



STORMWATER CONTROL PLAN

Date: March 29, 2023

BKF Job Number: C20211224

From: **Jim McCurdy**
BKF Engineers – Senior Associate Principal

Subject: **City of Morgan Hill Butterfield Blvd Fire Station - SWCP**

1) DOCUMENTATION OF THE APPLICABLE POST-CONSTRUCTION STORMWATER REQUIREMENTS

BKF Engineers has prepared a stormwater control plan (SWCP) for a proposed Fire Station on Butterfield Blvd in Morgan Hill, California. The site shall comply with the following requirements from the California Regional Water Quality Control Board Central Coast Region Resolution No. R3-2013-0032 as documented by the Stormwater Management Guidance Manual for Low Impact Development and Post-Construction Requirements:

- Site Design and Runoff Reduction – Performance Requirement No. 1
- Water Quality Treatment – Performance Requirement No. 2
- Runoff Retention – Performance Requirement No. 3

The proposed improvements create and/or replace 17,766 SF of impervious area therefore the project must comply with performance requirements No. 1, 2, and 3. Performance requirement No. 4 is not applicable because the proposed impervious area is $\leq 22,500$ SF.

2) GENERAL PROJECT DATA

- a) Project Name: City of Morgan Hill, Butterfield Fire Station
- b) Reference Number: To be provided
- c) Address: 17295 Butterfield Blvd, Morgan Hill, CA
- d) Assessor's Parcel Number: 726-15-072
- e) Name of Project Applicant: Jim McCurdy
- f) Project Phase: N/A
- g) Project Type: Commercial. New Fire Station located at 17295 Butterfield Blvd is undeveloped with some asphalt-concrete areas.
- h) Is the project a detached single-family home? No
- i) Development Type: New Development
- j) Total Site area: 0.74 acres
- k) Impervious Area:
 - i) Existing on-site impervious surface area: 8,641 SF
 - ii) New impervious surface area: 9,125 SF
 - iii) Replacement impervious surface area: 8,641 SF
 - iv) Net Impervious Area: 17,766 SF
 - v) Total of new plus replacement impervious surface area: 17,766 SF

- vi) Calculation of Net Impervious Area: 0 SF
- l) New pervious surface area: 0 SF
- m) 10% of Equivalent impervious surface area (EISA): Not Applicable, treatment and retention can be contained on site.
- n) Watershed Management Zone: WMZ 1
- o) 95th percentile rainfall depth: 1.7 inches
- p) Is the project located in a portion of the watershed management zones 4, 7, or 10 which overlies a designated groundwater basin: No
- q) Is the project located within an approved urban sustainability area: No
- r) Owner of stormwater control measures: City of Morgan Hill

Relevant supporting documents: Attachment A: Civil Plan set, Attachment B: Detention and Stormwater Calculations, Attachment C: Water Management Zone, Attachment D: 95th Percentile Map, Attachment E: PR-1 Checklist.

3) SITE ASSESSMENT

The existing site is approximately 0.74 acres and undeveloped with paved sections. The site will conform to the parking lot to the west and the building to the east. The existing slopes are gently sloping and there are existing high points to the south of the site. The site is located in Morgan Hill, California Map. In watershed management zone 1 requires retention of the 95th percentile 24-hr storm event via infiltration. The design storm is 1.7 inches and Morgan Hill is not located in an urban sustainability area. Groundwater is approximately 30 ft below the existing grade. Santa Clarita Valley Water District indicates historic groundwater levels at approximately 20 ft below grade. Boring logs indicate clayey soils with poor infiltration rates placing the onsite soils in hydrologic soil group D. An existing site assessment with major site features callouts, setbacks, utilities, and other features as appropriate to the development site can be found in the Existing Conditions sheet of Attachment A.

Site improvements create and replace 17,766 SF which requires the project to comply with tier 3 (22,500 SF $\geq x \geq 15,000$ SF). The site grading promotes drainage towards bioretention basins and so self-retaining area (SRA) is not feasible. The majority of site space is allocated to basins and grading with limited space for SRAs. The delineated watersheds can be found in the Stormwater Control plan of Attachment A.

Relevant supporting documents: Attachment A: Civil Plan set, Attachment B: Detention and Stormwater Calculations, Attachment G: Geotechnical Investigation, Attachment I: PR-3 Design Rainfall Events & treatment Requirements for WMZs, Attachment I: PR-3 LID Site Assessment Checklist.

4) STORMWATER CONTROL MEASURES

- a) Minimize Runoff Generated Within the Project Site

The Morgan Hill fire station is split into four drainage management areas (DMAs) that each drain to bioretention basins. There are no onsite natural drainage features that require protection or disturbance mitigation. Soils onsite can be classified as hydrologic soil group D which are poorly draining and do not require compaction minimization. The project area has been minimized while leaving natural areas in an undisturbed state. Stormwater runoff has been minimized by directing the roof and impervious area runoff into vegetated areas that drain away from building foundations and into bioretention areas.



The bioretention areas are unlined and an underdrain will be placed near the top of the storage gravel layer which provides infiltration and evapotranspiration before discharging treated stormwater through the underdrain. This is typical for sites with D-type soils. Local site constraints, site area, and hydrologic soil conditions prevent larger bioretention areas and other infiltration methods.

b) Delineation of Drainage Management Areas and Quantifying Runoff

The site has been split into four DMAs which are shown in the Stormwater Plan, Attachment A. The summary table below provides an overview of the site drainage intent (Table 1).

Table 1: Drainage Management Areas*		
DMA Name	Surface Type	DMA Area (SF)
DMA 1	Roof, landscaping, and impervious walk	5,515
DMA 2	Roof, landscaping, and impervious walk	10,955
DMA 3	Roof, landscaping, and parking	8,734
DMA 4	Roof, landscaping, and parking	7,149
Total (SF):		32,354
* See Stormwater Control Plan in Attachment A		

c) Stormwater Retention

Calculations for the runoff retention can be found in Appendix B. The gravel section depths were designed to retain the 95th percentile 24-hour storm. Existing drainage patterns could not be maintained so the reduction from replaced impervious area was distributed across the site based on the designer's judgment. See Table 2 for a summary of runoff retention stormwater control measures.



Table 2: Runoff Retention Stormwater Control Measures

DMA Name	Area (square feet)	Retention Tributary Area (SF)	Retention Volume Required to be Controlled (CU FT)	SCM Type(s)	SCM Retention Method(s) (infiltration, storage, rainwater harvesting, evapotranspiration)	Location on Plan Set	Volume Retained (CU FT)
DMA 1	5,515	2,162	166	Bioretention Basin	Infiltration, storage, evapotranspiration	IMP #1	179
DMA 2	10,955	4,427	182	Bioretention Basin	Infiltration, storage, evapotranspiration	IMP #2	214
DMA 3	8,734	4,466	287	Bioretention Basin	Infiltration, storage, evapotranspiration	IMP #3	297
DMA 4	7,149	3,416	156	Bioretention Basin	Infiltration, storage, evapotranspiration	IMP #4	162
	Total (SF): 32,354	Total (SF): 14,470	Total (CU FT): 635	n/a	n/a	n/a	Total (CU FT): 852

d) Stormwater Detention

Calculations for the stormwater treatment can be found in Attachment B. Basins were sized based on the

Table 3: Water Quality Treatment Stormwater Control Measures for Projects Also Subject to Performance Requirement No. 3

DMA Name	Impervious Surface Area (SF)	Required Runoff to be Controlled (SF)	Is the runoff from all water quality events being retained by SCMs for Performance Requirement #3?
DMA 1	4,135	4,254	YES
DMA 2	4,590	5,200	YES
DMA 3	5,720	5,996	YES
DMA 4	3,392	3,744	YES
	Total (SF): 17,837	Total (SF): 19,194	n/a

Relevant supporting documents: Attachment A: Civil Plan set, Attachment B: Detention and Stormwater Calculations, Attachment J: LID Site Measures.

5) OPERATIONS AND MAINTENANCE PLAN FOR STRUCTURAL STORMWATER CONTROL MEASURES

Structural SCMs requiring maintenance are called out in Attachment K and maintenance practice practices for the site can be found in Attachment L. The relevant operation and maintenance practices



for each structural SCM are detailed in Attachment K which also details the frequency. The City of Morgan Hill will be responsible for the operation and maintenance of the facilities. Based on maintenance, the estimated cost of maintaining a stormwater planter can range from \$500 to \$1,500 per year, depending on the size and complexity of the planter. Common maintenance tasks for stormwater planters include but are not limited to:

- Removing debris and litter from the planter.
- Pruning and trimming vegetation to promote healthy growth and prevent overgrowth
- Checking and repairing irrigation systems
- Testing the soil pH and nutrient levels and adding amendments if necessary
- Monitoring for pests and diseases and treating them if needed

Relevant supporting documents: Attachment K: SCM Locations, Attachment L: Maintenance Schedule

6) POST-CONSTRUCTION STORMWATER CONTROL PLAN SUMMARY AND CERTIFICATION

The project as designed satisfies the requirement outlined in the Regional Water Quality Control Board Central Coast Region Resolution No. R3-2013-0032 as documented by the Stormwater Management Guidance Manual for Low Impact Development and Post-Construction Requirements. With proper maintenance and monitoring the storm system should meet the needs of the site. Table 4, below, summarizes the control measures for the site.

Table 4: Post-Construction Stormwater Control Measures Summary for Morgan Hill Fire Station			
Post-Construction Requirements (from Section 1). <i>For example:</i>	Design Area/Volume to be Controlled (from Section 4c)	Performance of SCMs (from Section 4c)	Does the Project Design meet the post-construction control requirements? (y/n)
Use of Site Design Measures	n/a		Yes
Water Quality Treatment: 85 th percentile, 24-hour storm event	618 SF	843 SF	Yes
Retention: 95 th percentile, 24-hour storm event	635 CU FT	852 CU FT	Yes
Peak Management: 2-through 10-year storm events			N/A



March 29, 2023

Attachment A





coar
DESIGN GROUP

previously JKA
200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

BKF
500 17th STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com

ABBREVIATIONS:

AC	ASPHALTIC CONCRETE
BC	BEGINNING OF CURVE
BLDG	BUILDING
BW	BACK OF WALK
CL	CENTERLINE
CONC	CONCRETE
DIA	DIAMETER
EB	ELECTRIC BOX
EC	END OF CURVE
FH	FIRE HYDRANT
FL	FLOW LINE
GND	GROUND ELEVATION
HC	HANDICAPPED
HCR	HANDICAP RAMP
INV	INVERT ELEVATION
LG	LIP OF GUTTER
PRC	POINT OF REVERSE CURVE
PVC	POLYVINYL CHLORIDE
RPC	REINFORCED CONCRETE PIPE
SD	STORM DRAIN
SDCB	STORM DRAIN CATCH BASIN
SSCO	STORM SEWER CLEAN OUT
SW	SIDEWALK
TC	TOP OF CURB
TYP	TYPICAL
VCP	VITRIFIED CLAY PIPE
WV	WATER VALVE
W/	WITH

LEGEND:

	ASPHALTIC CONCRETE
	CONCRETE
	BOUNDARY LINE
	FENCE LINE
	FLOW LINE
	STORM CATCH BASIN
	SANITARY SEWER MANHOLE
	STORM SEWER CLEAN OUT
	STREET LIGHT
	WATER VALVE
	FIRE HYDRANT
	SIGN
	BACK FLOW PREVENTION DEVICE
	WATER METER

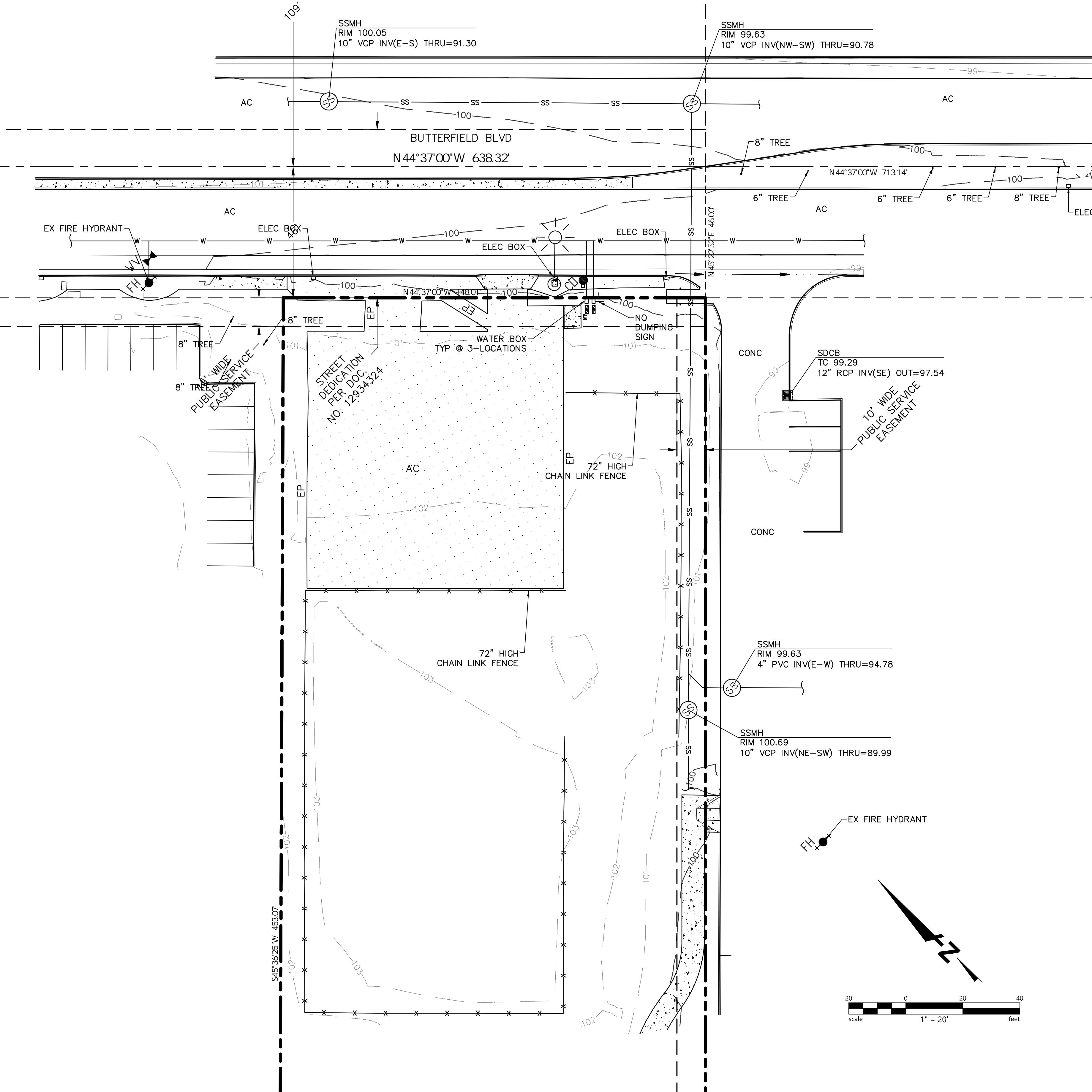
EXISTING CONDITION NOTES:

1. A REASONABLE EFFORT HAS BEEN MADE TO LOCATE AND DELINATE KNOWN UNDERGROUND UTILITIES. THE TYPES, LOCATIONS, EXTENTS, SIZES AND DEPTHS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE AND WERE OBTAINED FROM VARIOUS SOURCES, INCLUDING TOPOGRAPHIC FIELD SURVEYS, AND AS-BUILT DRAWINGS PROVIDED BY THE PROPERTY OWNER. ABANDONED UNDERGROUND UTILITIES MAY EXIST, THE LOCATION OF WHICH ARE NOT KNOWN. CONTRACTOR IS CAUTIONED THAT THE TYPES, LOCATIONS, EXTENTS, SIZES AND DEPTHS OF EXISTING UNDERGROUND UTILITIES INDICATED ON THE PLANS MAY NOT BE THE TYPES, LOCATIONS, EXTENTS, SIZES AND DEPTHS ENCOUNTERED IN THE FIELD.
2. ONLY EXCAVATION AND PHYSICAL EXPOSURE WILL REVEAL THE ACTUAL TYPES, EXTENT, SIZES, LOCATIONS AND DEPTHS OF EXISTING UNDERGROUND UTILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR POTHOLING EXISTING UNDERGROUND UTILITIES WITHIN THE AREA OF WORK. CONTRACTOR SHALL RETAIN A PRIVATE UTILITY LOCATOR TO IDENTIFY EXISTING UTILITIES. THE CONTRACTOR SHALL POTHOLE AS NECESSARY AT CONNECTION LOCATIONS AND PROPOSED UTILITY CROSSINGS TO FULLY LOCATE AND IDENTIFY EXISTING UTILITIES. POTHOLING SHALL BE DONE AND THE RESULTS, INCLUDING ANY CONFLICTS IDENTIFIED, REPORTED TO THE ENGINEER PRIOR TO THE START OF WORK.
3. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING HIS WORK TO AVOID CONFLICTS BETWEEN SEWER LATERALS, STORM DRAINS, WATER MAINS, AND ALL OTHER UNDERGROUND UTILITIES.
4. UTILITY INFORMATION IS OBTAINED BY AS-BUILT INFORMATION AS WELL AS SURVEY OBSERVATION. ALL EXISTING UTILITY INFORMATION IN THIS PLAN SET IS IDENTIFIED PER THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) STANDARD FOR LEVEL OF QUALITY. BELOW IS A LIST OF THE LEVEL OF QUALITY CATEGORIES WITH THE ASSOCIATED DEFINITION PER ASCE STANDARDS.
 - (C) - INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.
 - (D) - UTILITY LOCATION INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

PROJECT: CITY OF MORGAN HILL
BUTTERFIELD FIRE STATION
17285 Butterfield Blvd, Morgan Hill, CA 95037

DESCRIPTION: DATE:
95% 01/16/23
CONSTRUCTION DOCUMENTS
100% 03/23/23
CONSTRUCTION DOCUMENTS

PROJECT NUMBER: 211224
SHEET TITLE: EXISTING CONDITIONS
SHEET NUMBER:



C1.0

**coar**
DESIGN GROUPpreviously **JKA**
200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com**BKF**
980 17th STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.comPROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037DESCRIPTION: DATE:
95% 01/16/23
CONSTRUCTION DOCUMENTS
100% 03/23/23
CONSTRUCTION DOCUMENTSPROJECT NUMBER: 211224
SHEET TITLE: DEMOLITION PLAN
SHEET NUMBER:

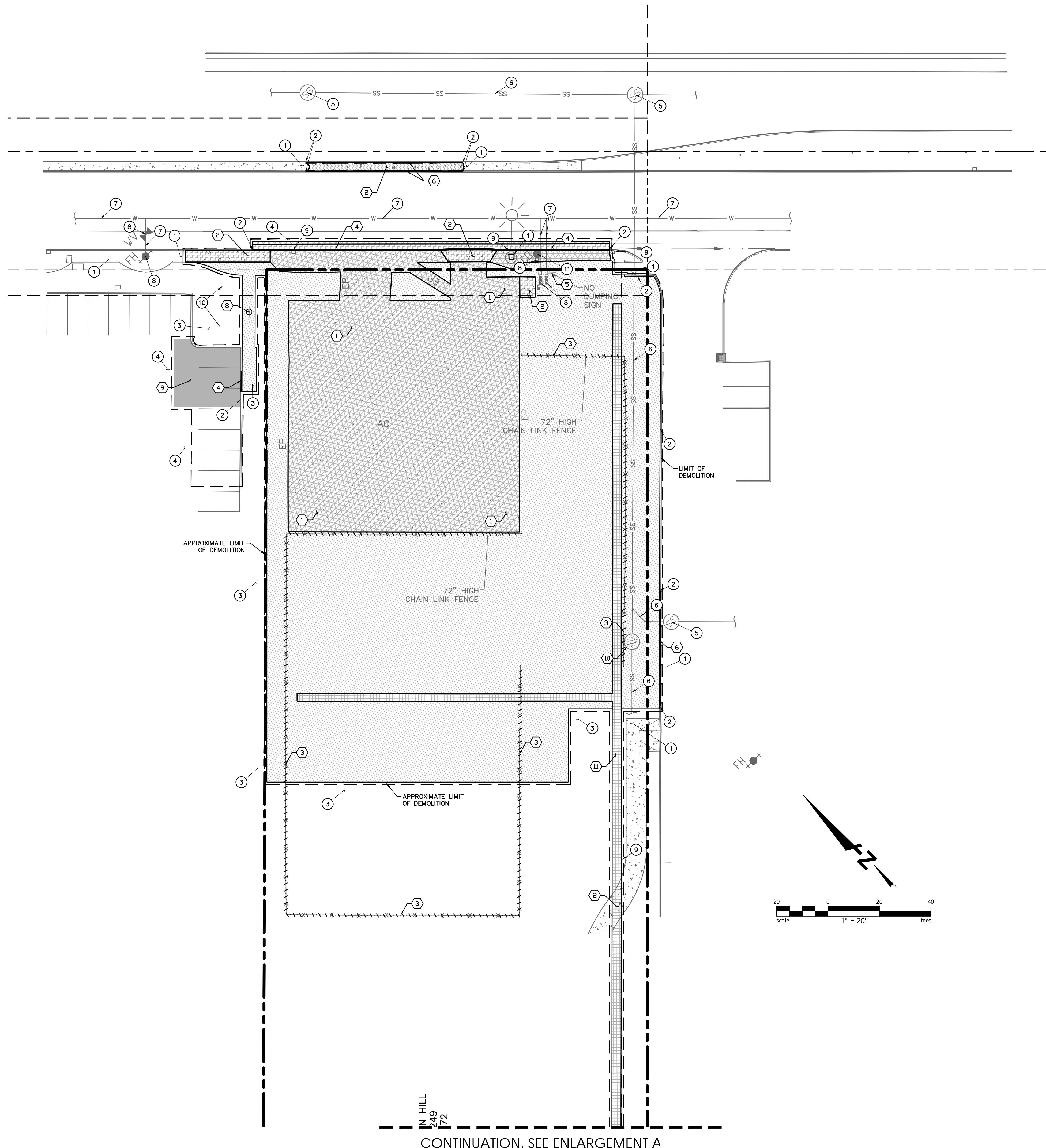
C2.0

DEMOLITION ITEMS:	
1	REMOVE EX AC PAVEMENT
2	REMOVE EX CONCRETE
3	REMOVE EX FENCING
4	REMOVE EX CURB AND FOOTING
5	REMOVE EX CURB AND GUTTER
6	REMOVE EX SIGN
7	CLEAR AND GRUB
8	REMOVE EX TREE
9	AC GRIND AND OVERLAY
10	REMOVE AND RELOCATE EX SANITARY SEWER MANHOLE
11	APPROXIMATE UTILITY TRENCH LIMITS

PROTECTION ITEMS:	
1	PROTECT EX CONCRETE
2	PROTECT EX CONCRETE CURB
3	PROTECT EX LANDSCAPE
4	PROTECT EX ASPHALT
5	PROTECT EX SANITARY SEWER STRUCTURE
6	PROTECT EX SANITARY SEWER LINE
7	PROTECT EX WATER LINE
8	PROTECT EX WATER STRUCTURE
9	PROTECT EX ELECTRICAL STRUCTURE
10	PROTECT EX TREE
11	PROTECT EX STORM DRAIN STRUCTURE

DEMOLITION NOTES:

1. CONTRACTOR TO USE CAUTION WHEN WORKING ADJACENT TO EXISTING BUILDING.
2. CONTRACTOR TO CLEAR AND GRUB WITHIN THE LIMITS OF PROPOSED WORK, UNLESS OTHERWISE NOTED ON PLANS.
3. RIM ELEVATIONS FOR EXISTING UTILITY STRUCTURES SHALL BE RAISED TO PROPOSED SURFACE ELEVATIONS.
4. THE UTILITY LINES AND STRUCTURES SHOWN ON THESE PLANS ARE DERIVED FROM RECORD DATA AND/OR SURFACE OBSERVATION AND ARE APPROXIMATE ONLY. ACTUAL LOCATION AND SIZE, TOGETHER WITH THE PRESENCE OF ANY ADDITIONAL UTILITY LINES AND STRUCTURES NOT SHOWN ON THIS PLAN, SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR DURING CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS IN THE FIELD AND INFORMATION SHOWN ON THESE PLANS.
5. THE CONTRACTOR IS REQUIRED BY STATE LAW TO ACTIVELY RESEARCH THE WORK AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION. REFER TO ANY MONUMENTS, AND REPLACE THOSE DAMAGED OR REMOVED DURING CONSTRUCTION.
6. THE LIMITS OF DEMOLITION SHOWN ARE APPROXIMATE ONLY. CONTRACTOR IS RESPONSIBLE FOR MATCHING EXISTING SURROUNDINGS, LANDSCAPE AND OTHER IMPROVEMENTS WITH A SMOOTH TRANSITION IN PAVING, CURBS, GUTTERS, AND SIDEWALKS AND AVOIDING ANY ABRUPT OR APPARENT CHANGES IN GRADES OR CROSS SLOPES OR HAZARDOUS CONDITIONS.
7. EXISTING CURB AND SIDEWALK AND LANDSCAPE/IRRIGATION WITHIN THE PROJECT LIMITS THAT ARE DAMAGED OR DISPLACED, EVEN THOUGH THEY WERE NOT TO BE REMOVED, SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
8. PROTECT ALL EXISTING UTILITIES AND SITE FEATURES FROM BEING DAMAGED. UNLESS OTHERWISE NOTED, ALL UTILITIES AND IMPROVEMENTS THAT BECOME DAMAGED DURING CONSTRUCTION SHALL BE COMPLETELY RESTORED AT NO ADDITIONAL COST TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.



PROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037



DESCRIPTION: DATE:
95% 01/16/23
CONSTRUCTION DOCUMENTS
100% 03/23/23
CONSTRUCTION DOCUMENTS

PROJECT NUMBER: 211224
SHEET TITLE: SURFACE IMPROVEMENT PLAN
SHEET NUMBER:

C3.0

SURFACE IMPROVEMENTS LEGEND:

	REINFORCED CONCRETE WALK (4" PCC WITH 6X6X10 WELDED WIRE MESH/4" AB)
	HEAVY VEHICULAR CONCRETE (8" PCC W/#3 REBAR @ 24 O.C.E.W/12" AB)
	LIGHT VEHICULAR CONCRETE (6" PCC W/#3 REBAR @ 24 O.C.E.W/12" AB)
	CAST-IN-PLACE DETECTABLE WARNING SURFACE
	LANDSCAPED AREA, SLD
	BIOTREATMENT AREA
	ASPHALT (3½" AC/12½" CLASS II AB, TI=6.0)
	FLUSH CURB
	AC GRIND AND OVERLAY(MIN. 2" AC)

SURFACE IMPROVEMENTS NOTES:

- THE LIMITS OF WORK ARE APPROXIMATE ONLY. CONTRACTOR IS RESPONSIBLE FOR MATCHING EXISTING SURROUNDINGS, LANDSCAPE, AND OTHER IMPROVEMENTS WITH A SMOOTH TRANSITION, AVOIDING ANY ABRUPT OR APPARENT CHANGES IN GRADES OR CROSS-SLOPES OR HAZARDOUS CONDITIONS.
- EXISTING CONCRETE SHALL BE REMOVED AT THE NEAREST EXPANSION JOINTS.
- NEW WORK SHALL MATCH EXISTING AS CLOSELY AS POSSIBLE IN FINISH, SCORING, AND COLOR.
- EXISTING SITE FEATURES (CURBS, CONCRETE WALKS, LANDSCAPE, IRRIGATION, ETC.) DEMOLISHED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.
- REFER TO ARCHITECTURAL PLANS FOR JOINT PATTERNS
- PROVIDE 1"X1" V-NOTCH IN V-GROOVE TRACK @ 16" O.C. FOR DRAINAGE.
- APPROXIMATE LIMIT OF OVER EXCAVATION SEE NOTE #7.

LEGEND:

- 1 BIORETENTION AREA
- 2 CURB CUT
- 3 4" WIDE WHITE PAVEMENT STRIPE
- 4 CURB RAMP
- 5 CONCRETE MOW STRIP, SAD
- 6 TYPE I 10' ARROW CALTRANS STANDARD SHEET A24A
- 7 TRASH ENCLOSURE, SAD
- 8 VERTICAL CURB
- 9 CONFORM TO EX CONCRETE
- 10 AC PLUG, TYP
- 11 CONCRETE DRIVEWAY WITH DETACHED SIDEWALK
- 12 DETACHED CONCRETE SIDEWALK
- 13 CONFORM TO EX AC
- 14 FLUSH CURB
- 15 DETECTABLE WARNING SURFACE
- 16 CONCRETE CURB AND/OR GUTTER
- 17 VEHICULAR ROLLING GATE SECTION, SLD. SEE NOTE #6
- 18 APPROXIMATE LIMIT OF OVER EXCAVATION, SEE NOTE #7.

LINE TABLE

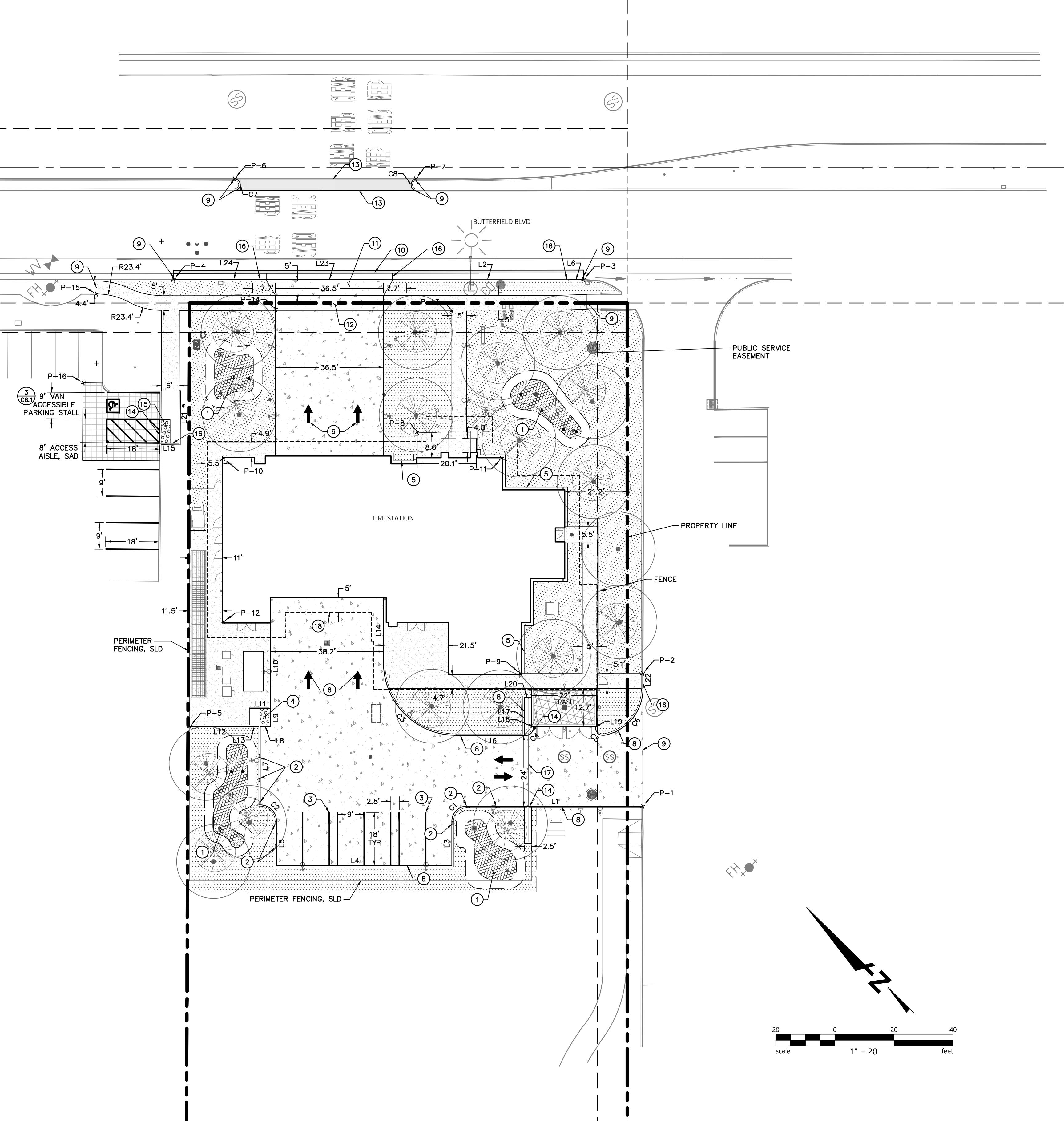
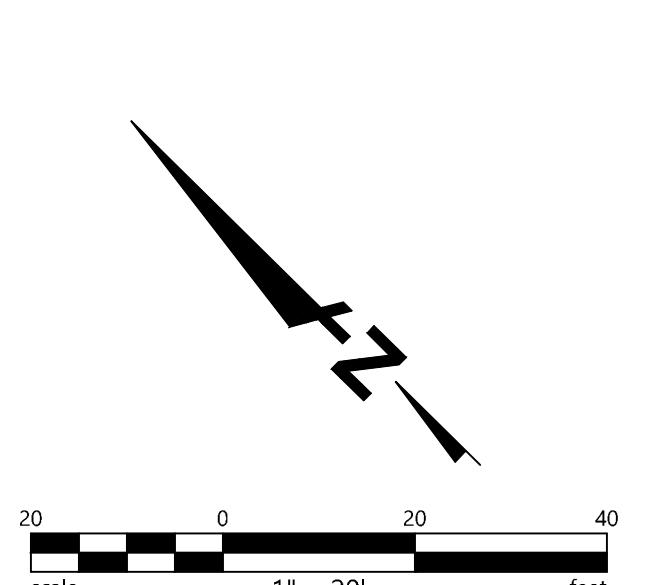
LINE NO.	LENGTH	DIRECTION
L1	59.56'	N44° 37' 00.00"W
L2	54.96'	S44° 39' 35.70"E
L3	15.00'	S45° 23' 00.00"W
L4	59.33'	N44° 37' 00.00"W
L5	15.00'	N45° 23' 00.00"E
L6	5.00'	S42° 56' 24.02"E
L7	26.50'	N45° 23' 00.00"E
L8	3.50'	S44° 37' 00.00"E
L9	6.00'	N45° 23' 00.00"E
L10	29.00'	N45° 23' 00.00"E
L11	7.00'	S44° 37' 00.00"E
L12	20.29'	N44° 37' 00.00"W
L13	3.00'	N44° 37' 00.00"W
L14	22.07'	N45° 23' 00.00"E
L15	6.00'	N44° 24' 11.75"W
L16	23.67'	N44° 37' 00.00"W
L17	12.83'	N45° 23' 00.00"E
L18	0.67'	S45° 23' 00.00"W
L19	0.63'	N45° 23' 00.00"E
L20	2.50'	S44° 37' 00.00"E
L21	17.78'	S45° 35' 48.25"W
L22	5.14'	S45° 23' 29.15"W
L23	52.00'	S44° 39' 35.70"E
L24	26.76'	S44° 39' 35.70"E

CURVE TABLE

CURVE NO.	LENGTH	RADIUS	DELTA
C1	7.85'	5.00'	90.00°
C2	8.66'	5.50'	90.22°
C3	38.48'	24.50'	90.00°
C4	3.93'	2.50'	90.00°
C5	4.42'	2.50'	101.21°
C6	22.00'	16.00'	78.78°
C7	6.13'	1.95'	179.83°
C8	5.38'	2.05'	150.36°

REFERENCE POINTS FOR IMPROVEMENTS

POINT #	DESCRIPTION	NORTHLING	EASTING
P-1	FACE OF CURB	1197.12	4348.91
P-2	FACE OF CURB	11228.67	4380.88
P-3	FACE OF CURB	11336.50	4461.66
P-4	FACE OF CURB	11435.26	4364.27
P-5	FACE OF CURB	11325.14	4260.52
P-6	FACE OF CURB	11444.47	4402.91
P-7	FACE OF CURB	11400.86	4445.97
P-8	CORNER OF CONC	11340.30	4385.39
P-9	GRIDLINE INTERSECTION G/8	11258.24	4351.70
P-10	GRIDLINE INTERSECTION A/1	11380.64	4333.02
P-11	GRIDLINE INTERSECTION A/7	11313.73	4399.04
P-12	GRIDLINE INTERSECTION F/1	11341.89	4293.75
P-13	CORNER OF CONC	11360.75	4422.84
P-14	CORNER OF CONC	11403.58	4381.28
P-15	CONCRETE WALK	11450.33	4342.38
P-16	AC	11432.46	4317.88

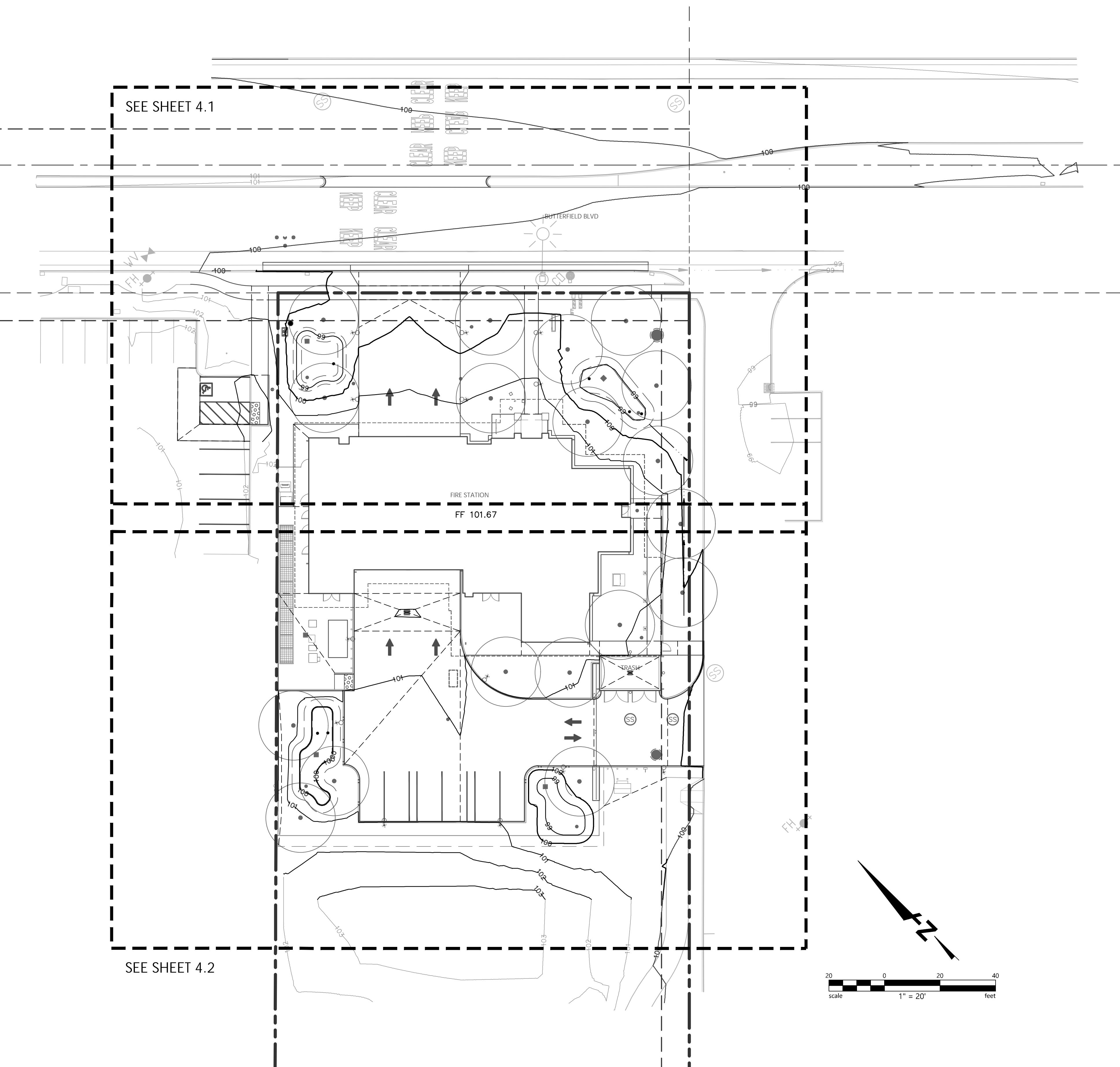




coar
DESIGN GROUP

previously **JKA**
200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

BKF
980 17TH STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com



GRADING LEGEND:

- · · · · FLOW LINE
- · · · · GRADE BREAK
- 100 — PROPOSED CONTOUR
- 99 — EXISTING CONTOUR
- XX XX PROPOSED SLOPE
- XX XX EXISTING SLOPE
- FF: XX.XX ELEVATION LABEL

AC: ASPHALT CONCRETE
CC: CONCRETE
EX: EXISTING
FF: FINISHED FLOOR
FL: FLOW LINE
GB: GRADE BREAK GROUND
GND: GROUND
LG: LIP OF GUTTER
RIM: UTILITY STRUCTURE RIM
TC: TOP OF CURB
TH: THRESHOLD
TSL: TOP OF SOIL LAYER

GRADING NOTES:

1. PROPOSED SITE PLAN AND UTILITIES HAS BEEN SCREENED FOR CLARITY.
2. GRADING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND THE REQUIREMENTS AND RECOMMENDATIONS CONTAINED IN THE PROJECT GEOTECHNICAL REPORT.
3. THE CONTRACTOR SHALL EXERCISE EXTREME CARE TO CONFORM TO THE LINES, GRADES, SECTIONS, AND DIMENSIONS AS SET FORTH ON THESE PLANS. GRADED AREAS SHALL CONFORM TO THE VERTICAL ELEVATIONS SHOWN WITHIN TOLERANCE OF ONE-TENTH OF A FOOT IN LANDSCAPED AREAS AND TWO-HUNDREDTHS OF A FOOT IN HARDCAPED OR PAVED AREAS. WHERE GRADED AREAS DO NOT CONFORM TO THESE TOLERANCES, THE CONTRACTOR SHALL BE REQUIRED TO DO CORRECTIVE GRADING, AT NO EXTRA COST TO THE OWNER.
4. CONTRACTOR SHALL FIELD VERIFY FINISHED FLOOR ELEVATIONS OF EXISTING BUILDINGS PRIOR TO STARTING CONSTRUCTION.
5. CONTRACTOR SHALL TAKE CAUTION WHEN GRADING ADJACENT TO EXISTING BUILDINGS, TO PROTECT EXISTING FOUNDATIONS AND TO NOT TO COVER EXISTING VENTS.
6. RIMS OF UTILITY STRUCTURES SHALL BE ADJUSTED TO FINISHED GRADE IN AREAS OF RE-GRADING. IN PAVED AREAS, ELEVATION DIFFERENCE SHALL NOT BE MORE THAN $\frac{1}{4}$ INCH BETWEEN RIMS AND ADJACENT SURFACE.
7. WHERE IMPROVEMENTS INVOLVE ADA ACCESSIBILITY, CONTRACTOR'S ATTENTION IS DIRECTED TO THE FOLLOWING PARAMETERS THAT NEED TO BE MET WITH THE FINISHED CONSTRUCTION:
 - a. WALKWAYS SHALL HAVE A MAXIMUM LONGITUDINAL SLOPE OF 4.9% AND A MAXIMUM CROSS SLOPE OF 2%.
 - b. LANDINGS SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - c. ADA PARKING STALLS AND STRIPED AISLE SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - d. TRANSITIONS BETWEEN PROPOSED IMPROVEMENTS AND EXISTING CONDITIONS SHALL BE SMOOTH AND FREE OF ABRUPT CHANGES.

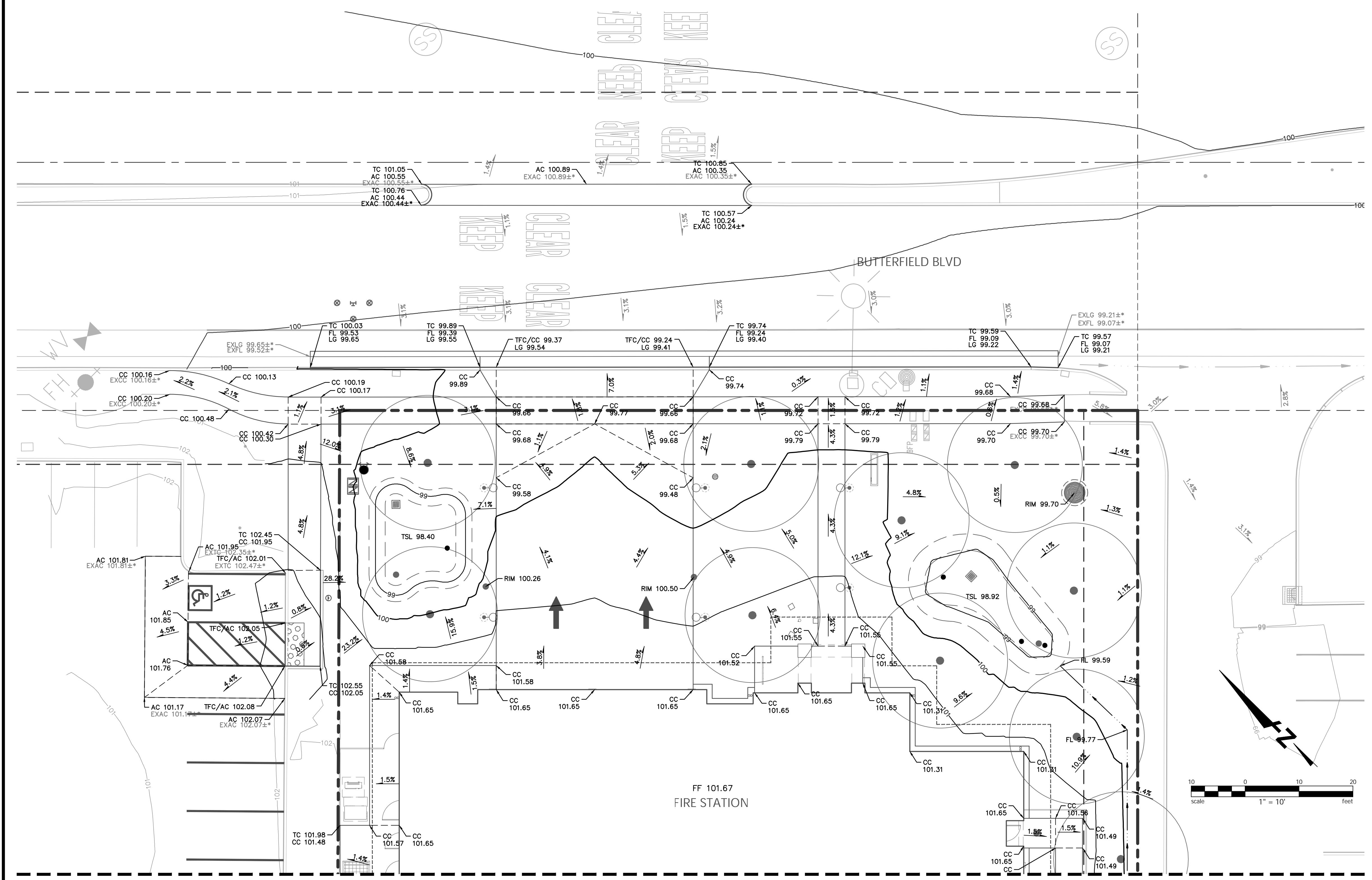
* CONTRACTOR SHALL FIELD VERIFY EXISTING GRADES AT CONFORMS PRIOR TO FORMING/AC WORK.

PROJECT NUMBER: 211224

SHEET TITLE: GRADING PLAN

SHEET NUMBER:

C4.0



GRADING LEGEND:

— . — — — —	FLOW LINE
— — — — —	GRADE BREAK
— 100 —	PROPOSED CONTOUR
— 99 —	EXISTING CONTOUR
<u>X.X%</u>	PROPOSED SLOPE
<u>X.X%</u>	EXISTING SLOPE
FF: XX.XX	<u>ELEVATION LABEL:</u>
AC	ASPHALT CONCRETE
CC:	CONCRETE
EX:	EXISTING
FF:	FINISHED FLOOR
FL:	FLOW LINE
GB:	GRADE BREAK GROUND
GND:	GROUND
LG:	LIP OF GUTTER
RIM:	UTILITY STRUCTURE RIM
TC:	TOP OF CURB
TH:	THRESHOLD
TSL:	TOP OF SOIL LAYER

GRADING NOTES:

1. PROPOSED SITE PLAN AND UTILITIES HAS BEEN SCREENED FOR CLARITY.
2. GRADING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND THE REQUIREMENTS AND RECOMMENDATIONS CONTAINED IN THE PROJECT GEOTECHNICAL REPORT.
3. THE CONTRACTOR SHALL EXERCISE EXTREME CARE TO CONFORM TO THE LINES, GRADES, SECTIONS, AND DIMENSIONS AS SET FORTH ON THESE PLANS. GRADED AREAS SHALL CONFORM TO THE VERTICAL ELEVATIONS SHOWN WITHIN TOLERANCE OF ONE-TENTH OF A FOOT IN LANDSCAPED AREAS AND TWO-HUNDREDTHS OF A FOOT IN HARDSCAPED OR PAVED AREAS. WHERE GRADED AREAS DO NOT CONFORM TO THESE TOLERANCES, THE CONTRACTOR SHALL BE REQUIRED TO DO CORRECTIVE GRADING, AT NO EXTRA COST TO THE OWNER.
4. CONTRACTOR SHALL FIELD VERIFY FINISHED FLOOR ELEVATIONS OF EXISTING BUILDINGS PRIOR TO STARTING CONSTRUCTION.
5. CONTRACTOR SHALL TAKE CAUTION WHEN GRADING ADJACENT TO EXISTING BUILDINGS, TO PROTECT EXISTING FOUNDATIONS AND TO NOT TO COVER EXISTING VENTS.
6. RIMS OF UTILITY STRUCTURES SHALL BE ADJUSTED TO FINISHED GRADE IN AREAS OF RE-GRADING. IN PAVED AREAS, ELEVATION DIFFERENCE SHALL NOT BE MORE THAN $\frac{1}{4}$ INCH BETWEEN RIMS AND ADJACENT SURFACE.
7. WHERE IMPROVEMENTS INVOLVE ADA ACCESSIBILITY, CONTRACTOR'S ATTENTION IS DIRECTED TO THE FOLLOWING PARAMETERS THAT NEED TO BE MET WITH THE FINISHED CONSTRUCTION:
 - a. WALKWAYS SHALL HAVE A MAXIMUM LONGITUDINAL SLOPE OF 4.9% AND A MAXIMUM CROSS SLOPE OF 2%.
 - b. LANDINGS SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - c. ADA PARKING STALLS AND STRIPED AISLE SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - d. TRANSITIONS BETWEEN PROPOSED IMPROVEMENTS AND EXISTING CONDITIONS SHALL BE SMOOTH AND FREE OF ABRUPT CHANGES.

