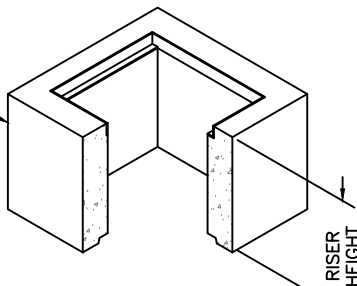
Sheet Name
DETAILS - VOID FILLED RIPRAP

2026001054 NTS
Project No. Horizontal Scale

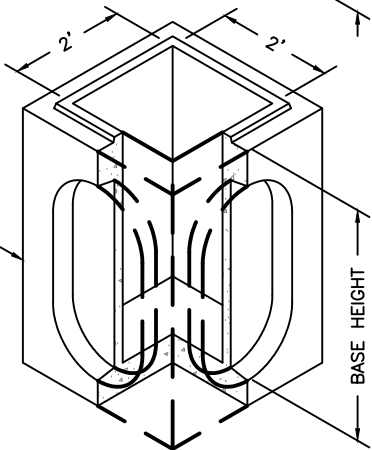
2'x2' FRAME & GRATE



2'x2' RISER

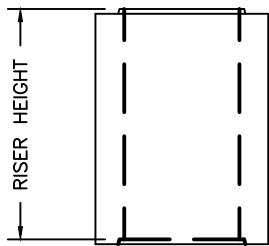


2'x2' BASE

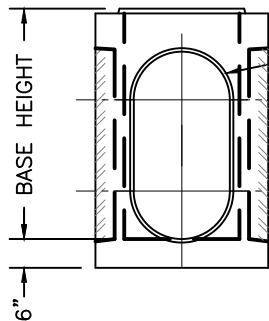


HEIGHT	WEIGHTS	
	BASE	RISER
6"		375 #
1'		899 #
2'	1,374 #	1,798 #
3'	2,596 #	2,697 #
4'	3,998 #	3,596 #

NOTES:
1. Vault design complies with ASTM C-857 and C-858 with less than 2' of earth cover and an AASHTO HS-20 loading.
2. Lifting insert type and location may change without notice.

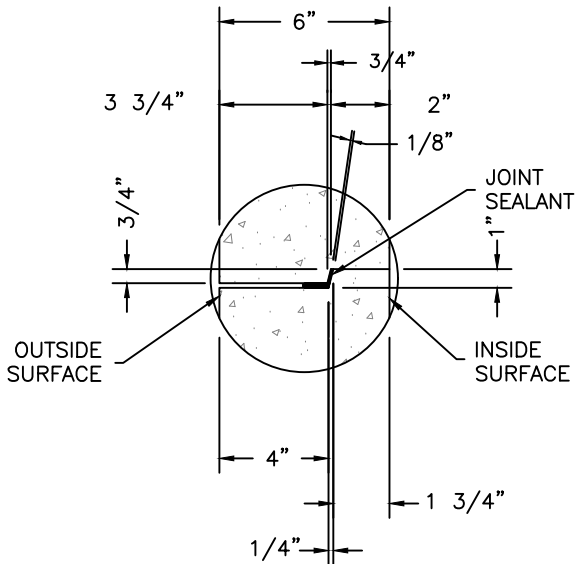


2'x2' CATCH BASIN RISER
ELEVATION VIEW

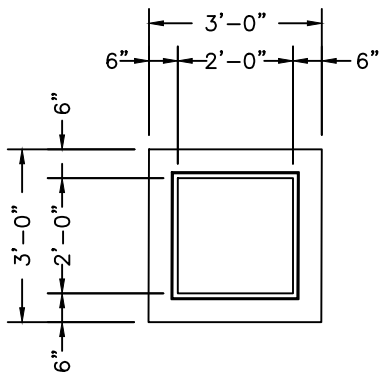


2'x2' CATCH BASIN BASE
ELEVATION VIEW

SEE KNOCKOUT TABLE

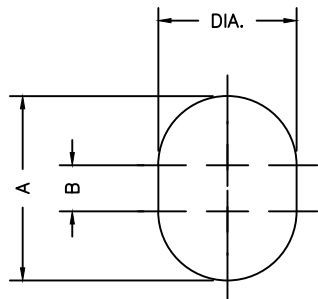


JOINT DETAIL



2'x2' CATCH BASIN
PLAN VIEW

BASE HEIGHT	KNOCKOUT DIMENSIONS		
	DIA.	A	B
2'	20"	20"	0"
3'	20"	27"	7"
4'	20"	30"	10"



KNOCKOUTS ARE 4" DEEP

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Legend

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GRAND LAKE, CO

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2026001054 NTS
Project No. Horizontal Scale

Sheet 30 of 31



801 West 12th Street, Ogden, Utah 84404
Phone: 801-399-1171 Fax: 801-392-7849

2' x 2' Basin

FILE NAME: 210DIC2X2CB6WL

ISSUE DATE: 1/08

www.oldcastleprecast.com

**2' x 2' Catch Basin
Bases and Risers
6" Wall**

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GRAND LAKE STORMWATER PLAN

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BID SET

Sheet Name
DETAILS - RCP

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Project No. Horizontal Scale