* CONTRACTOR SHALL FIELD VERIFY EXISTING GRADES AT CONFORMS PRIOR TO FORMING/AC

PROJECT:
| CITY OF MORGAN HILL
| BUTTERFIELD FIRE
| STATION
| 17285 Butterfield Blvd.
Morgan Hill, CA 95037

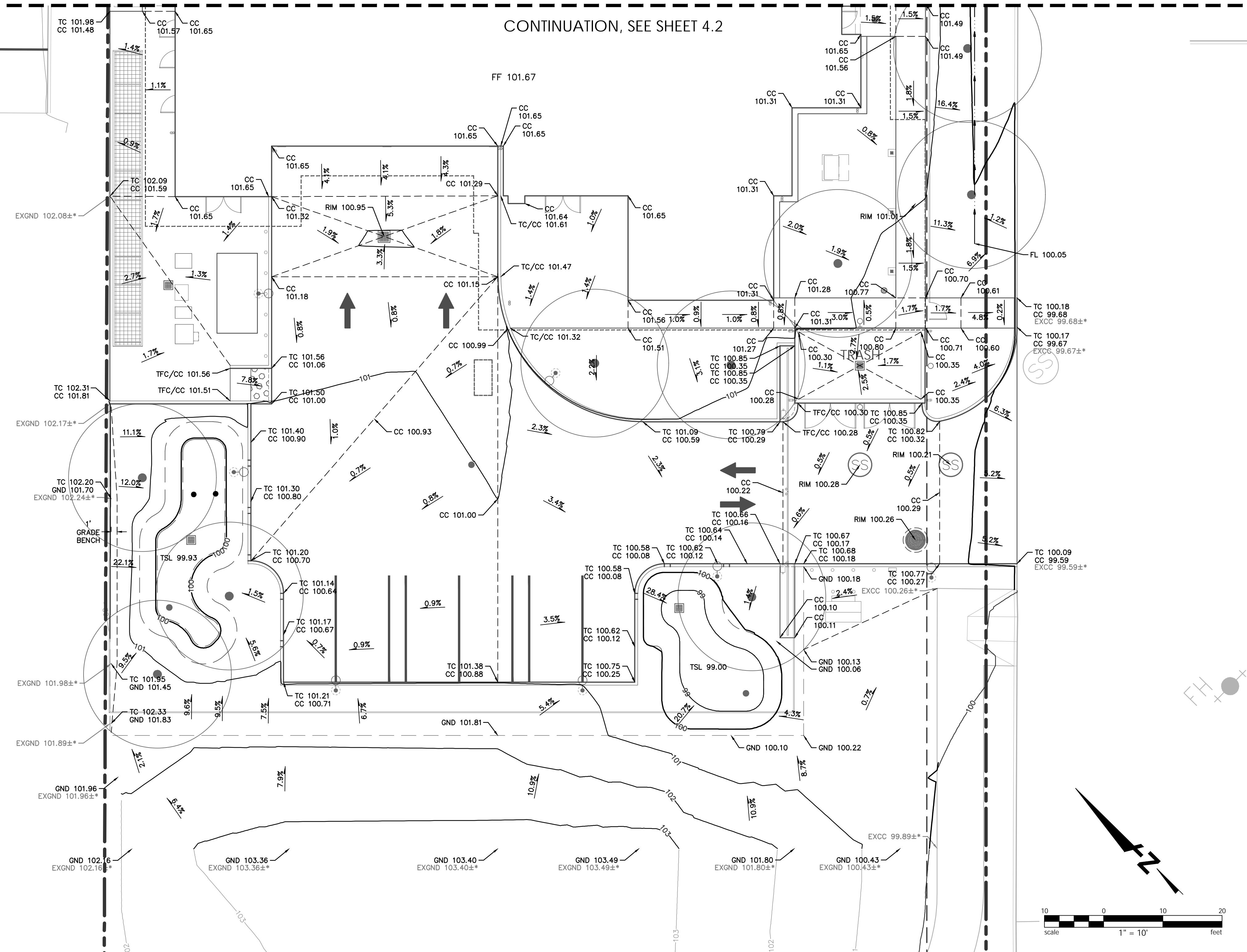


DESCRIPTION: DATE:
95% 01/16/23
CONSTRUCTION
DOCUMENTS
00% 03/23/23
CONSTRUCTION

PROJECT NUMBER:
211224

SHEET TITLE:
GRADING PLAN

SHEET NUMBER:



CONTINUATION, SEE SHEET 4.2

GRADING LEGEND:

- . . . ← FLOW LINE
- — — — — GRADE BREAK
- 100 — PROPOSED CONTOUR
- 99 — EXISTING CONTOUR
- X.X% PROPOSED SLOPE
- X.X% EXISTING SLOPE
- FF: XX.XX ELEVATION LABEL:

AC: ASPHALT CONCRETE
CC: CONCRETE
EX: EXISTING
FF: FINISHED FLOOR
FL: FLOW LINE
GB: GRADE BREAK GROUND
GND: GROUND
LG: LIP OF GUTTER
RIM: UTILITY STRUCTURE RIM
TC: TOP OF CURB
TH: THRESHOLD
TSL: TOP OF SOIL LAYER

GRADING NOTES:

1. PROPOSED SITE PLAN AND UTILITIES HAS BEEN SCREENED FOR CLARITY.
2. GRADING WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND THE REQUIREMENTS AND RECOMMENDATIONS CONTAINED IN THE PROJECT GEOTECHNICAL REPORT.
3. THE CONTRACTOR SHALL EXERCISE EXTREME CARE TO CONFORM TO THE LINES, GRADES, SECTIONS, AND DIMENSIONS AS SET FORTH ON THESE PLANS. GRADED AREAS SHALL CONFORM TO THE VERTICAL ELEVATIONS SHOWN WITHIN TOLERANCE OF ONE-TENTH OF A FOOT IN LANDSCAPED AREAS AND TWO-HUNDREDTHS OF A FOOT IN HARDCAPED OR PAVED AREAS. WHERE GRADED AREAS DO NOT CONFORM TO THESE TOLERANCES, THE CONTRACTOR SHALL BE REQUIRED TO DO CORRECTIVE GRADING, AT NO EXTRA COST TO THE OWNER.
4. CONTRACTOR SHALL FIELD VERIFY FINISHED FLOOR ELEVATIONS OF EXISTING BUILDINGS PRIOR TO STARTING CONSTRUCTION.
5. CONTRACTOR SHALL TAKE CAUTION WHEN GRADING ADJACENT TO EXISTING BUILDINGS, TO PROTECT EXISTING FOUNDATIONS AND TO NOT COVER EXISTING VENTS.
6. RIMS OF UTILITY STRUCTURES SHALL BE ADJUSTED TO FINISHED GRADE IN AREAS OF RE-GRADING. IN PAVED AREAS, ELEVATION DIFFERENCE SHALL NOT BE MORE THAN $\frac{1}{4}$ INCH BETWEEN RIMS AND ADJACENT SURFACE.
7. WHERE IMPROVEMENTS INVOLVE ADA ACCESSIBILITY, CONTRACTOR'S ATTENTION IS DIRECTED TO THE FOLLOWING PARAMETERS THAT NEED TO BE MET WITH THE FINISHED CONSTRUCTION:
 - a. WALKWAYS SHALL HAVE A MAXIMUM LONGITUDINAL SLOPE OF 4.9% AND A MAXIMUM CROSS SLOPE OF 2%.
 - b. LANDINGS SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - c. ADA PARKING STALLS AND STRIPED AISLE SHALL HAVE A MAXIMUM SLOPE OF 2% IN ALL DIRECTIONS, INCLUDING DIAGONAL.
 - d. TRANSITIONS BETWEEN PROPOSED IMPROVEMENTS AND EXISTING CONDITIONS SHALL BE SMOOTH AND FREE OF ABRUPT CHANGES.

CONTRACTOR SHALL FIELD VERIFY EXISTING
GRADES AT CONFORMS PRIOR TO FORMING/AC
WORK

A circular professional engineer seal. The outer ring contains the text "PROFESSIONAL" at the top, "REGISTERED" on the left, "T. MCCURRY" on the right, and "E. 64850" at the bottom. The inner circle contains "JAMES" at the top, "9" in the center, "C 64850" below it, "EXP. 6/30/23" to the right, "CIVIL" at the bottom, and "STATE OF CALIFORNIA" along the bottom edge.

coar
DESIGN GROUP

200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

980 9TH STREET
SUITE 2300
SACRAMENTO,
(916) 556-5800
www.bkf.com

PROJECT: CITY OF MORGAN HILL
BUTTERFIELD FIRE STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037



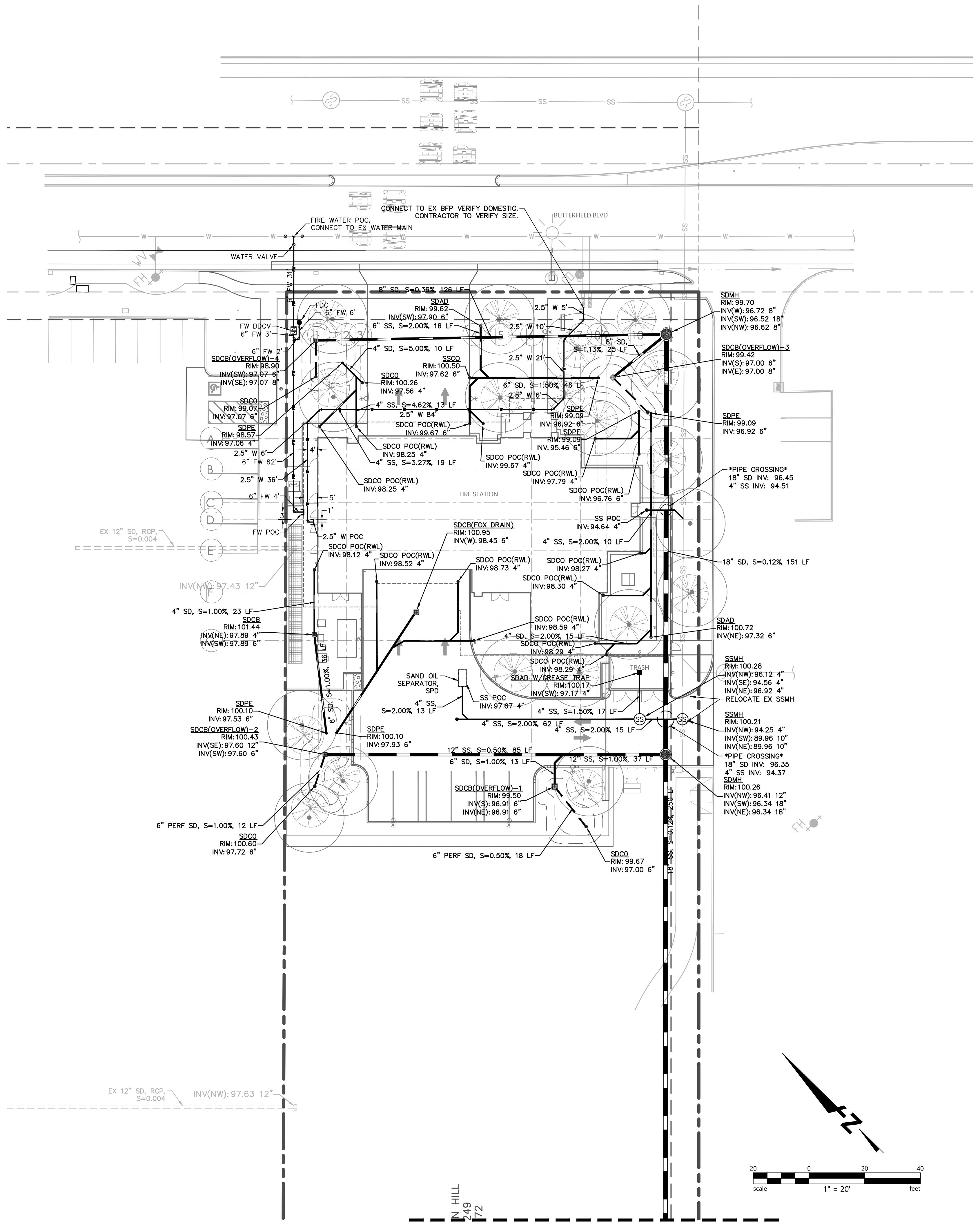
DESCRIPTION:	DATE
95% CONSTRUCTION DOCUMENTS	01/16/2010
100% CONSTRUCTION	03/23/2010

PROJECT NUMBER:

SHEET TITLE:

SHEET NUMBER:

C4.2



UTILITY SCHEDULE

PIPING	
SYSTEM:	MATERIAL
WATER (DOMESTIC)	DUCTILE IRON PIPE CLASS 50
WATER (FIRE)	DUCTILE IRON PIPE CLASS 50
STORM DRAIN	PVC SDR 35
STORM SUB DRAIN/PERF PIPE	HDPE SDR 35
SANITARY SEWER	PVC SDR 26
STRUCTURES	
SYSTEM:	DETAIL
FIRE WATER	
FDC	PER DETAIL 2, C8.1
DDCV	PER DETAIL 3, C8.4
GATE VALVE	PER DETAIL 1, C8.3
STORM DRAIN	
MANHOLE	PER DETAIL 2, C8.4
CLEANOUT	PER DETAIL 8, C8.0
CLEANOUT (BIOTREATMENT)	PER DETAIL 4, C8.2
SDCB	PER DETAIL 3, C8.2
SD OUTFALL	PER DETAIL 2, C8.5
SDPE(POP-UP Emitter)	PER DETAIL 7, C8.2
SDAD	PER DETAIL 10, C8.0
SDCB(FOX DRAIN)	PER DETAIL 1, C8.2
SANITARY SEWER	
MANHOLE	PER DETAIL 1, C8.4
CLEANOUT	PER DETAIL 8, C8.0

UTILITY LEGEND

	STORM DRAIN LINE
	SANITARY SEWER LINE
	WATER LINE
	FIRE WATER
	STORM DRAIN DROP INLET
	STORM DRAIN MANHOLE
•	STORM DRAIN CLEANOUT
	SANITARY SEWER MANHOLE
•	SANITARY SEWER CLEANOUT
	BACK FLOW PREVENTOR
	WATER VALVE
	FDC

UTILITY NOTES:

1. PROPOSED SITE PLAN HAS BEEN SCREENED FOR CLARITY.
2. RIM ELEVATIONS FOR EXISTING UTILITY STRUCTURES SHALL BE RAISED TO PROPOSED SURFACE ELEVATIONS. EXISTING STRUCTURES LOCATED WITHIN PROPOSED VEHICULAR ROADWAY, AN H-20 TRAFFIC-RATED TOP SHALL BE USED TO REPLACE THE EXISTING TOP OF THE ADJUSTED STRUCTURE.
3. PROTECT ALL EXISTING UTILITIES AND SITE FEATURES FROM BEING DAMAGED, UNLESS OTHERWISE NOTED. ALL UTILITIES AND IMPROVEMENTS THAT BECOME DAMAGED DURING CONSTRUCTION SHALL BE COMPLETELY RESTORED AT NO ADDITIONAL COST TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.

4. THE EXISTING UTILITY LINES AND STRUCTURES SHOWN ON THESE PLANS ARE DERIVED FROM RECORD DATA, UNDERGROUND UTILITY SURVEY AND/OR SURFACE OBSERVATION AND ARE APPROXIMATE ONLY. ACTUAL LOCATION AND SIZE, TOGETHER WITH THE PRESENCE OF ANY ADDITIONAL UTILITY LINES AND STRUCTURES NOT SHOWN ON THIS PLAN, SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR DURING CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY UPON DISCOVERY OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS IN THE FIELD AND INFORMATION SHOWN ON THESE PLANS.

5. THRUST BLOCKS SHALL BE INSTALLED AT ALL BENDS AND TEES ON WATER MAINS & FIRE SERVICE LINES. CONTRACTOR MAY USE RESTRAIN JOINTS INSTEAD OF THRUST BLOCKS AT ALL BENDS AND TEES. CONTRACTOR SHALL BE RESPONSIBLE TO CALCULATE THE RESTRAIN JOINT LENGTH.

6. EXISTING UNDERGROUND UTILITIES, INCLUDING THOSE MARKED UNKNOWN, ARE BASED ON SURVEY COMPLETED BY OTHERS AND PROVIDED TO BKF ENGINEERS FOR INCLUSION IN PLANS.

7. EXISTING PIPE LINES MAY HAVE CATHODIC PROTECTION. CONTRACTOR SHALL ENSURE THAT ALL CONNECTIONS TO EXISTING PIPE LINES ARE ELECTRICALLY COMMON WITH THE PIPE LINE.

8. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF CONSTRUCTION.

9. LENGTH OF PIPES ARE HORIZONTAL DISTANCES FROM CENTER TO CENTER OF STRUCTURES, ROUNDED TO THE NEAREST FOOT AND ARE SHOWN FOR ENGINEERING CALCULATIONS ONLY. CONTRACTOR SHALL ESTIMATE THEIR OWN PIPE LENGTHS PRIOR TO BIDDING.

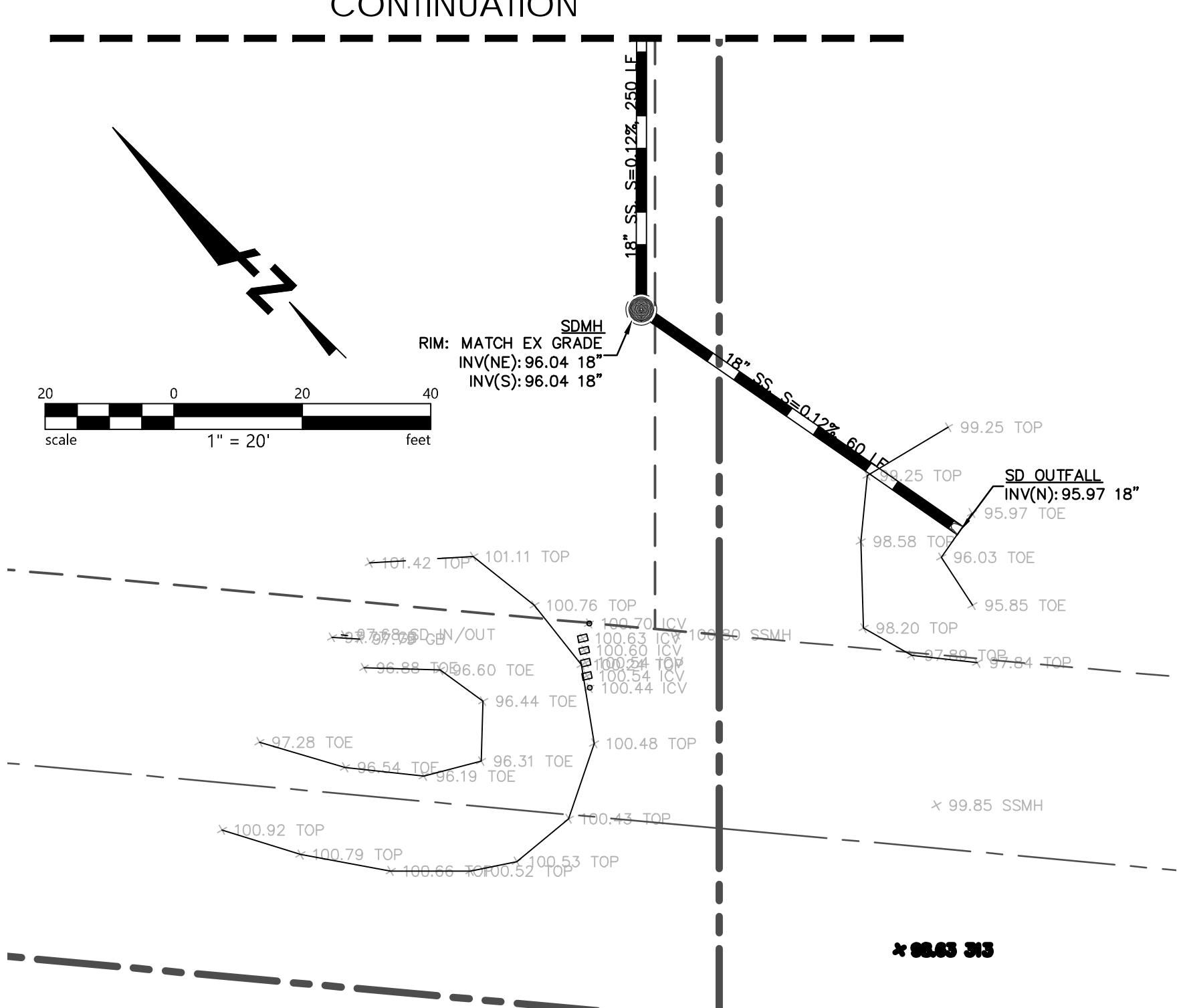
10. FIRE SERVICE SIZE IS SHOWN FOR REFERENCE ONLY. FIRE SERVICE SIZE SHALL BE CONFIRMED BY A LICENSED FIRE PROTECTION ENGINEER OR DESIGN-BUILD CONTRACTOR IN CONJUNCTION WITH THE FIRE SPRINKLER SYSTEM DESIGN AND

CALCULATIONS. CONTRACTOR IS CAUTIONED NOT TO ORDER ANY MATERIALS RELATED TO THE FIRE SERVICE UNTIL SAID SIZING IS CONFIRMED. IF REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ), SHOP DRAWINGS OF THE FIRE SERVICE SHALL BE SUBMITTED TO THE AHJ BY THE INSTALLING CONTRACTOR. SHOP DRAWINGS OF THE FIRE SERVICE ARE NOT REQUIRED TO BE SUBMITTED TO THE CIVIL ENGINEER OF RECORD.

11. UTILITY TRENCHES PARALLEL TO FOUNDATIONS ARE TO HAVE A MINIMUM OF 18" INCHES CLEARANCE, SEE STRUCTURAL DRAWINGS FOR ADDED CLEARANCE AND TRENCHING DEPTHS ADJACENT TO STRUCTURAL FOUNDATIONS.

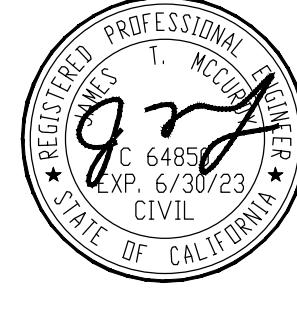
12. UTILITY TRENCHING PER DETAIL 1 ON SHEET C8 5

CONTINUATION



ENLARGEMENT A

C5.0



coar
DESIGN GROUP
previously **JKA**



980 9TH STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com

PROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd



DESCRIPTION:	DATE:
95% CONSTRUCTION DOCUMENTS	01/16/23
100% CONSTRUCTION	03/23/23

PROJECT NUMBER:
211224

SHEET TITLE:
UTILITY PLAN

100



coar
DESIGN GROUP
previously **JKA**

200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

BKF
980 19th STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com

PROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037



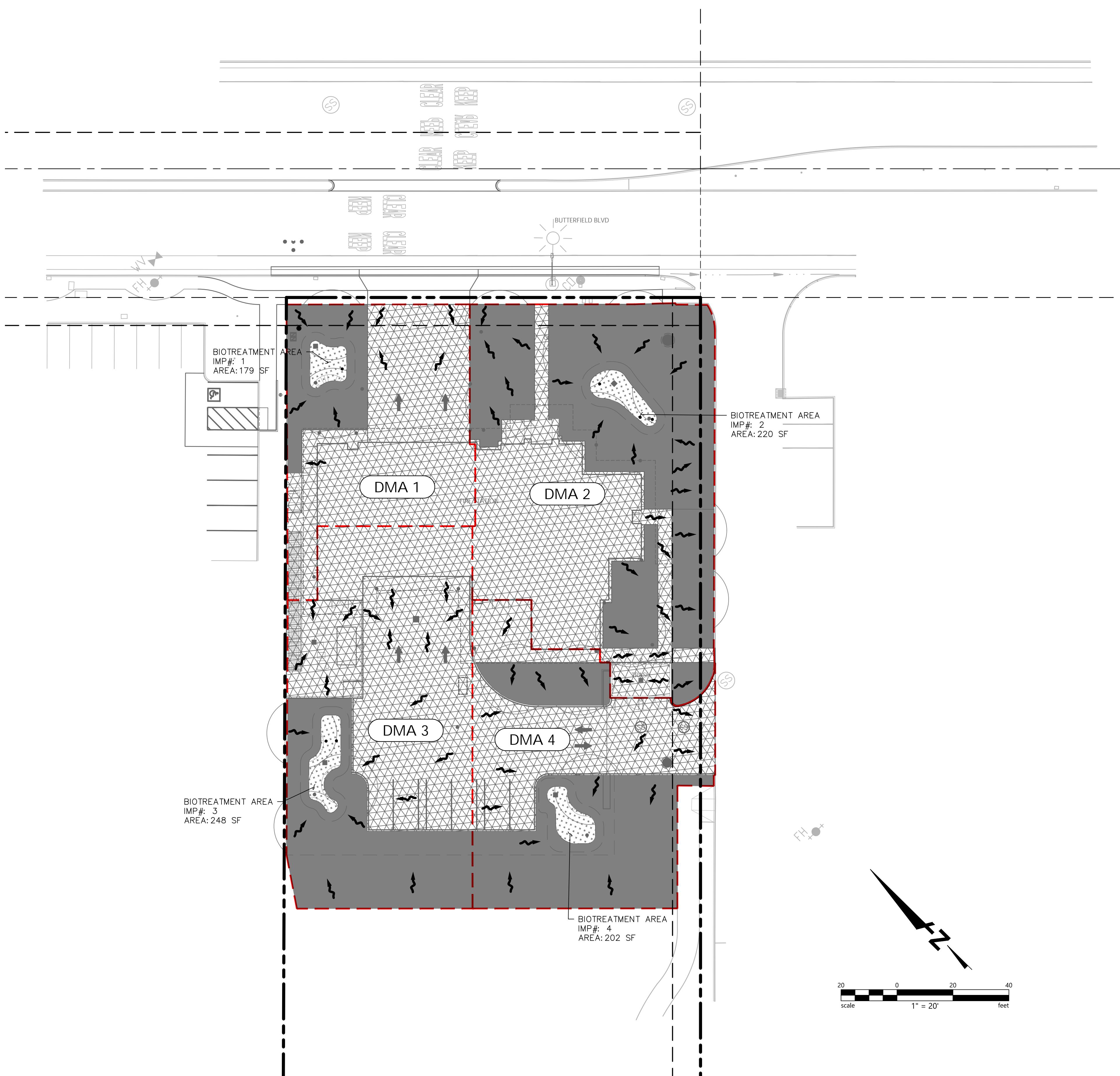
DESCRIPTION: 01/16/23
95% CONSTRUCTION DOCUMENTS
100% CONSTRUCTION DOCUMENTS 03/23/23

PROJECT NUMBER: 211224

SHEET TITLE: STORMWATER MANAGEMENT PLAN

SHEET NUMBER:

C6.0



SURFACE CLASSIFICATION	A	B
	Pre-Project (sq. ft.)	Post-project (sq. ft.)
IMPERVIOUS	8,619	17,866
PERMEABLE	23,762	14,515
Totals:	32,381	32,381

LEGEND:
 IMPERVIOUS SURFACE
 PERVIOUS SURFACE
 BIORETENTION AREA

[DMA] NAME	(1) DMA Area (sq ft)	(2) Previous Area (sq ft)	(3) Imperious Area (sq ft)	(4) Retention Tributary Area* (1) - (2) = (4)	(5) Runoff Coefficient**	(6) 95th Percentile 24-hr Rainfall Depth (in)		(7) Required Retention Volume (cu ft) (4)x(5)x(6)/12=(7)	(8) Available Retention Volume*** (cu ft) (10)x(11)x40%=(8)	(9) % Replacement of Imperious Credit	(10) Available Bioretention Area (sq ft)	(11) Gravel storage Depth (ft)
						(6) 95th Percentile 24-hr Rainfall Depth (in)	(7) Required Retention Volume (cu ft) (4)x(5)x(6)/12=(7)					
DMA 1	5,515	1,193	4,135	2,12	0.54	1.70	166	179	50%	179	2.5	
DMA 2	10,955	6,096	4,590	4,427	0.29	1.70	182	214	10%	214	2.5	
DMA 3	8,734	2,757	5,720	4,466	0.45	1.70	287	297	35%	248	3.0	
DMA 4	7,149	3,517	3,392	3,416	0.32	1.70	156	162	5%	202	2.0	
TOTAL	32,354	13,563	17,837	14,470			635	852	100%	843		

* Sized reduced by 0.5 x (8,641 sq ft x % Replacement of impervious Credit (9)) to calculate Retention Tributary Area

** Runoff factor calculated using WEF Manual of Practice Equation C = 0.858I³ - 0.78I² + 0.774I + 0.04 where "I" is %Impervious

*** Porosity of gravel assumed to be 40%



coar
DESIGN GROUP
previously JKA

200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

BKF
980 9TH STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com

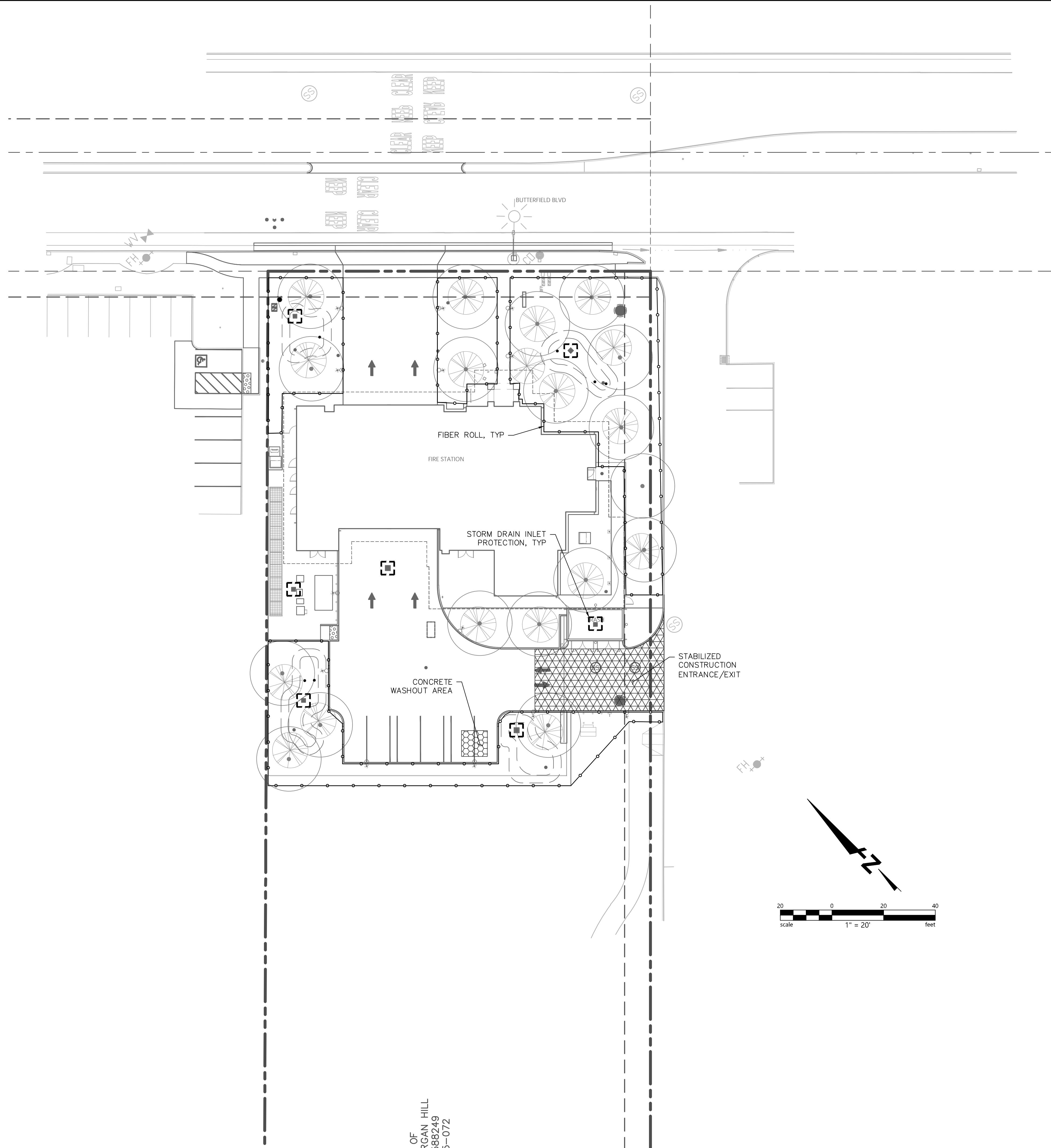
PROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037



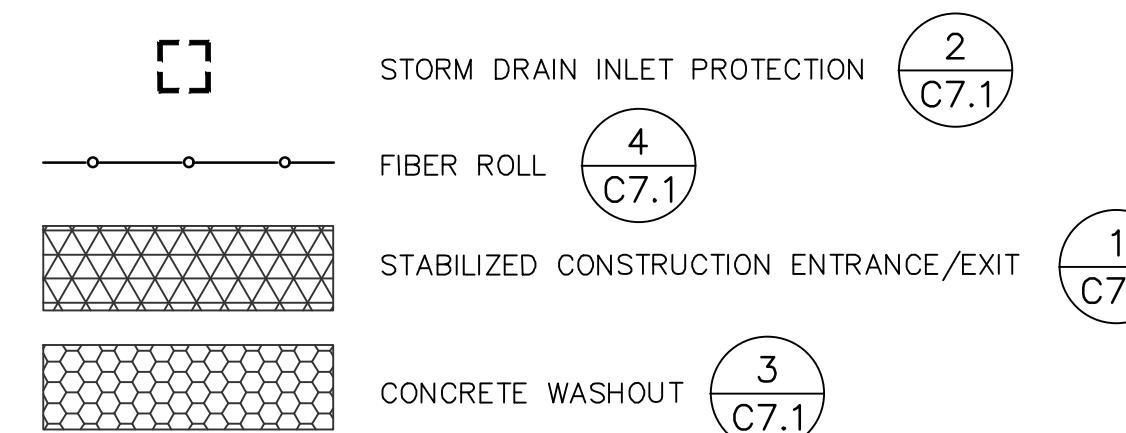
DESCRIPTION: DATE:
95% 01/16/23
CONSTRUCTION DOCUMENTS
100% 03/23/23
CONSTRUCTION DOCUMENTS

PROJECT NUMBER: 211224
SHEET TITLE: EROSION
CONTROL PLAN
SHEET NUMBER:

C7.0



LEGEND:

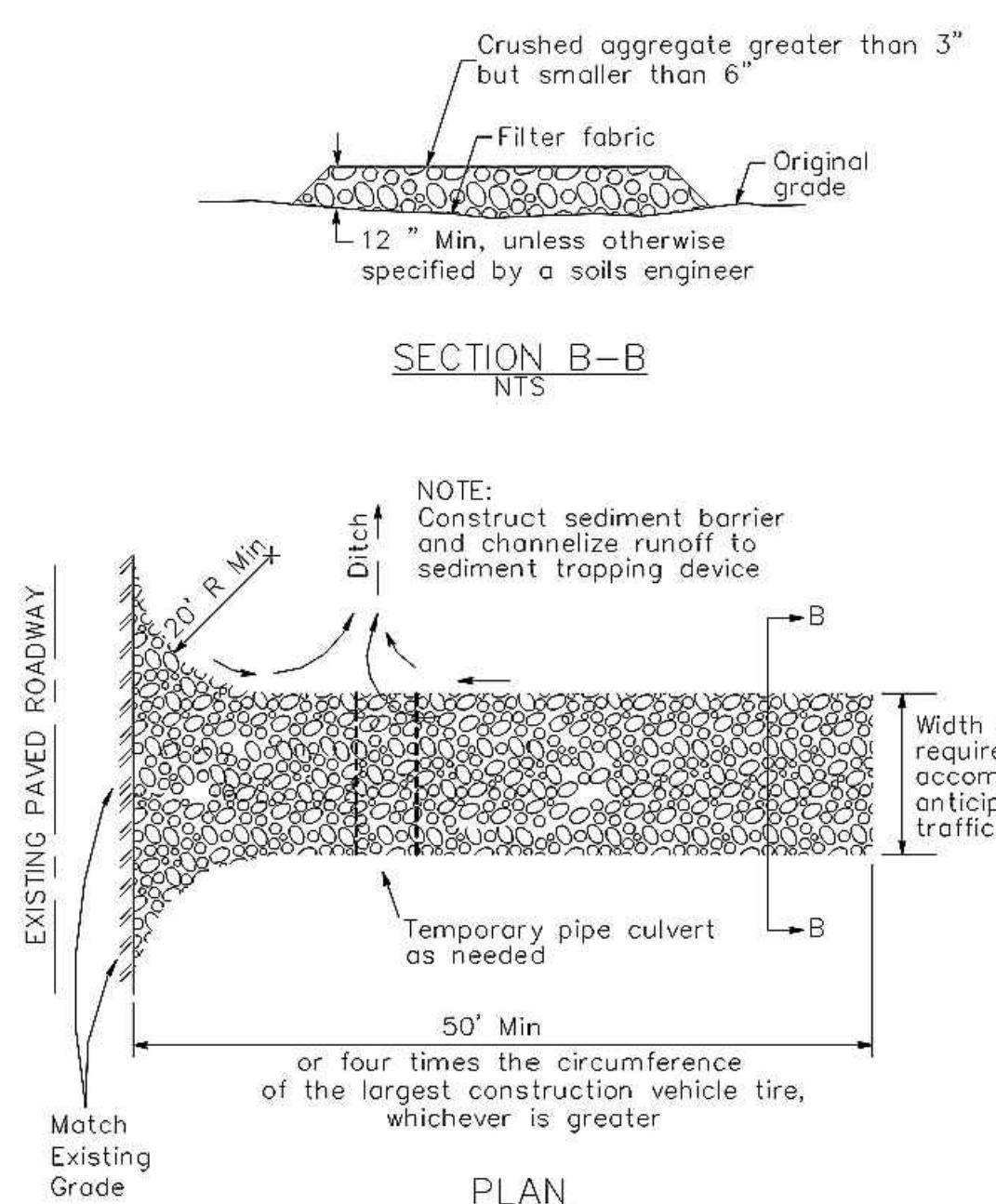


EROSION CONTROL NOTES:

1. REFERENCE: "CALIFORNIA STORM WATER BEST MANAGEMENT PRACTICE (BMP) HANDBOOK", LATEST EDITION.
2. CONSTRUCTION AREAS SHOWN ARE CONCEPTUAL. ACTUAL PLACEMENT TO BE DETERMINED BY CONTRACTOR BASED ON CURRENT BEST MANAGEMENT PRACTICES. CONTRACTOR SHALL SUBMIT A CONSTRUCTION STAGING PLAN.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN EFFECT AND MAINTAINED BY THE CONTRACTOR ON A YEAR-ROUND BASIS UNTIL ALL DISTURBED AREAS ARE STABILIZED UNLESS OTHERWISE PERMITTED BY THE CITY INSPECTOR.
4. AS PART OF THE GRADING OPERATIONS, THE CONTRACTOR SHALL ENSURE THAT THE SITE IS WATERED PRIOR TO THE COMMENCEMENT OF GRADING.
5. ALL INLETS RECEIVING STORM WATER RUNOFF FROM THE PROJECT AREA MUST BE EQUIPPED WITH REQUIRED INLET PROTECTION.
6. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIALS AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT LADEN RUNOFF ENTERING THE STORM DRAIN SYSTEM.
7. ALL CONCRETE SLURRY SHALL BE CONTAINED IN CONCRETE WASH-OUT AREAS DESIGNATED ON-SITE.
8. STOCKPILED EARTHEN MATERIAL SHALL BE EITHER COVERED WITH A TARP OR WATERED SUFFICIENTLY TO ELIMINATE DUST.
9. TEMPORARY EROSION CONTROLS TO STABILIZE ALL DENUDED AREAS UNTIL PERMANENT EROSION CONTROLS ARE ESTABLISHED.
10. DELINEATE WITH FIELD MARKERS CLEARING LIMITS, EASEMENTS, SETBACKS, SENSITIVE OR CRITICAL AREAS, BUFFER ZONES, TREES, AND DRAINAGE COURSES.
11. PERFORM CLEARING AND EARTH MOVING ACTIVITIES ONLY DURING DRY WEATHER.
12. USE SEDIMENT CONTROLS OR FILTRATION TO REMOVE SEDIMENT WHEN Dewatering AND OBTAIN ALL NECESSARY PERMITS.
13. PROTECT ALL STORM DRAIN INLETS IN VICINITY OF SITE USING SEDIMENT CONTROLS SUCH AS BERMS, FIBER ROLLS, OR FILTERS.
14. TRAP SEDIMENT ON-SITE, USING BMPs SUCH AS SEDIMENT BASINS OR TRAPS, EARTHEN DIKES OR BERMS, SILT FENCES, CHECK DAMS, SOIL BLANKETS OR MATS, COVERS FOR SOIL STOCK PILES, ETC.
15. DIVERT ON-SITE RUNOFF AROUND EXPOSED AREAS; DIVERT OFF-SITE RUNOFF AROUND THE SITE (E.G., SWALES AND DIKES).
16. PROTECT ADJACENT PROPERTIES AND UNDISTURBED AREAS FROM CONSTRUCTION IMPACTS USING VEGETATIVE BUFFER STRIPS, SEDIMENT BARRIERS OR FILTERS, DIKES, MULCHING, OR OTHER MEASURES AS APPROPRIATE.
17. LIMIT CONSTRUCTION ACCESS ROUTES AND STABILIZE DESIGNATED ACCESS POINTS.
18. NO CLEANING, FUELING, OR MAINTAINING VEHICLES ON-SITE, EXCEPT IN A DESIGNATED AREA WHERE WASHWATER IS CONTAINED AND TREATED.
19. STORE, HANDLE, AND DISPOSE OF CONSTRUCTION MATERIALS/WASTES PROPERLY TO PREVENT CONTACT WITH STORMWATER.
20. CONTRACTOR SHALL TRAIN AND PROVIDE INSTRUCTION TO ALL EMPLOYEES/SUBCONTRACTORS RE: CONSTRUCTION BMPs.
21. CONTROL AND PREVENT THE DISCHARGE OF ALL POTENTIAL POLLUTANTS, INCLUDING PAVEMENT CUTTING WASTES, PAINTS, CONCRETE, PETROLEUM PRODUCTS, CHEMICALS, WASHWATER OR SEDIMENTS, RINSE WATER FROM ARCHITECTURAL COPPER, AND NON-STORMWATER DISCHARGES TO STORM DRAINS AND WATERCOURSES.
22. CONTRACTOR SHALL PROVIDE INLET PROTECTION AT THE NEAREST DOWNSTREAM STORM DRAIN ALONG PROJECT SITE.
23. AS A PART OF THE BID DOCUMENTS, THE BIDDER SHALL DESIGNATE A QUALIFIED SWPPP PRACTITIONER (OSP) TO IMPLEMENT THE PROVISIONS OF THE SWPPP AND THE CONSTRUCTION SITE MONITORING PROGRAM (CSMP), AND SHALL COMPLY WITH THE NARRATIVE EFFLUENT STANDARDS.

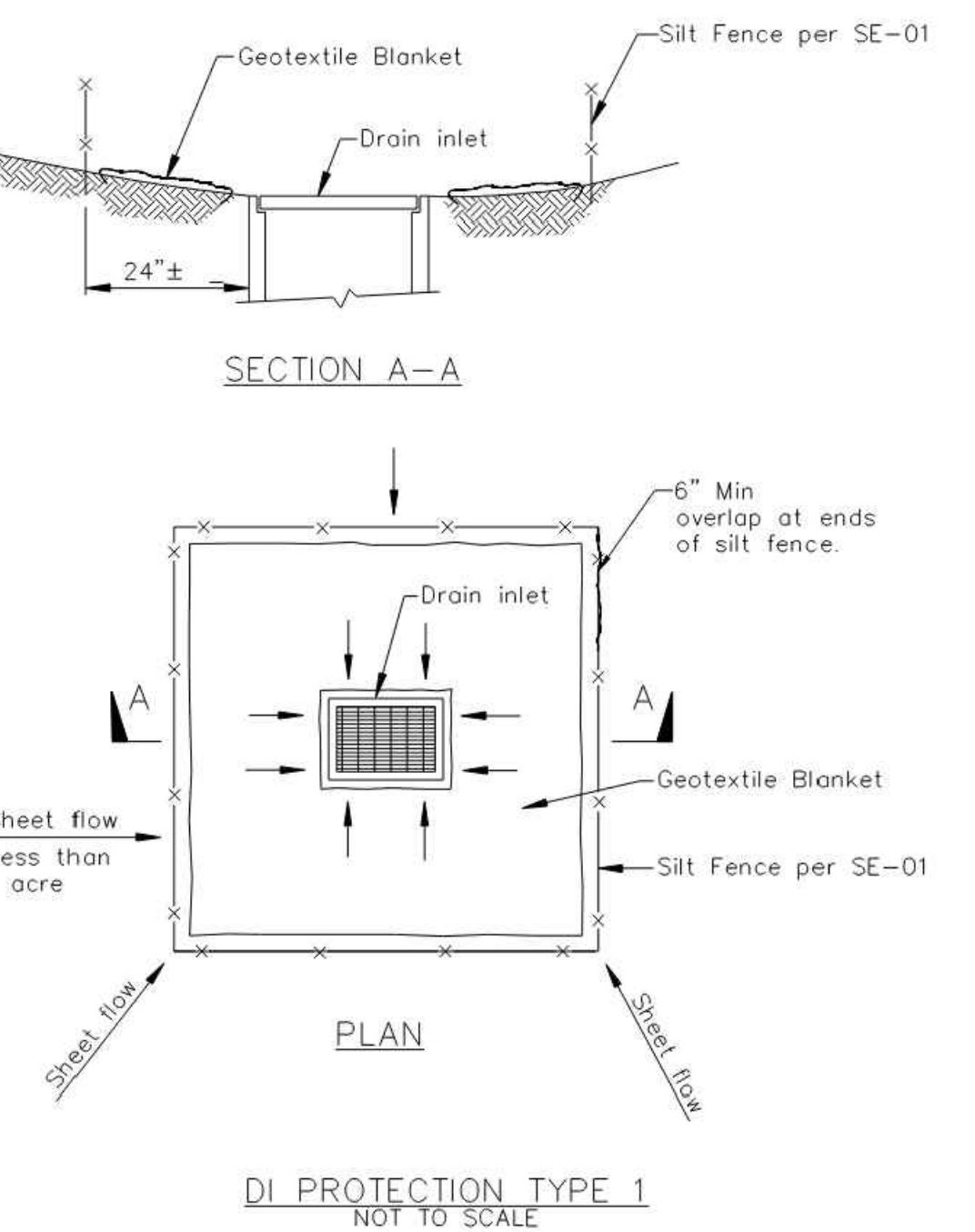
LOCATION OF CONSTRUCTION ACTIVITIES IS PRELIMINARY AND SHALL BE SUPERSEDED BY FINALIZED CONSTRUCTION ACTIVITY LOCATIONS, SHOWN/UPDATED BY CONTRACTOR.