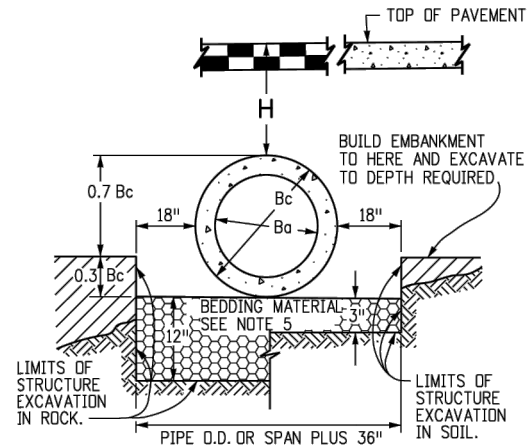
Sheet 31 of 31

GENERAL NOTES
REINFORCED CONCRETE PIPE

- FILL HEIGHTS GREATER THAN MAXIMUM ALLOWED IN THE HEIGHTS OF FILL TABLE ON THIS SHEET REQUIRE SPECIAL DESIGN OF STRUCTURE.
- PIPE DESIGN IS BASED ON SAFETY FACTOR OF 1.33 ON ULTIMATE STRENGTH.
- THE HEIGHTS OF FILL OVER TOP OF PIPE ARE BASED ON UNIT WEIGHT OF SOIL AT 135 LBS. PER CUBIC FT.
- PIPE CLASS IS DETERMINED FROM 0.01 IN. CRACK D-LOAD.
- BEDDING IS CLASS B (MODIFIED) (FROM CONCRETE PIPE DESIGN MANUAL-AMERICAN CONCRETE PIPE ASSOCIATION) WITH SETTLEMENT RATIO $R = 0.0_{sd}$ (YIELDING BED). BEDDING MATERIAL FOR RIGID PIPE IN SOIL SHALL BE 3 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS 2. BEDDING MATERIAL FOR RIGID PIPE IN ROCK SHALL BE 12 IN. LOOSE THICKNESS STRUCTURE BACKFILL CLASS 1.
- CHANGES IN DESIGN FACTORS REQUIRE COMPENSATING CHANGES IN PIPE DESIGN.
- MINIMUM WALL THICKNESS DIMENSIONS ARE BASED ON AASHTO M 170 (WALL B) FOR CIRCULAR PIPE, AND AASHTO M 207 FOR ELLIPTICAL PIPE.
- SPACING FOR MULTIPLE PIPE INSTALLATIONS SHALL CONFORM TO THE DETAILS SHOWN ON STANDARD PLAN M-206-1.
- WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL PIPE INSTALLATION SHALL BE USED.

NONREINFORCED CONCRETE PIPE

- AT THE OPTION OF THE CONTRACTOR, NONREINFORCED CONCRETE PIPE CONFORMING TO AASHTO M 86 MAY BE USED IN LIEU OF REINFORCED CONCRETE PIPE FOR ALL SIZES 36 INCHES IN DIAMETER AND SMALLER. THE NONREINFORCED CONCRETE PIPE SHALL MEET THE SAME D-LOAD TO PRODUCE THE ULTIMATE LOAD UNDER THE THREE-EDGE BEARING METHOD AS SPECIFIED FOR REINFORCED CONCRETE PIPE IN CONFORMANCE WITH AASHTO M 170. THE CONTRACTOR SHALL PROVIDE WRITTEN CERTIFICATION OF CONFORMANCE. THE WALL THICKNESS OF THE NONREINFORCED PIPE MAY BE INCREASED AS REQUIRED TO MEET D-LOAD REQUIREMENT.
- ALL REQUIREMENTS FOR REINFORCED CONCRETE PIPE, EXCEPT THOSE REFERRING TO REINFORCEMENT, SHALL APPLY TO NONREINFORCED CONCRETE PIPE.



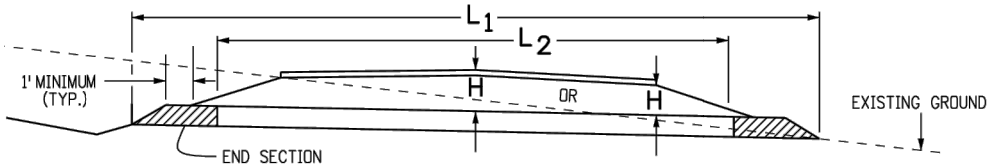
NOTE: Bc IS THE OUTSIDE DIMENSION FOR DIAMETER, SPAN OR RISE.