Stabilized Construction Entrance/Exit TC-1



① STABILIZED CONSTRUCTION ENTRANCE/EXIT
NTS

Storm Drain Inlet Protection SE-10

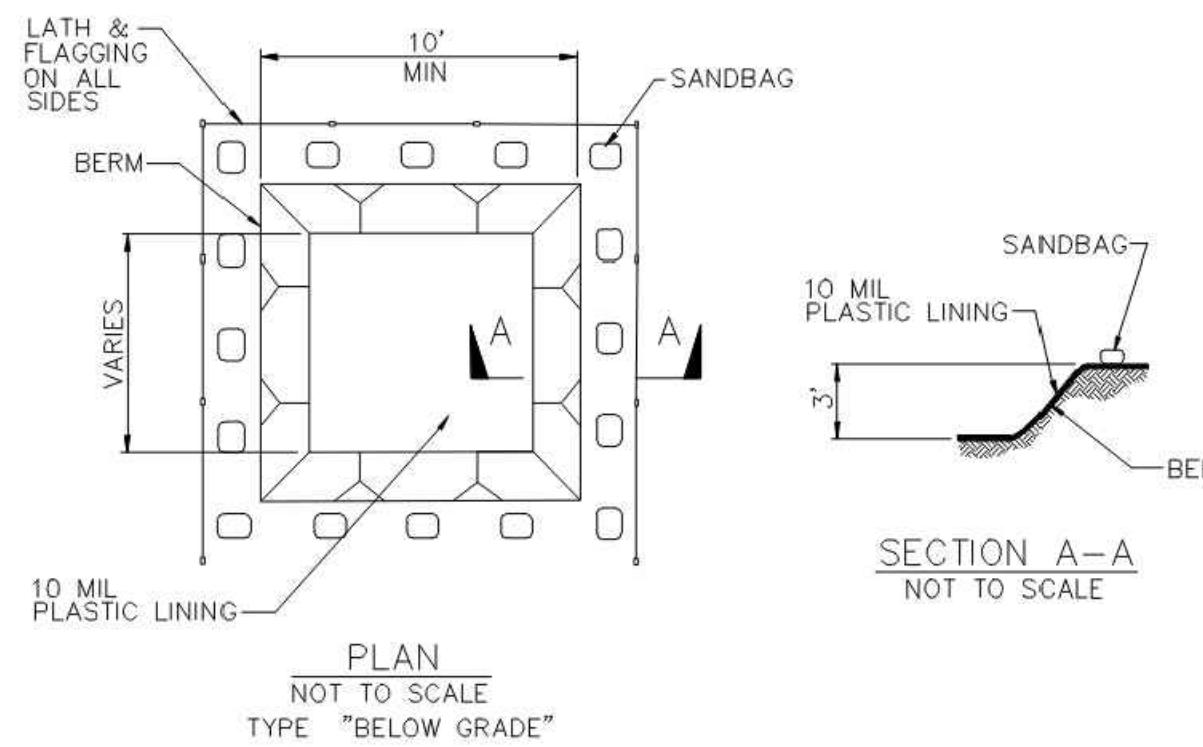


DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:
1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

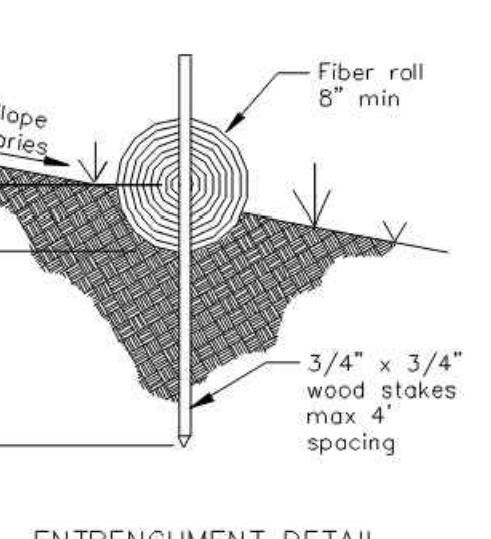
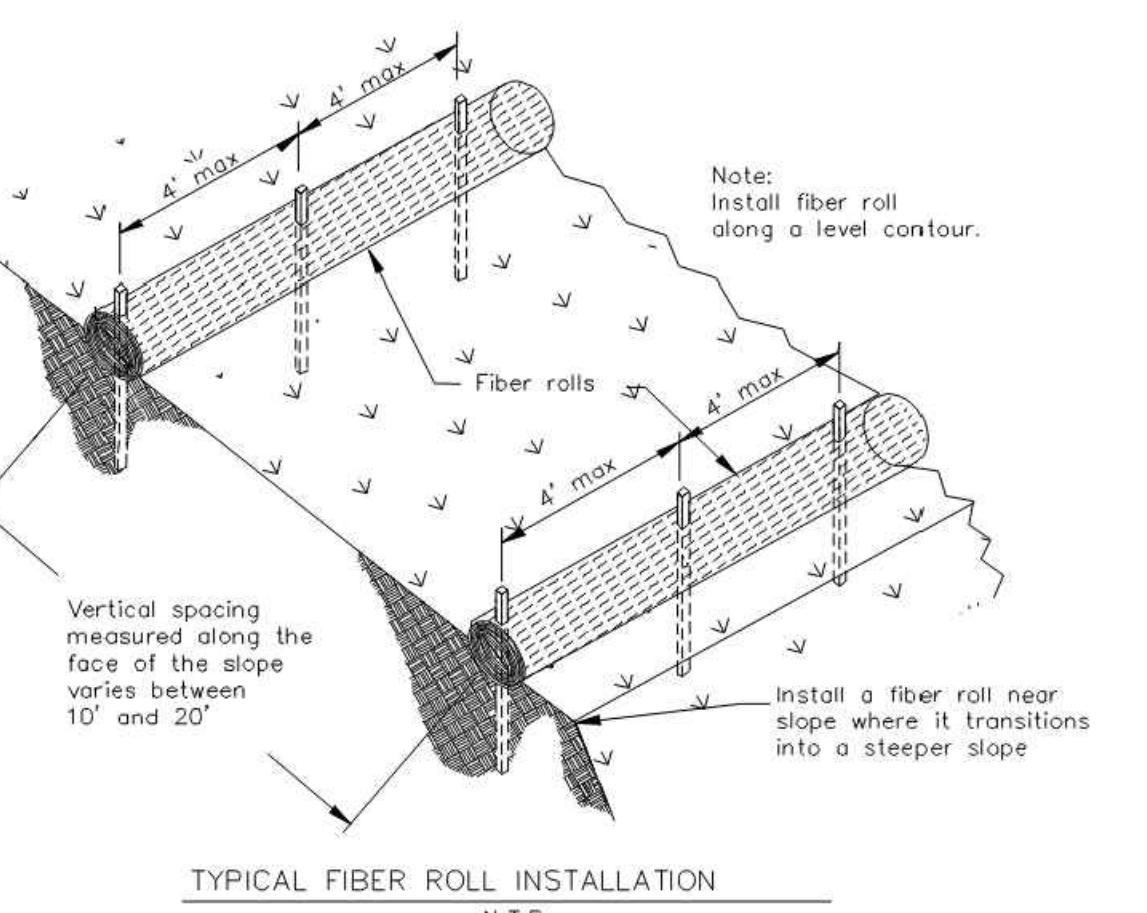
② STORM DRAIN INLET PROTECTION
NTS

Concrete Waste Management WM-8



③ CONCRETE WASTE MANAGEMENT
NTS

Fiber Rolls SE-5



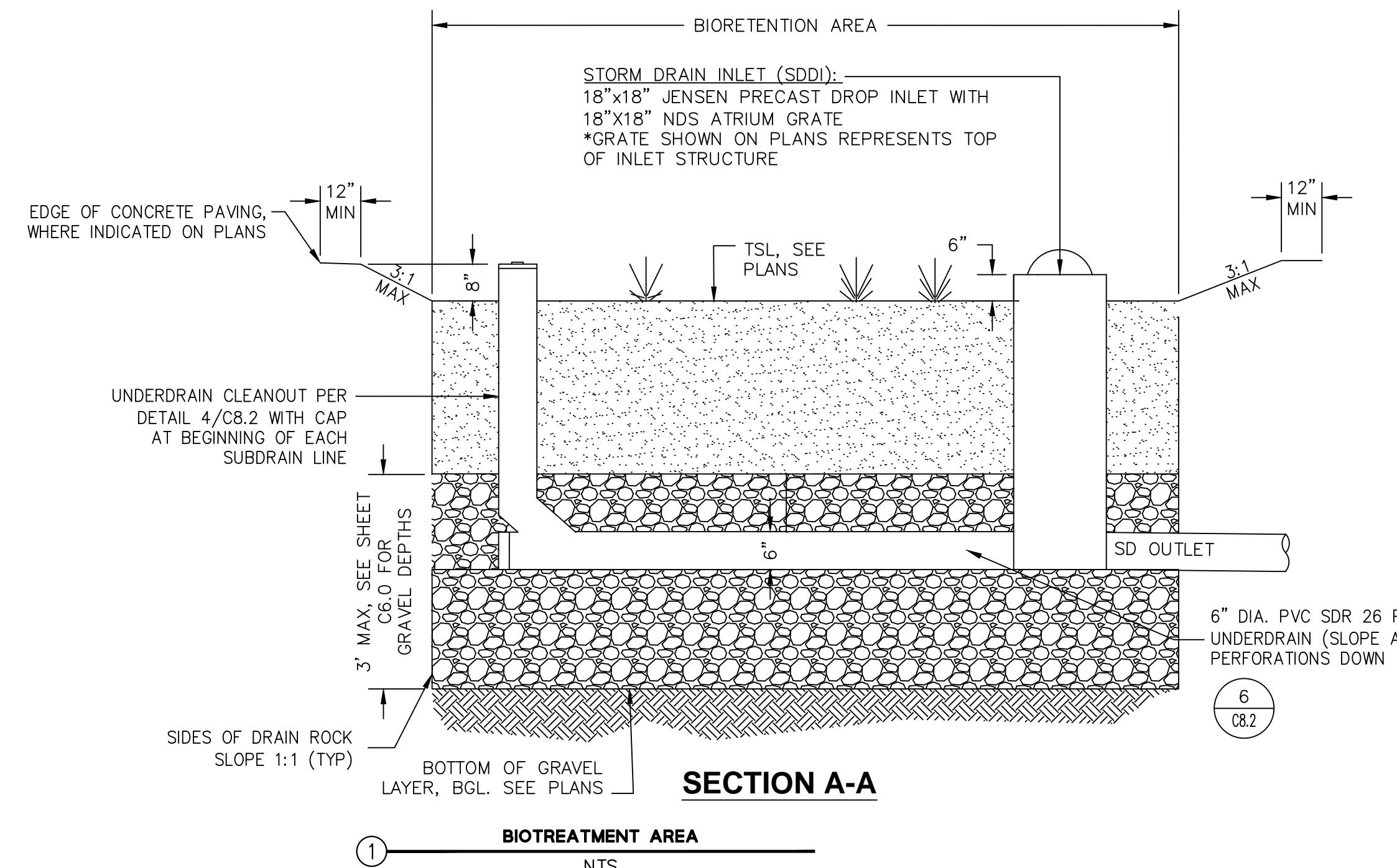
④ FIBER ROLLS
NTS

PROJECT NUMBER: 211224

SHEET TITLE: EROSION CONTROL DETAILS

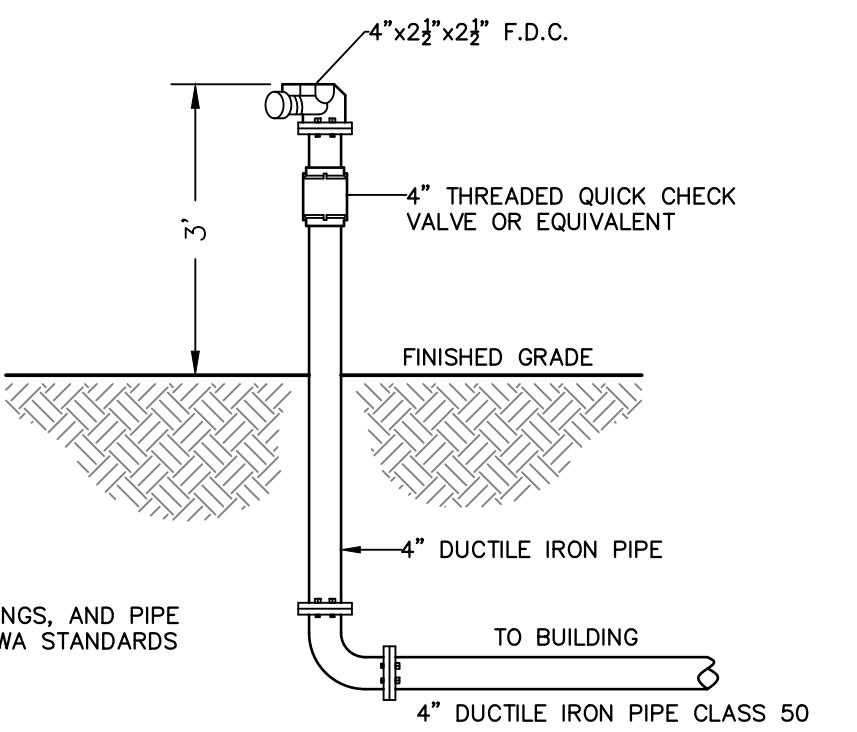
SHEET NUMBER:

C7.1



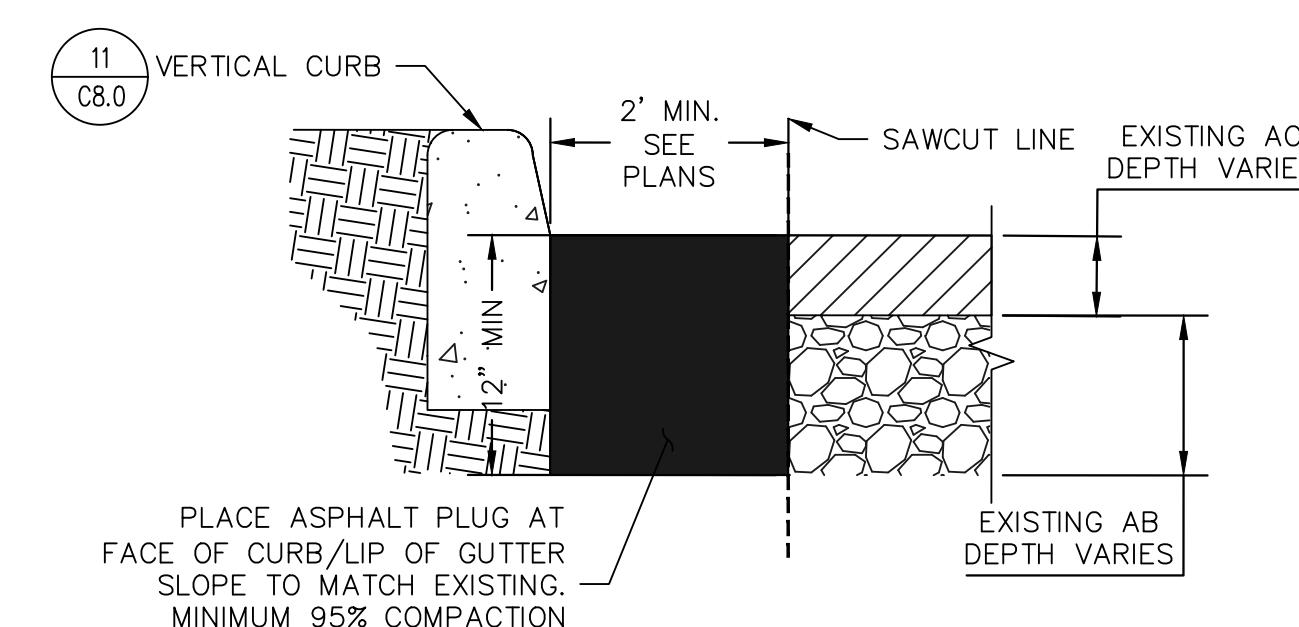
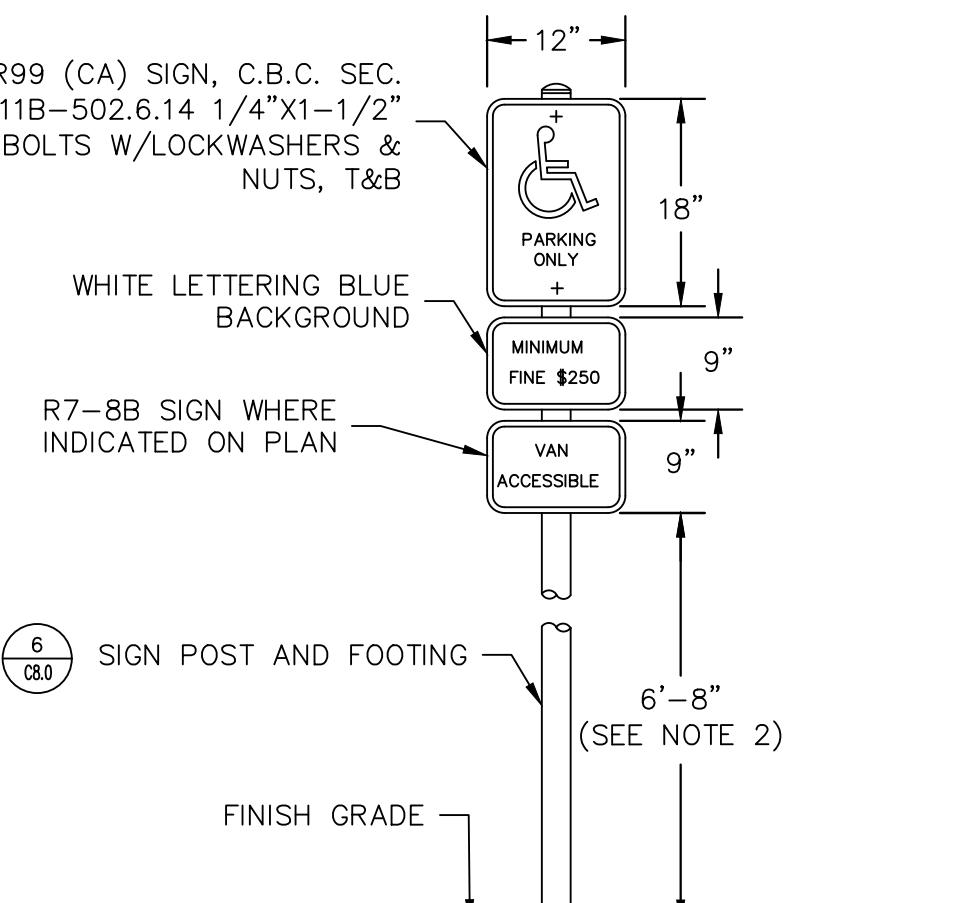
BIORETENTION NOTES

1. BIORETENTION AREAS WILL VARY AS TO LOCATION OF HIGH AND LOW POINTS BUT BASIC MATERIALS AND CONSTRUCTION METHODS SHOWN ABOVE SHALL REMAIN THE SAME.
2. SOIL LAYER SHALL CONSIST OF A UNIFORM MIX OF 60%-70% CONSTRUCTION SAND AND 30%-40% COMPOST, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS AND FREE OF NOXIOUS WEEDS. SOIL LAYER SHALL CONSIST OF A UNIFORM MIX OF 60%-70% CONSTRUCTION SAND AND 30%-40% COMPOST, FREE OF STONES, STUMPS, ROOTS, OR SIMILAR OBJECTS AND FREE OF NOXIOUS WEEDS. BIOTREATMENT SOIL MIX SHALL MEET THE CITY OF FOLSOM MANUAL OF STORM WATER QUALITY CONTROL STANDARDS FOR NEW DEVELOPMENT AND REDEVELOPMENT.
3. DRAIN ROCK LAYER SHALL CONSIST OF CLASS 2 PERMEABLE MATERIAL PER CALTRANS SPECIFICATION SECTION 68-1.025.
4. PROVIDE A SANDY LOAM TOP LAYER ABOVE THE BIORETENTION SOIL MEDIA LAYER. THIS LAYER SHOULD BE A MINIMUM OF SIX (6) INCHES DEEP, BUT A DEEPER LAYER IS RECOMMENDED TO PROMOTE HEALTHY VEGETATION.



② FIRE DEPARTMENT CONNECTION

NTS



③ VAN ACCESSIBLE PARKING STALL

NTS

④ SYMBOL OF ACCESSIBILITY

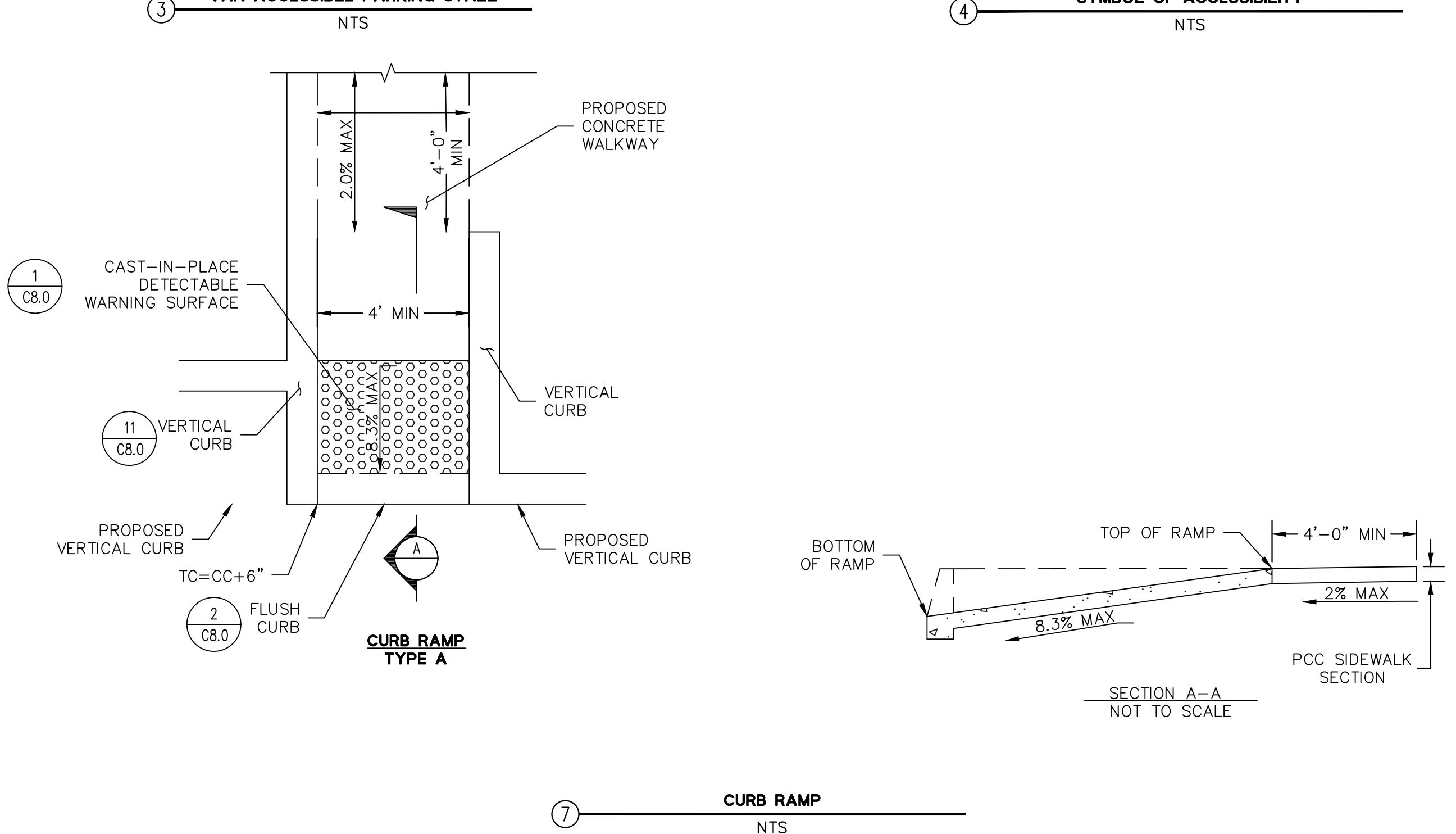
NTS

⑤ VAN ACCESSIBLE PARKING STALL SIGN AND FOOTING

NTS

⑥ AC PLUG

NTS



Detail of DD600 System

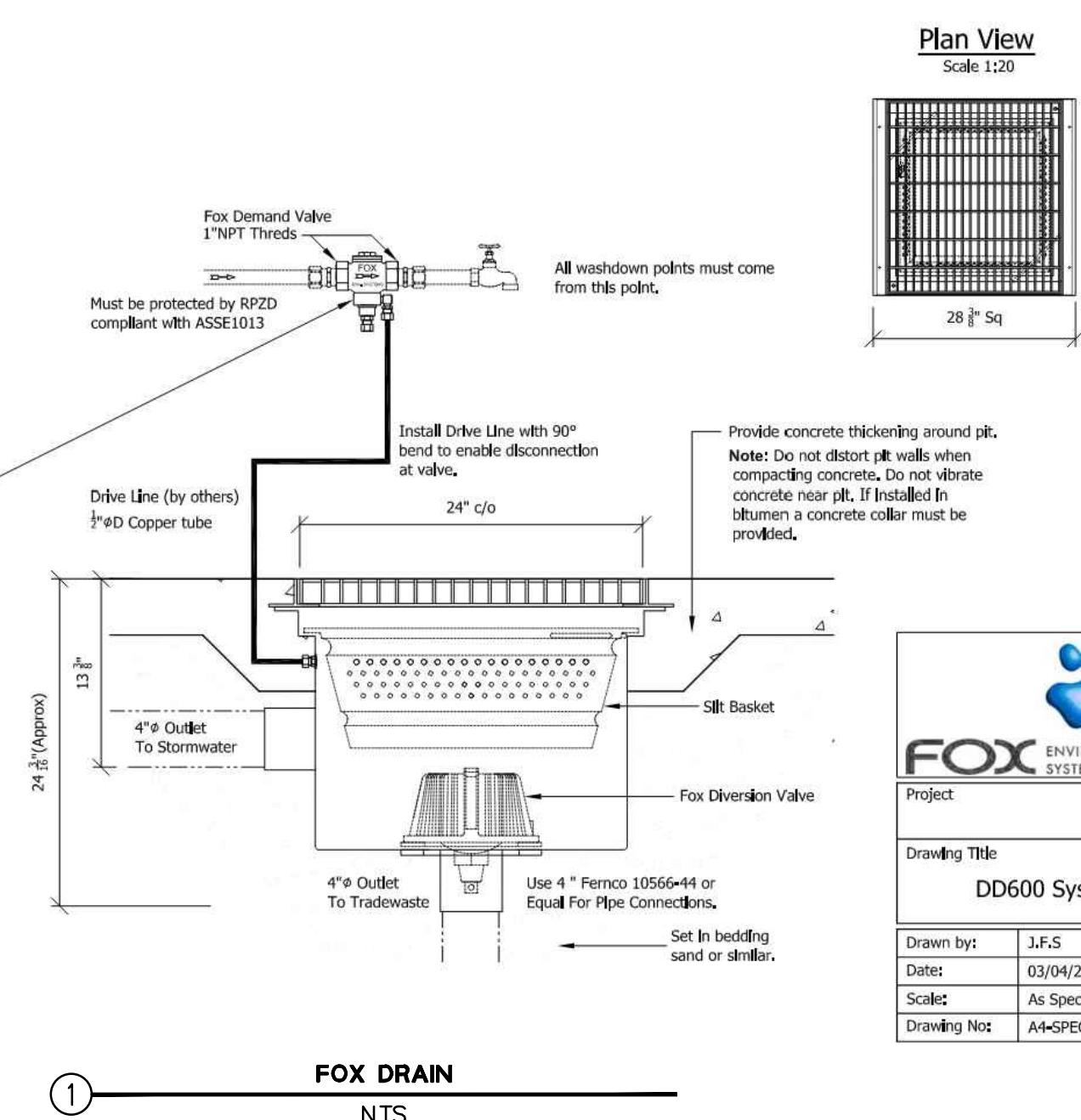
Model: DD600
Manufacturer: Fox Environmental Systems
Max Working Pressure: 170 PSI
Grade Class: Class D Heavy Duty
RPZ: Compliant with ASSE1013

Notes:
This is a schematic representation only.
Site size and gradient to engineers
details as applicable.
All piping and electrical connections
to be installed by certified tradesmen in
accordance with relevant authorities
requirements. Tradesmen to be engaged
by the purchaser.

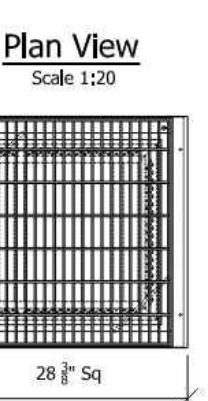
Placement of UPC Shield
Project: Fox Environmental Systems
Max Working Pressure: 170 PSI
Grade Class: Class D Heavy Duty
RPZ: Compliant with ASSE1013



IAPMO IGC 234 2016
File Number 10153



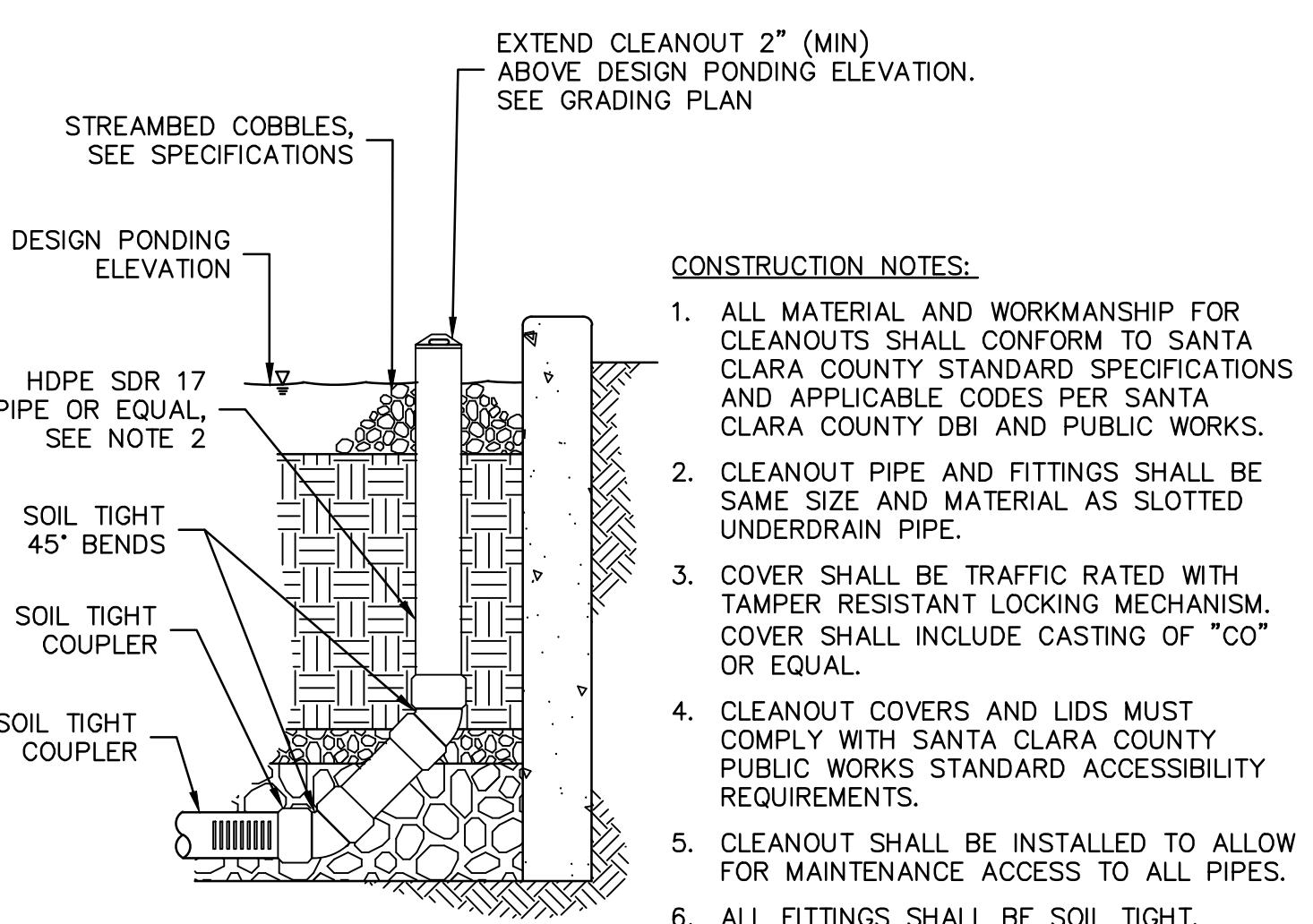
① FOX DRAIN
NTS



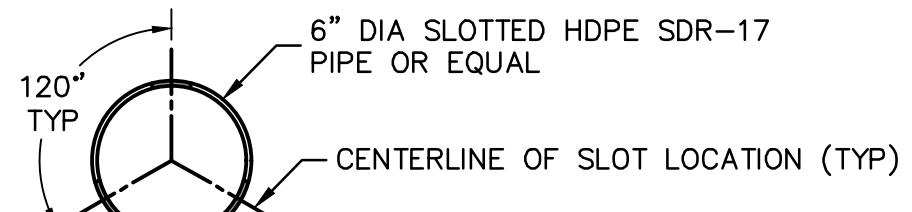
Plan View

Scale 1:20

28' Sq

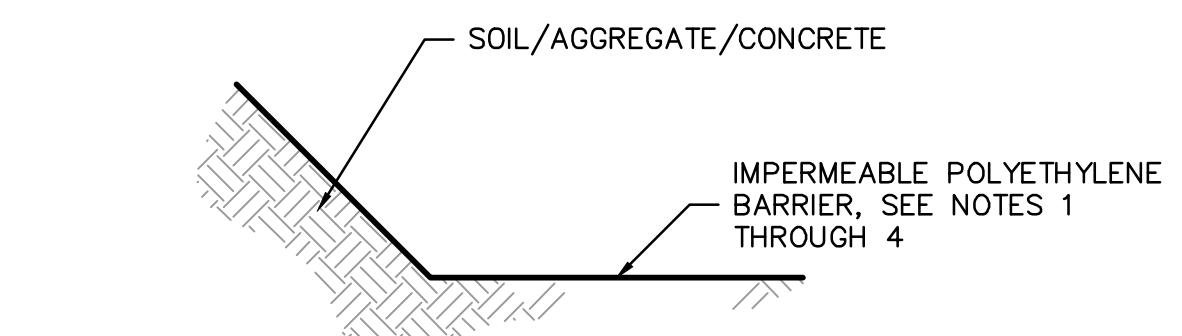


④ CLEANOUT IN TREATMENT AREA
NTS



GENERAL NOTES:
1. ALL PERFORATIONS SHALL BE SLOTTED TYPE AND MEASURING 0.032 INCH WIDE (MAX), SPACED AT 0.25 INCH (MIN), AND PROVIDING A MINIMUM INLET AREA OF 5.0 SQUARE INCH PER LINEAR FOOT OF PIPE.
2. PERFORATIONS SHALL BE LOCATED IN VALLEYS OF CORRUGATIONS, ORIENTED PERPENDICULAR TO LONG AXIS OF PIPE, AND EVENLY SPACED AROUND CIRCUMFERENCE AND LENGTH OF PIPE.

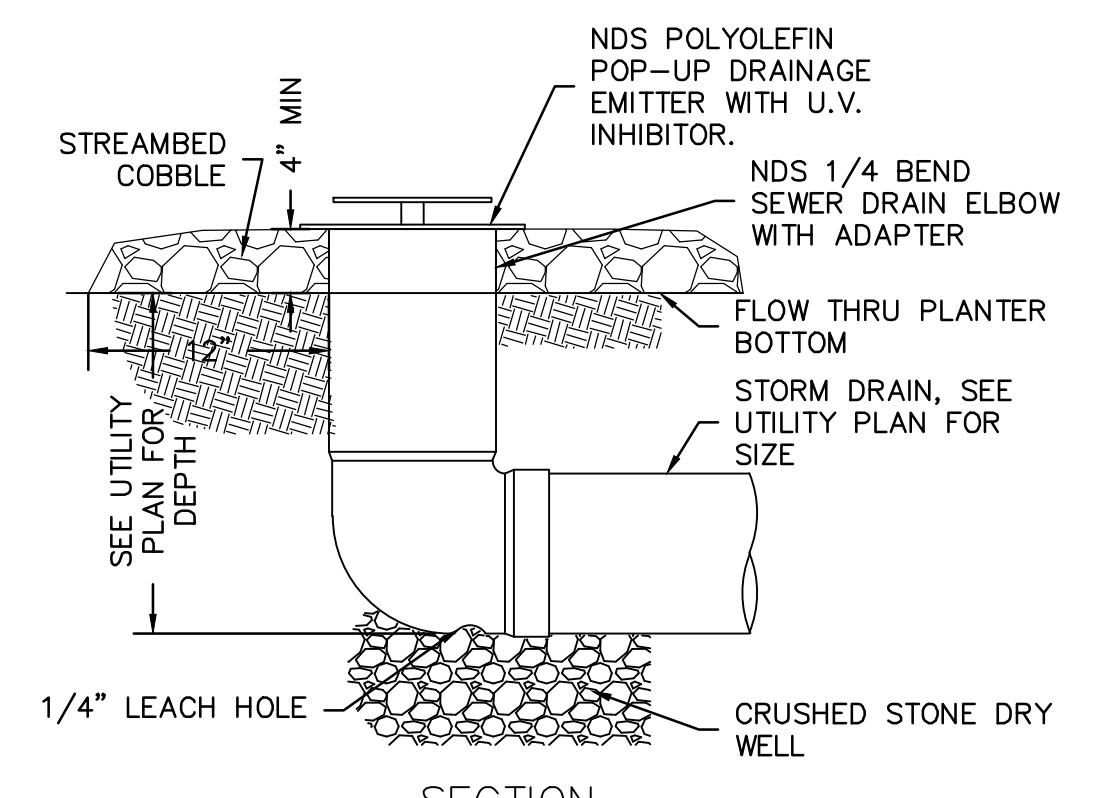
⑥ UNDERDRAIN
NTS



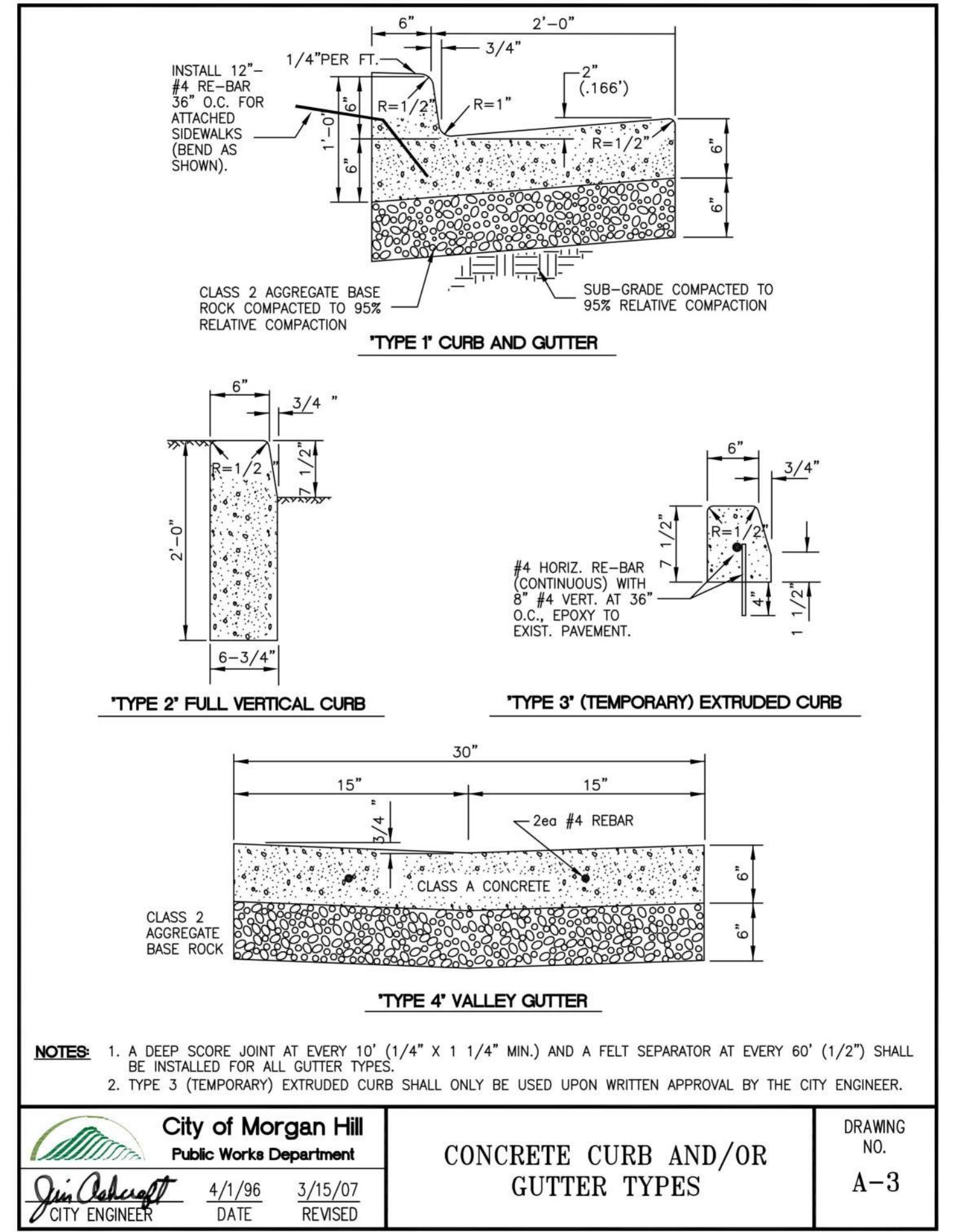
CONSTRUCTION NOTES:

1. LINER SHALL BE HDPE CONFORMING TO GEOSYNTHETIC RESEARCH INSTITUTE (GRI) GM13 OR LDPE CONFORMING TO GRI GM17.
2. LINER SHALL LAY FLUSH WITH GROUND WITH NO AIR VOIDS BELOW THE LINER PRIOR TO BACKFILLING MATERIAL ABOVE THE LINER. CONTOUR THE SUBGRADE AS NEEDED TO ENSURE LINER LAYS FLUSH WITH GROUND.
3. OVERLAP LINER PER MANUFACTURER'S RECOMMENDATIONS.
4. ALL SEAMS SHALL BE WELDED PER MANUFACTURER'S RECOMMENDATIONS UNLESS OTHERWISE SPECIFIED.
5. SECURE LINER CONTINUOUSLY WITH DOUBLE-SIDED TAPE ALONG LINER EDGE AND SINGLE SIDED TAPE ALONG THE TOP EDGE OF LINER TO HOLD LINER IN PLACE DURING BACKFILLING.
6. TOP OF LINER TO BE AT LEAST 3" BELOW FINISH GRADE OF BIORETENTION SOIL EXCEPT WHEN ADJACENT TO BUILDING WALL. WHEN ADJACENT TO BUILDING WALL, LINER OR EQUAL WATERPROOFING SHALL EXTEND TO TOP OF FREEBOARD ELEVATION.
7. APPLY BUTYL MASTIC CAULK, BATTEN STRIP, AND NEOPRENE RUBBER PAD CONTINUOUSLY ALONG TOP EDGE OF LINER.
8. APPLY BEAD OF POLYURETHANE ELASTOMERIC SEALANT CONTINUOUSLY ALONG TOP EDGE OF BATTEN STRIP ASSEMBLY.

⑤ IMPERMEABLE LINER
NTS

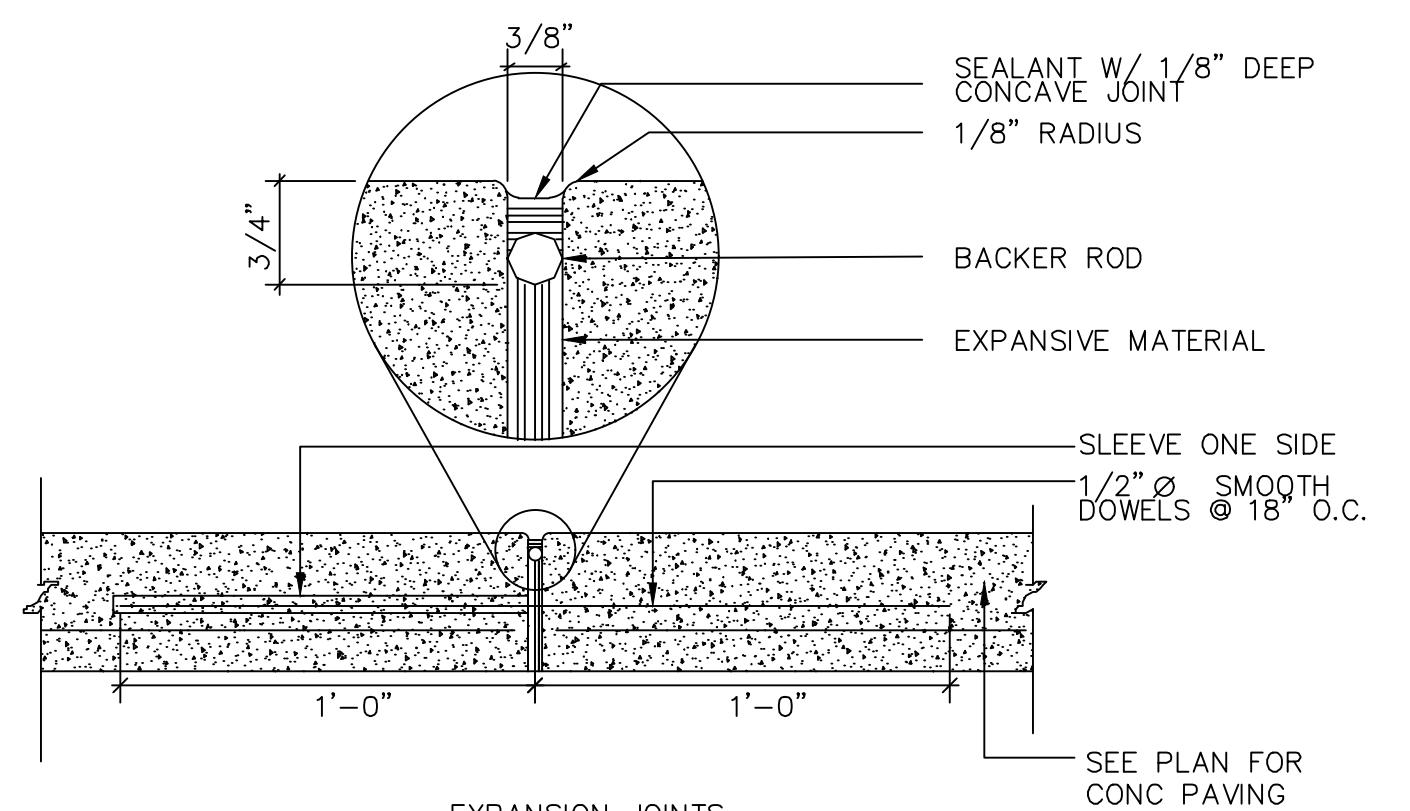
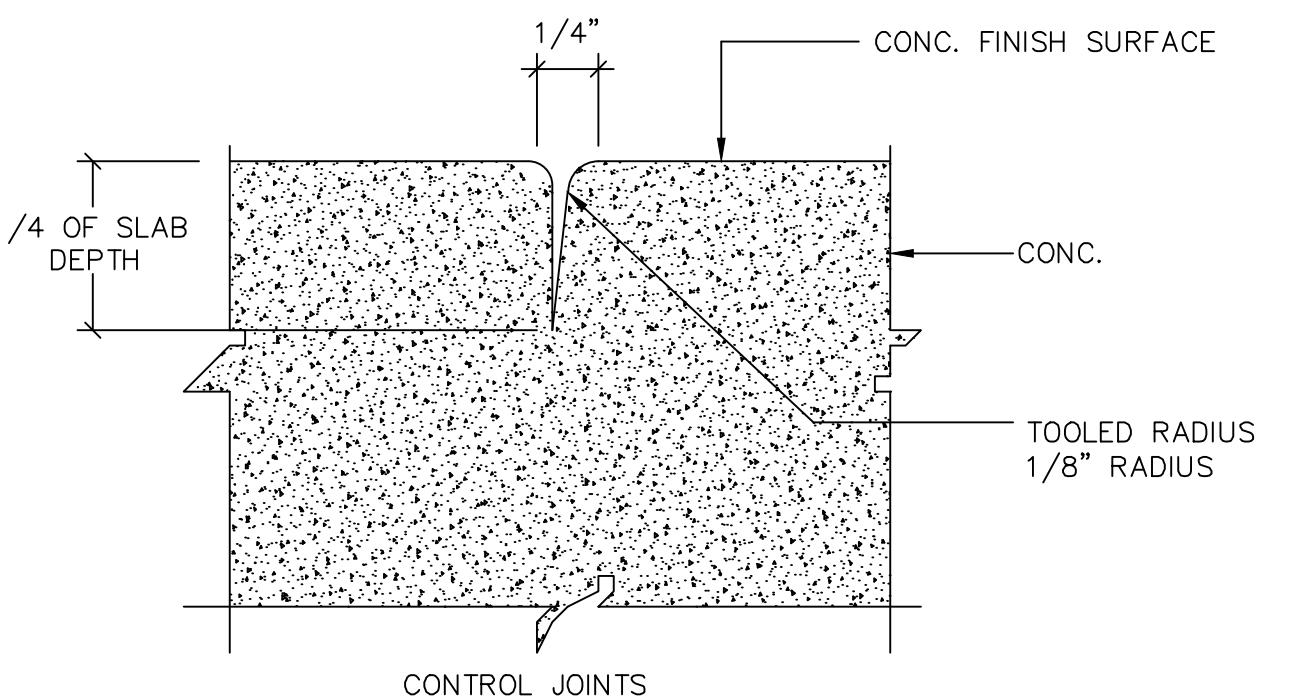