PIPE INSTALLATION
(WITH 0.7 PROJECTION RATIO)

CIRCULAR (CIR)			VERTICAL ELLIPTICAL (VE)				HORIZONTAL ELLIPTICAL (HE)			
PIPE SIZE= Ba (INSIDE DIA)	WALL THICKNESS	0.3 Bc (OUTSIDE DIA)	SPAN	RISE	WALL THICKNESS	0.3 OUTSIDE RISE	SPAN	RISE	WALL THICKNESS	0.3 OUTSIDE RISE
IN.		FT.	IN.			FT.	IN.			FT.
12	2	0.40								
15	2-1/4	0.49								
18	2-1/2	0.58					23	14	2-3/4	0.49
21	2-3/4	0.66								
24	3	0.75					30	19	3-1/4	0.66
27	3-1/4	0.84					34	22	3-1/2	0.73
30	3-1/2	0.92					38	24	3-3/4	0.79
33	3-3/4	1.01								
36	4	1.10	29	45	4-1/2	1.35	45	29	4-1/2	0.95
42	4-1/2	1.28	34	53	5	1.58	53	34	5	1.10
48	5	1.45	38	60	5-1/2	1.78	60	38	5-1/2	1.23
54	5-1/2	1.62	43	68	6	2.00	68	43	6	1.38
60	6	1.80	48	76	6-1/2	2.23	76	48	6-1/2	1.53
66	6-1/2	1.97	53	83	7	2.43	83	53	7	1.68
72	7	2.15	58	91	7-1/2	2.65	91	58	7-1/2	1.83
78	7-1/2	2.32	63	98	8	2.85	98	63	8	1.98
84	8	2.50	68	106	8-1/2	3.08	106	68	8-1/2	2.13
90	8-1/2	2.68	72	113	9	3.28	113	72	9	2.25
96	9	2.85	77	121	9-1/2	3.50	121	77	9-1/2	2.40
102	9-1/2	3.02	82	128	9-3/4	3.69	128	82	9-3/4	2.54
108	10	3.20	87	136	10	3.90	136	87	10	2.68

△ ALSO EQUIVALENT ROUND DIMENSION FOR ELLIPTICAL PIPE.

DIMENSIONS FOR REINFORCED CONCRETE PIPE
(FOR INFORMATION ONLY)



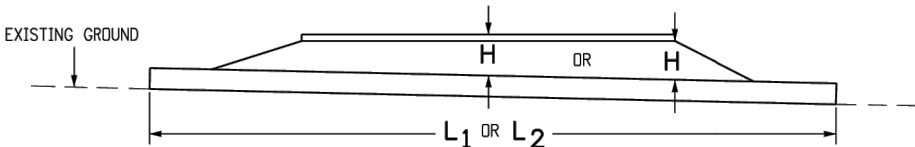
CONCRETE PIPE WITH END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

H = HEIGHT OF FILL OVER TOP OF PIPE, INCLUDING PAVEMENT THICKNESS.

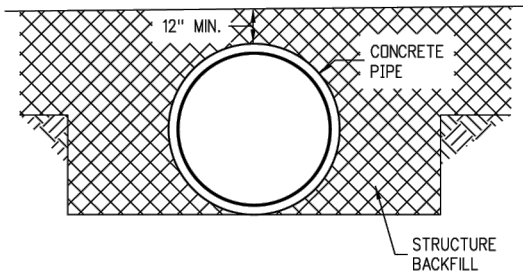
L1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 624.

L2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 603.



CONCRETE PIPE WITHOUT END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.



CONSTRUCTION
MINIMUM COVER FOR RIGID PIPE

TYPE OF PIPE	HEIGHT OF FILL OVER TOP OF PIPE, H (FEET)					
	CLASS OF PIPE (0.01 IN. CRACK D-LOAD)					
	CLASS CIR II CLASS VE II CLASS HE II	CLASS CIR III CLASS VE III CLASS HE III	CLASS CIR IV CLASS VE IV CLASS HE IV	CLASS CIR V CLASS VE V	CLASS VE VI	
	1000 D	1350 D	2000 D	3000 D	4000 D	
CIRCULAR (CIR)	1 TO 18	1 TO 25	± 25 TO 37	± 37 TO 45		
VERTICAL ELLIPTICAL (VE)	1 TO 18	1 TO 25	± 25 TO 37	± 37 TO 45	± 45 TO 62	
HORIZONTAL ELLIPTICAL (HE)	1 TO 18	1 TO 25	± 25 TO 37	± 37 TO 45		

ALLOWABLE RANGE OF HEIGHTS FOR FILL
OVER REINFORCED CONCRETE PIPE

(ALL SIZES)

Computer File Information			<div><div></div><div>R-X</div><div>R-X</div><div>R-X</div><div>R-X</div></div>	Sheet Revisions		<div>Colorado Department of Transportation</div> <div><div><div></div><div></div></div><div>2829 West Howard Place CDDT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868</div></div> <div>Project Development Branch</div> <div>JBK</div>	REINFORCED CONCRETE PIPE		STANDARD PLAN NO.	
Creation Date: 07/31/19				Date:	Comments				M-603-2	
Designer Initials: JBK										
Last Modification Date: 07/31/19										
Detailer Initials: LTA									Standard Sheet No. 1 of 1	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English									Project Sheet Number:	