⑦ SD EMMITTER
NTS



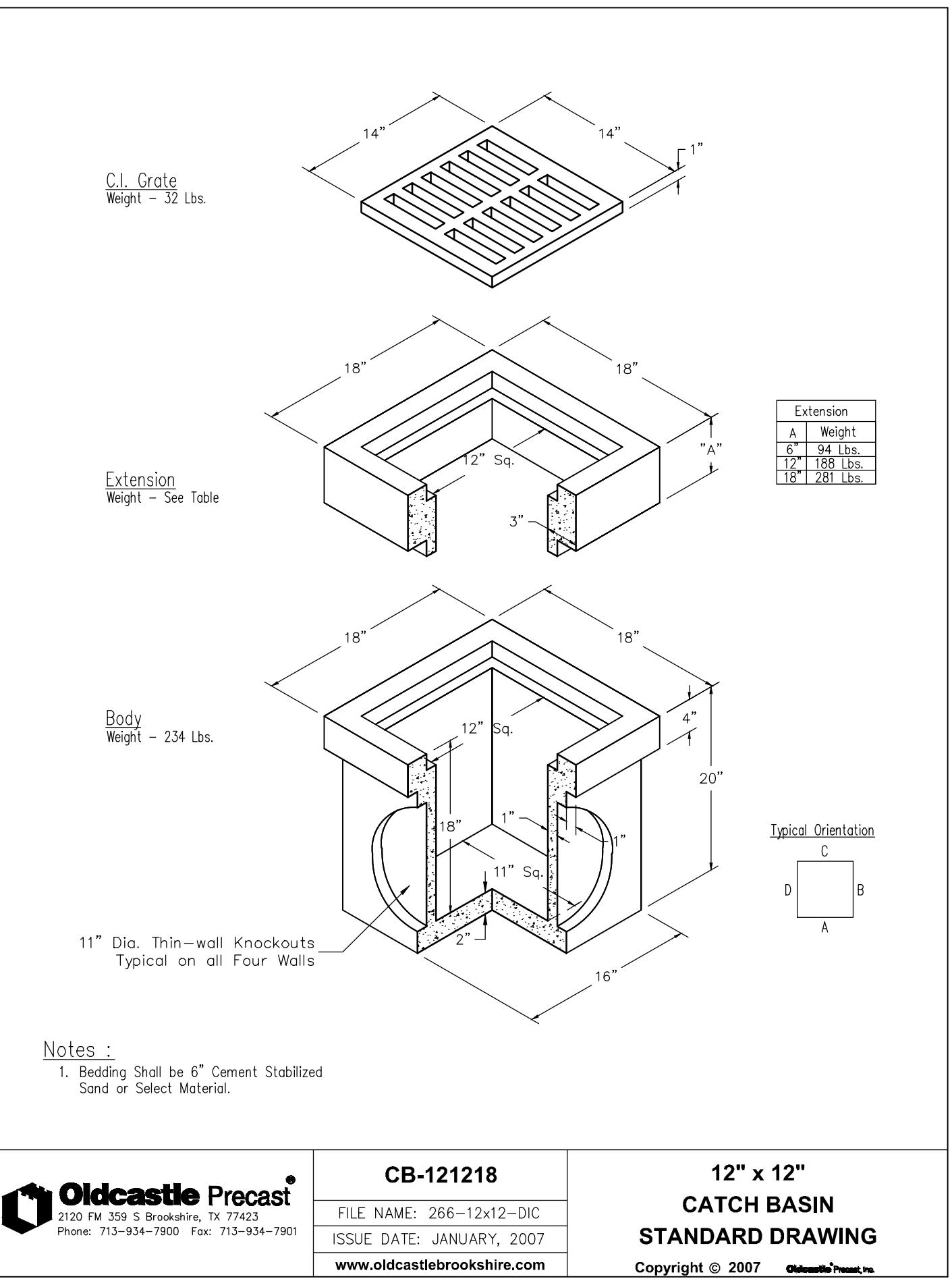
City of Morgan Hill
Public Works Department
4/1/96
3/15/07
CITY ENGINEER
DRAFTS
DRAWING NO.
A-3

② CONCRETE CURB AND/OR GUTTER
NTS



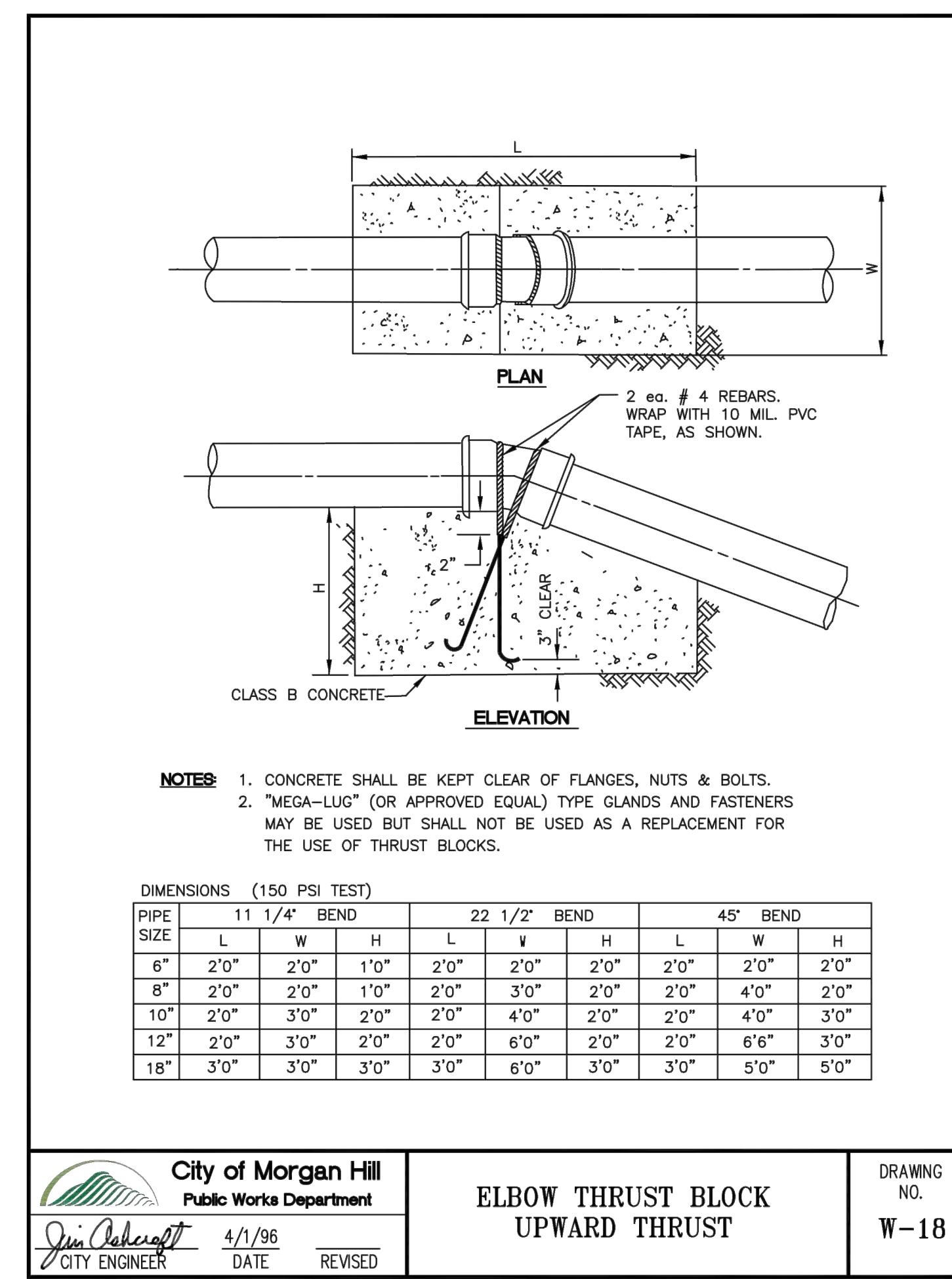
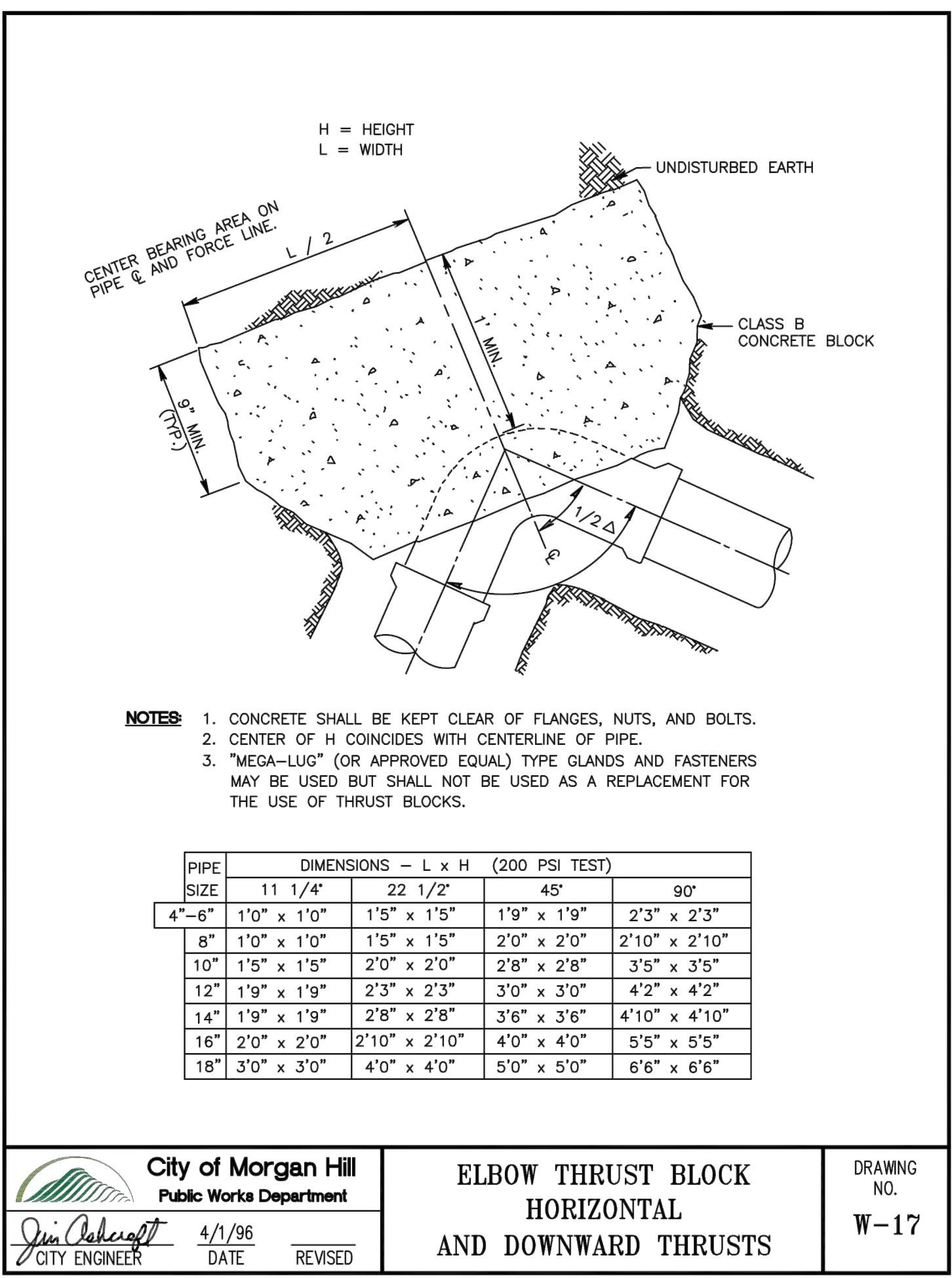
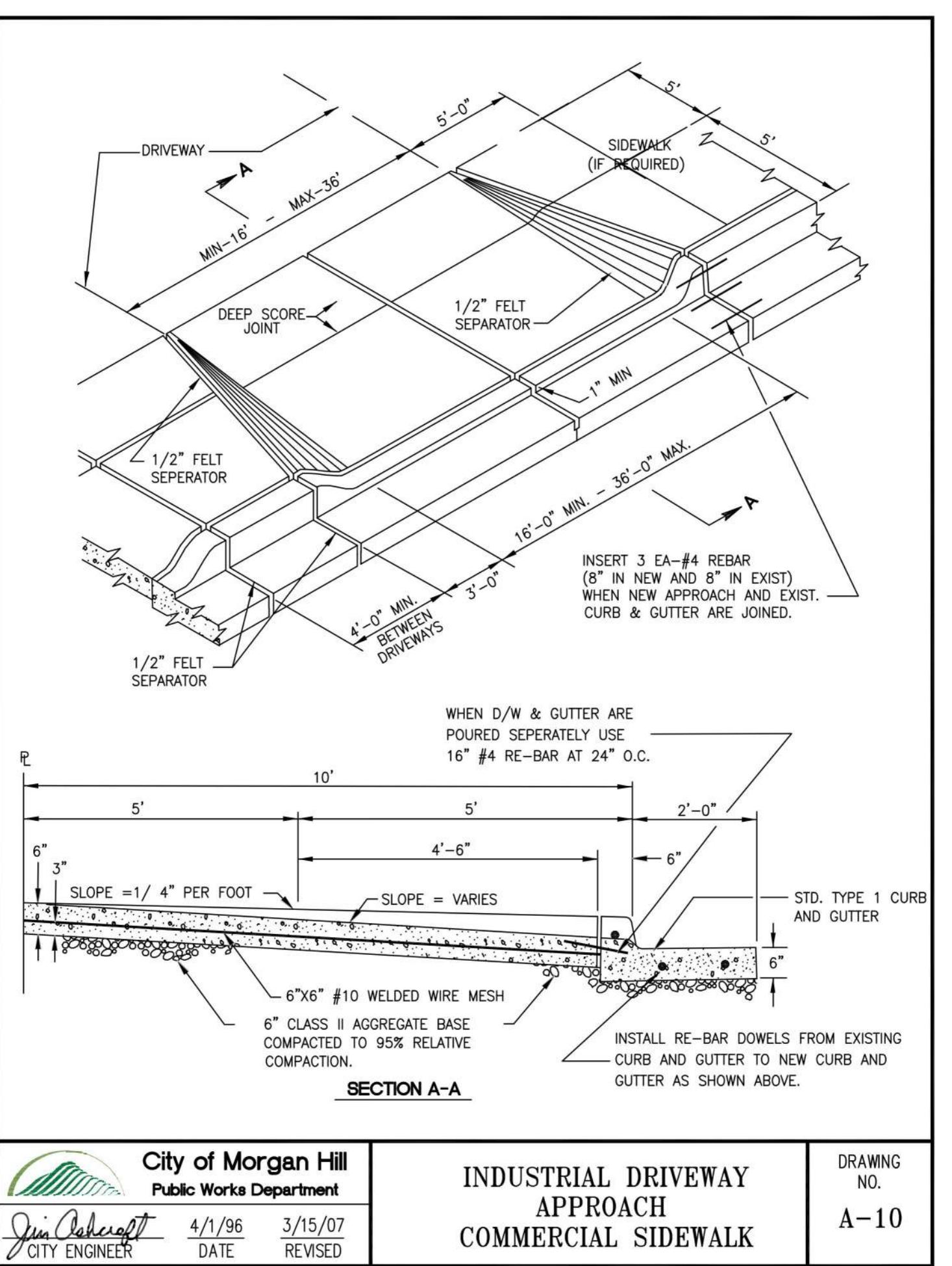
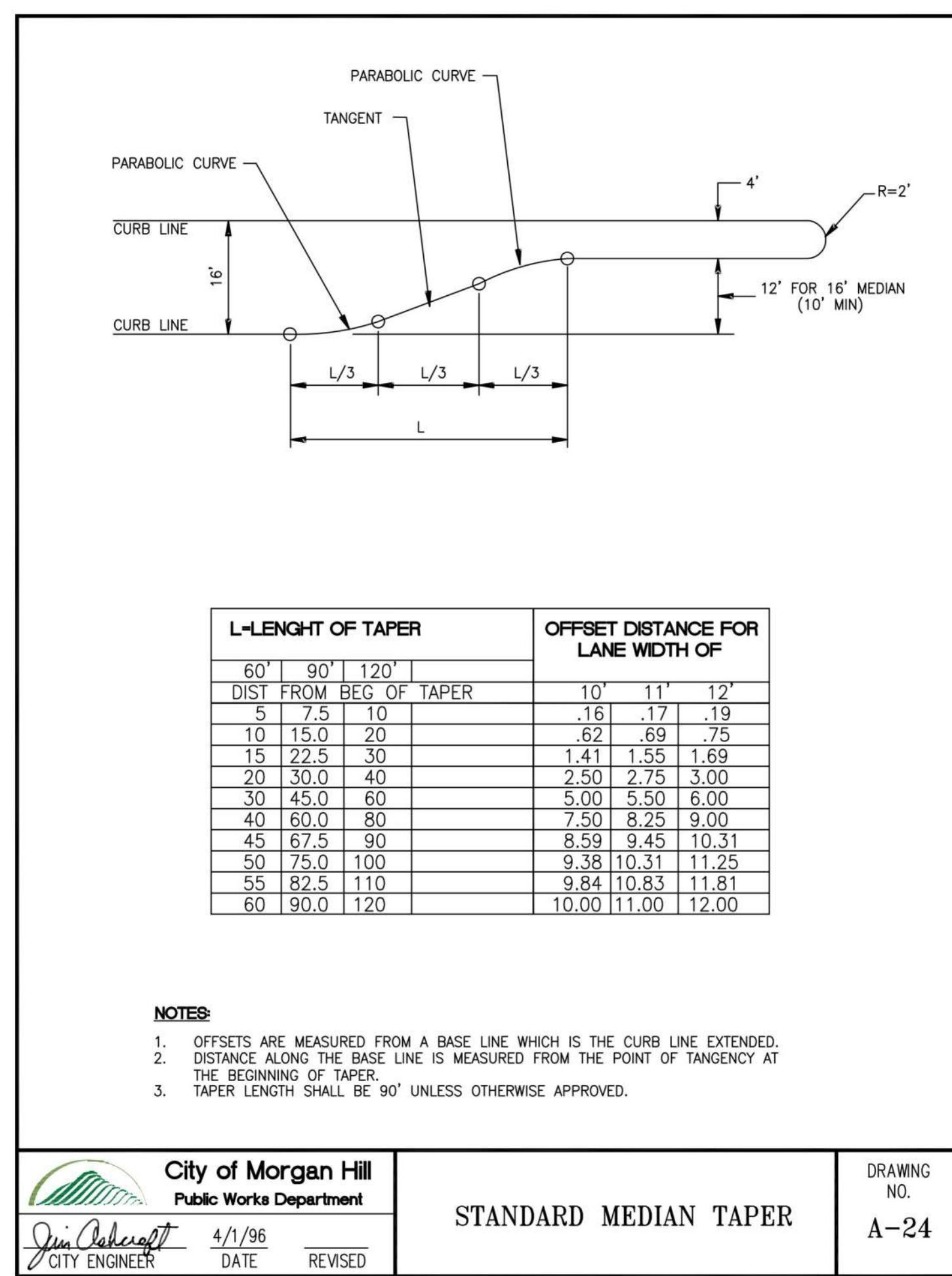
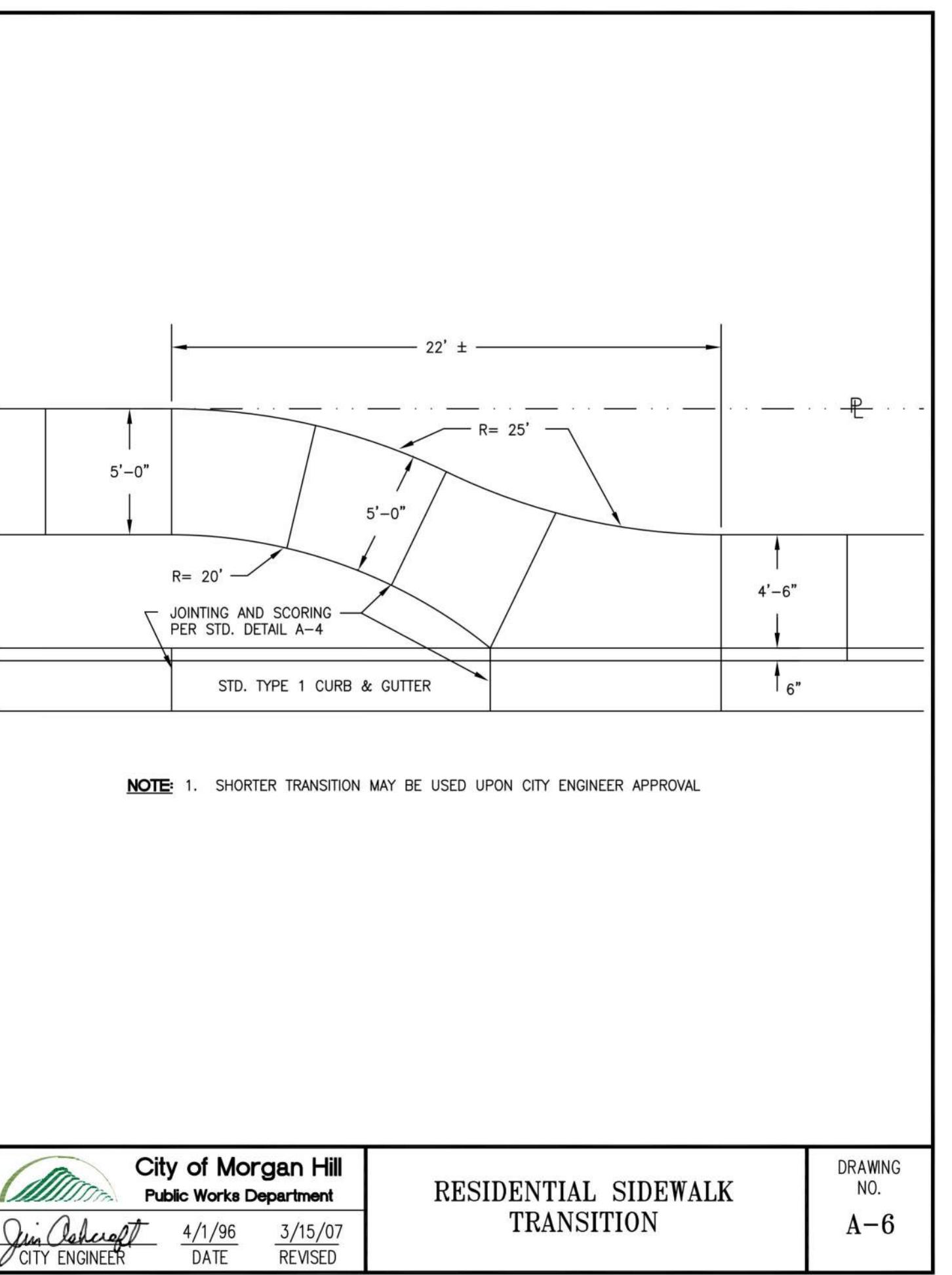
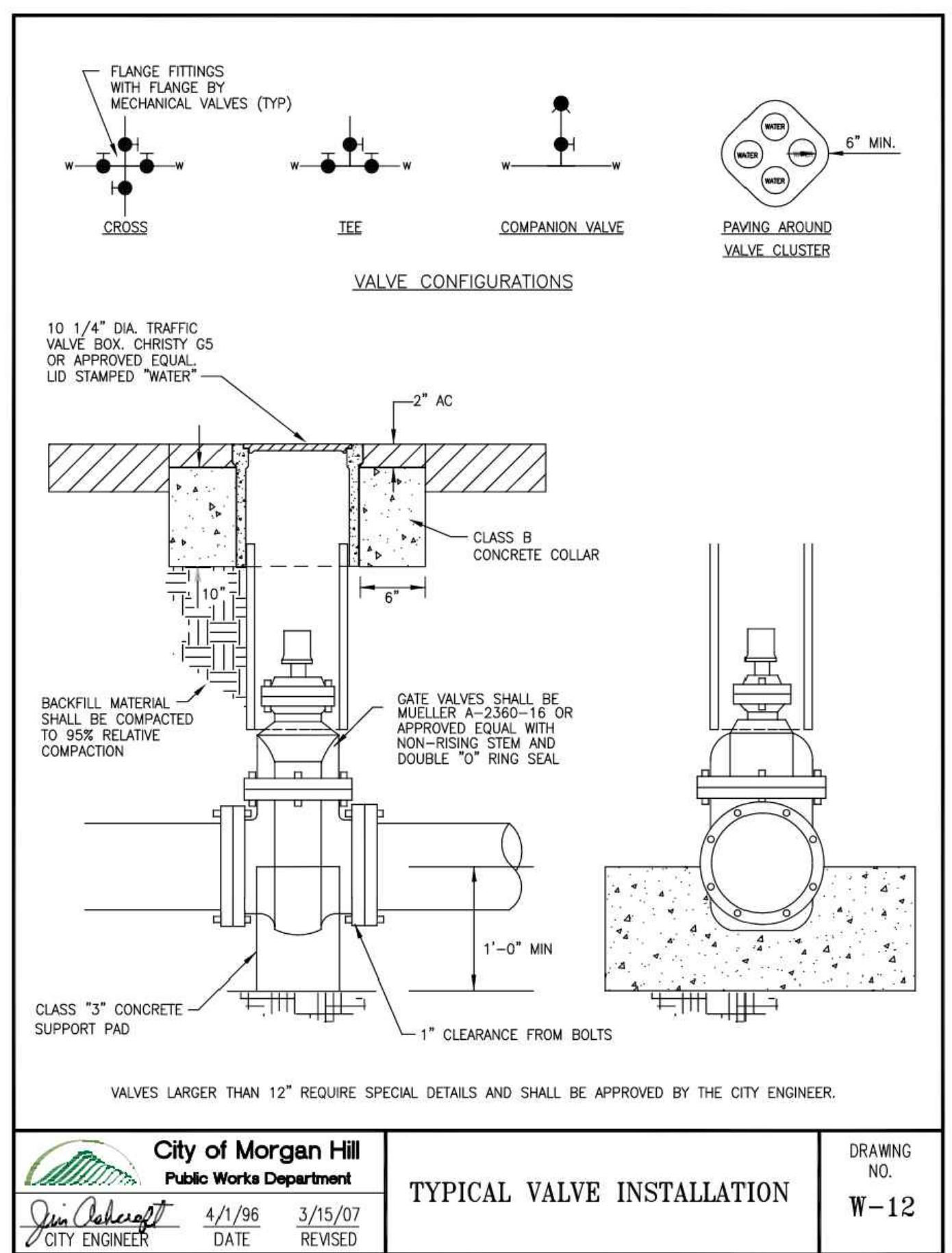
NOTE:
1. EXPANSION JOINTS AND CONTROL JOINTS SHALL BE PLACED AT A MAXIMUM SPACING OF 15 FEET O.C. & 5 FEET O.C., RESPECTIVELY.
2. JOINTS SHALL BE PLACED TO CREATE RECTANGULAR SHAPES WITH AN ASPECT RATIO OF 1:1.5 MAXIMUM.
3. CONSTRUCTION JOINTS SHALL BE PLACED WHEN CONCRETE POUR IS INTERRUPTED LONG ENOUGH FOR THE PLACED CONCRETE TO HARDEN.

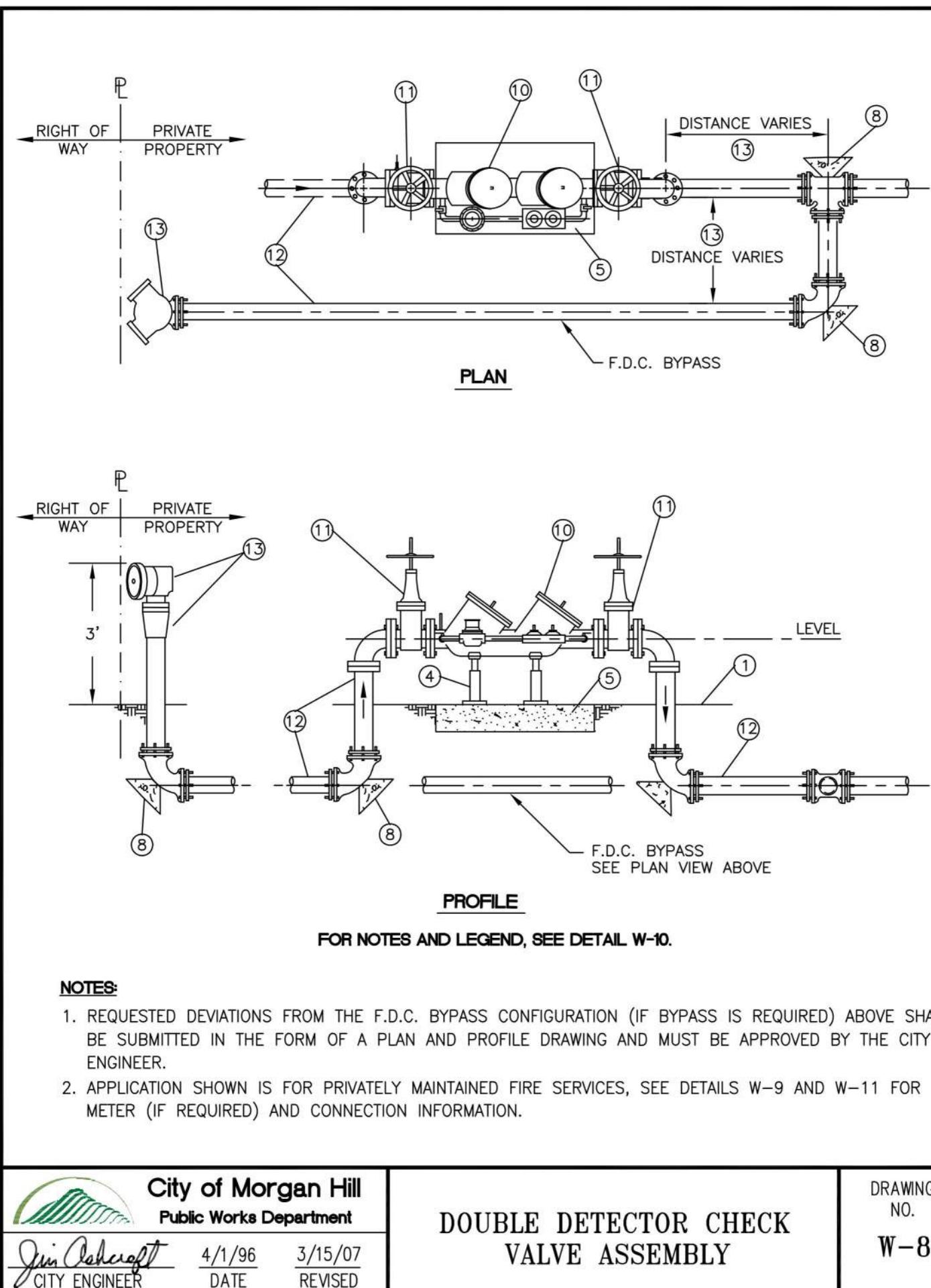
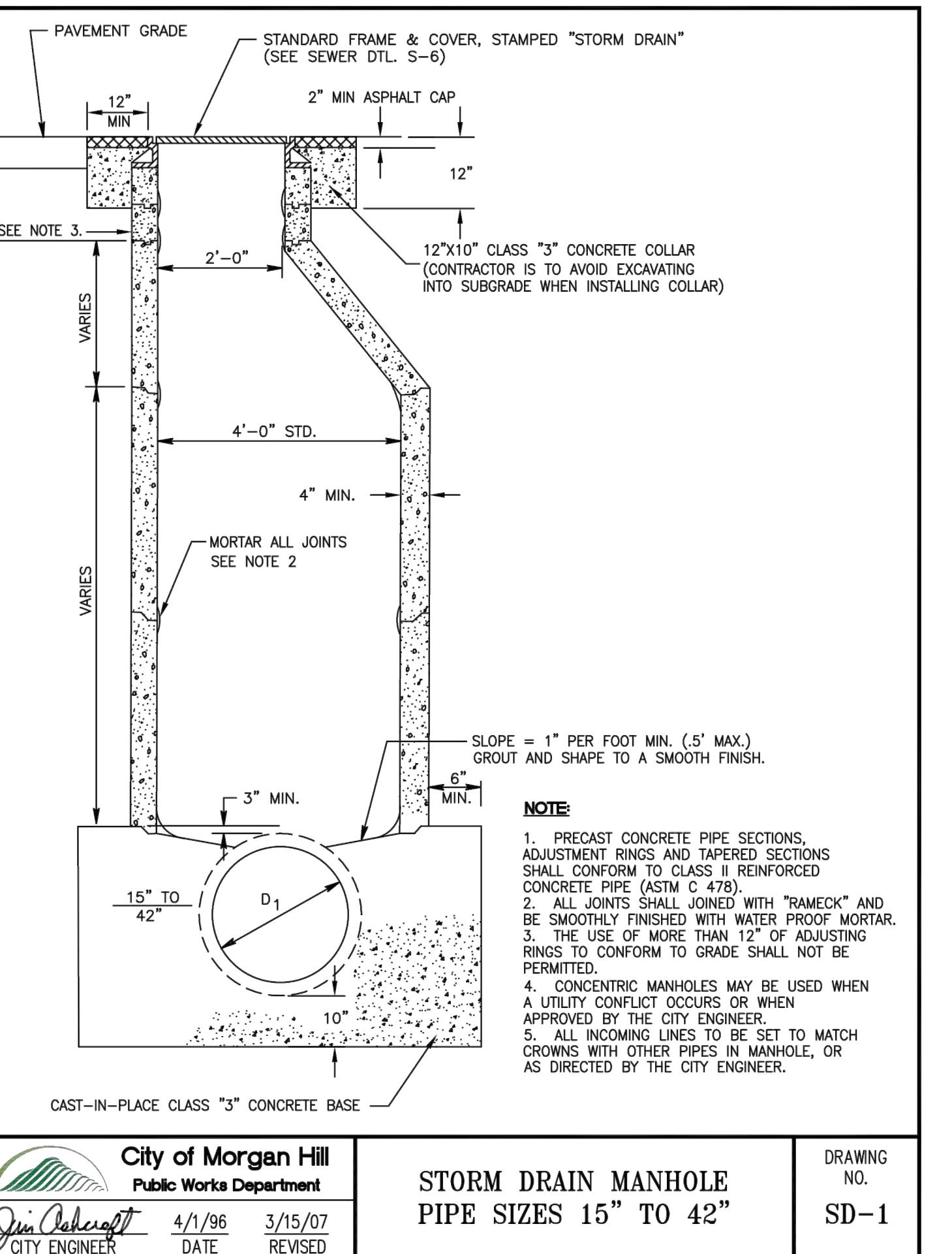
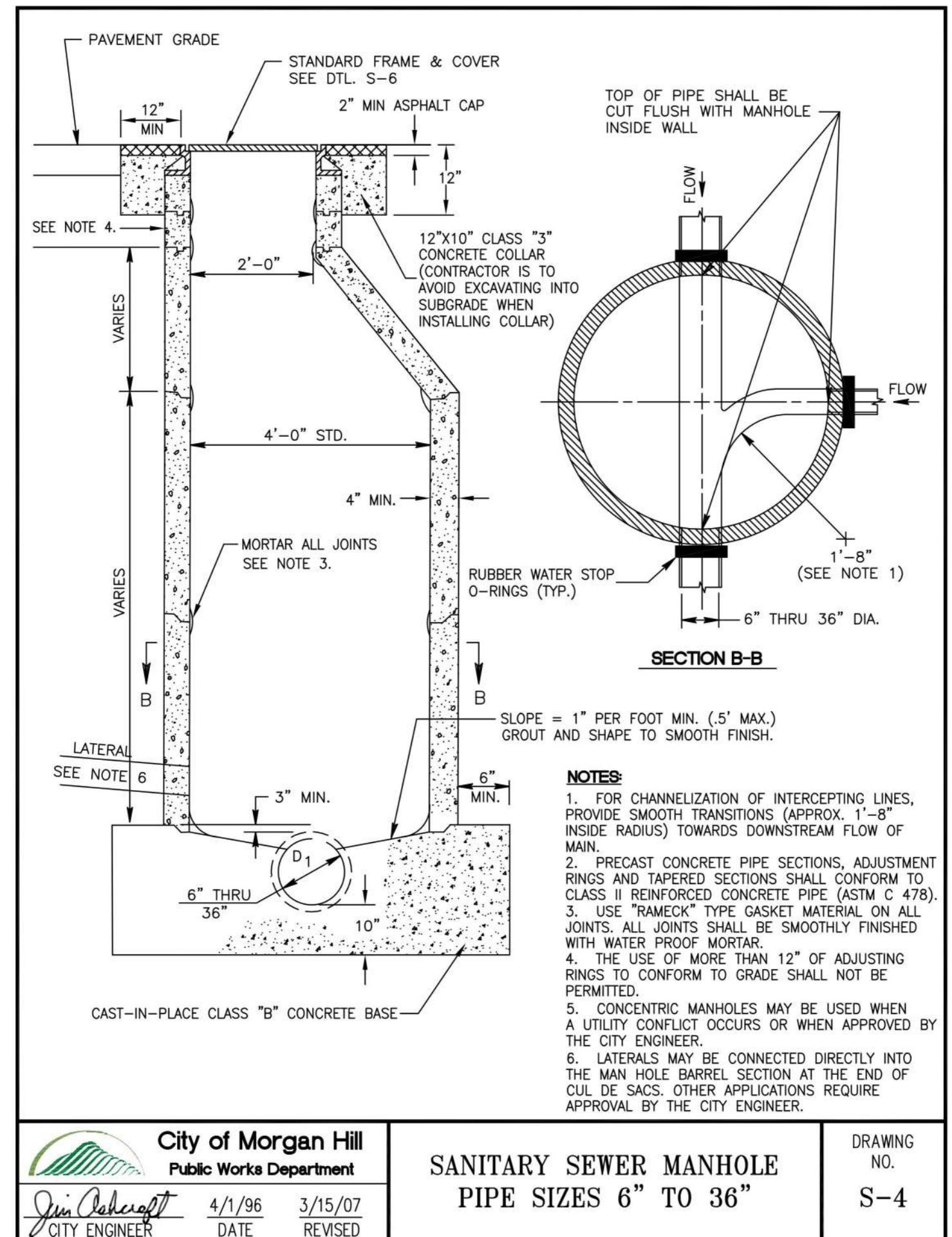
⑧ EXPANSION AND CONTROL JOINT
NTS



Oldcastle Precast
CB-121218
FILE NAME: 266-12x12-DIC
ISSUE DATE: JANUARY, 2007
www.oldcastlbrookshire.com

③ OLD CASTLE PRECAST
STORM RAINCATCH BASIN
NTS

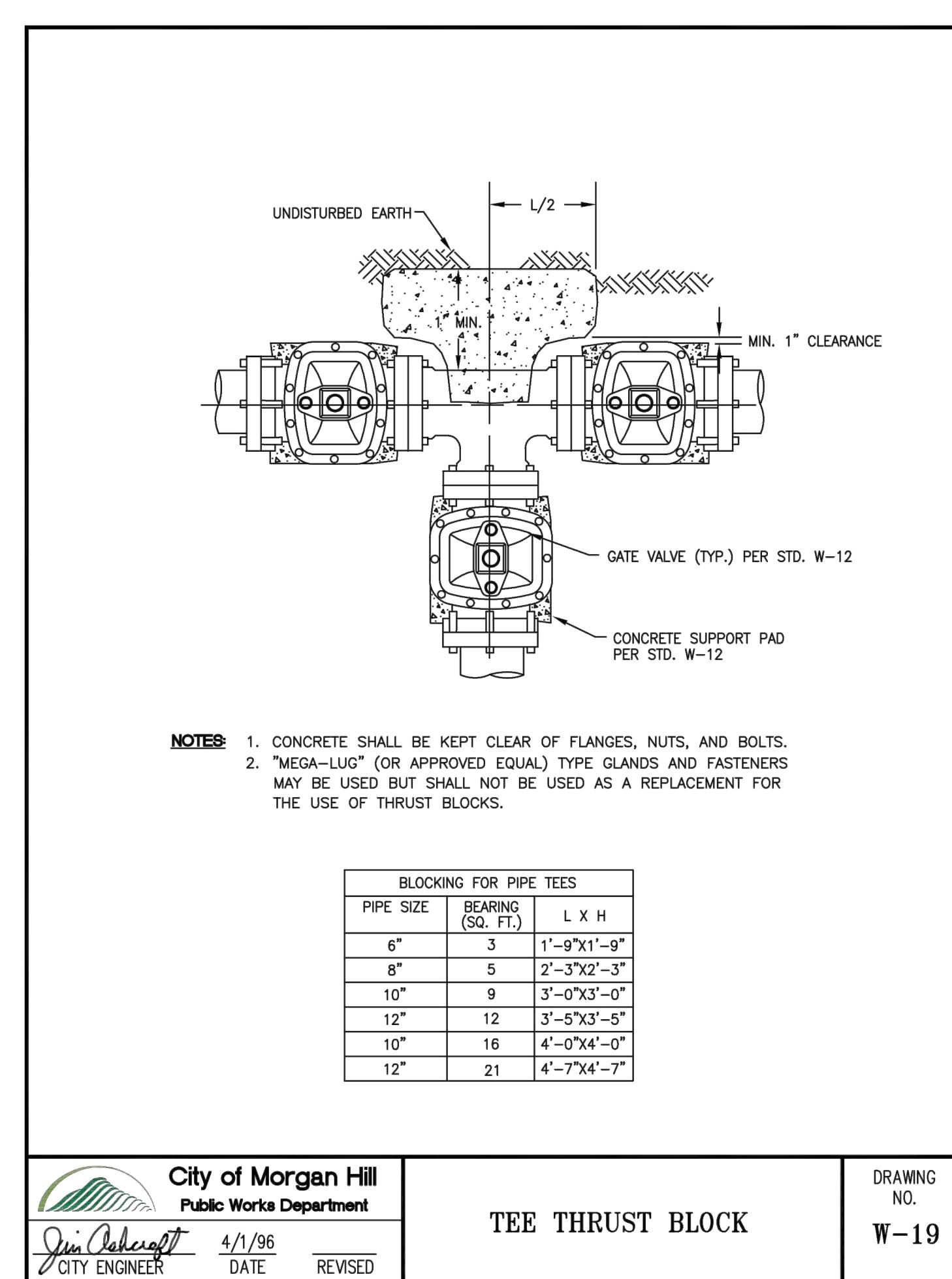
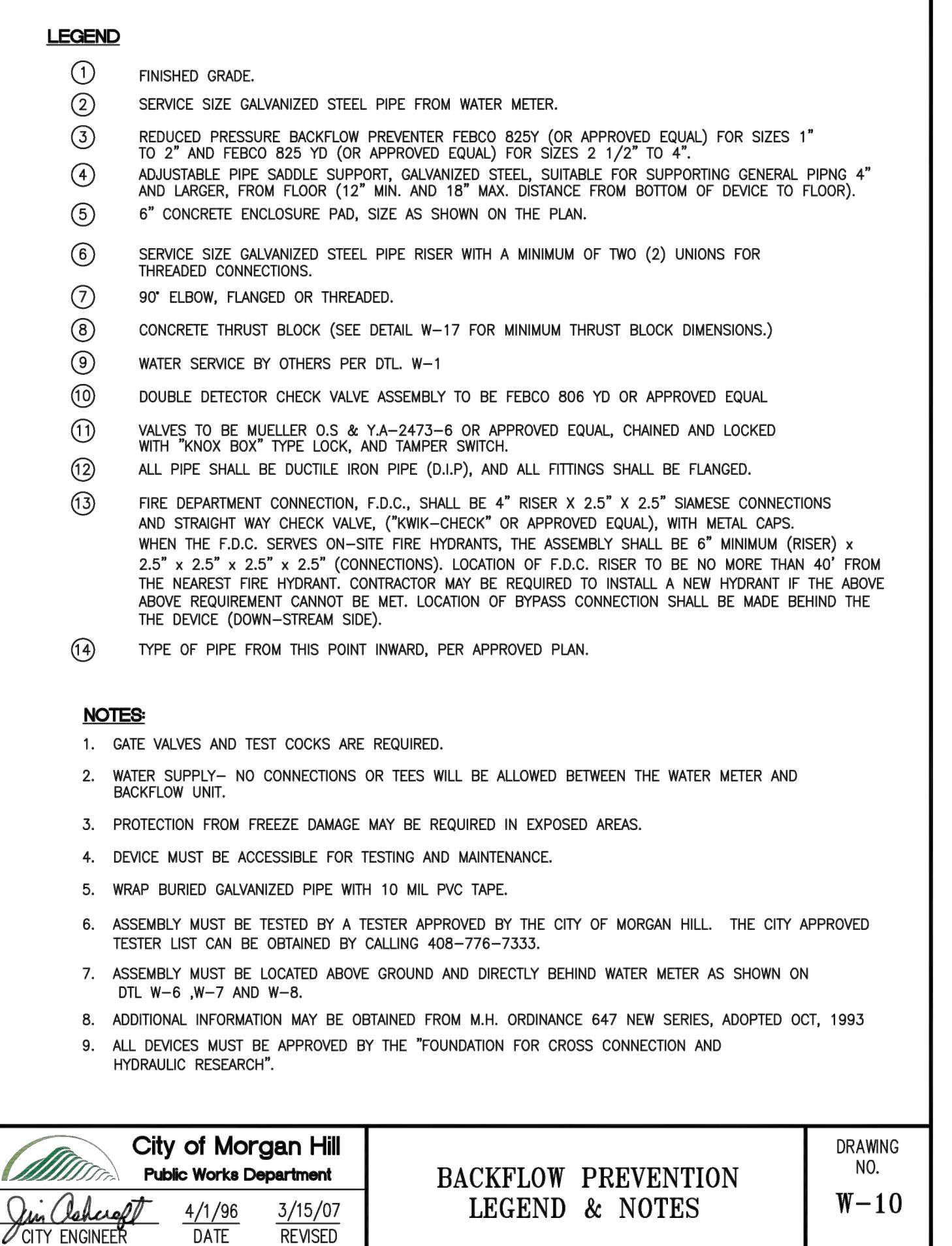
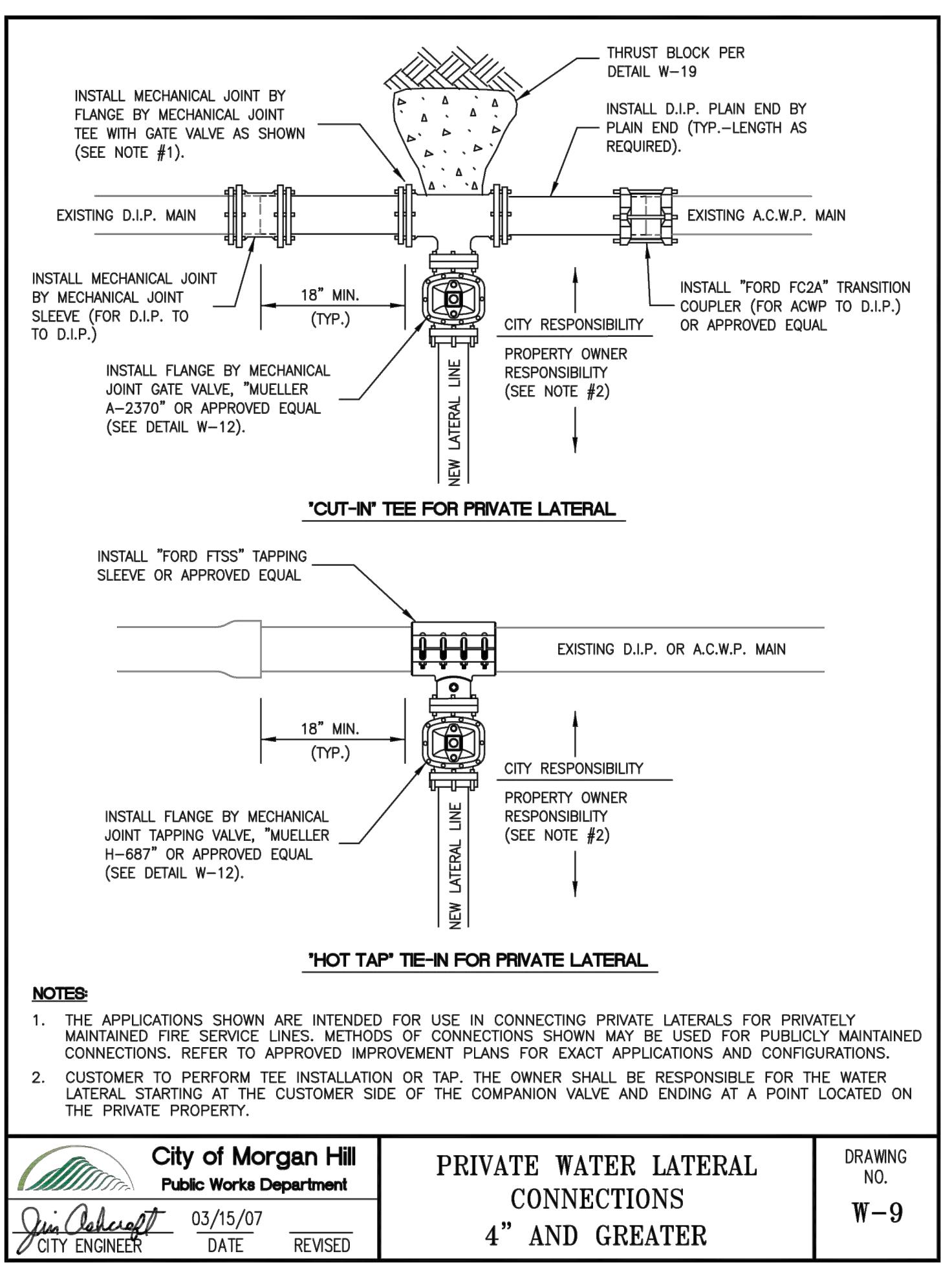




① SANITARY SEWER MANHOLE
NTS

② STORM DRAIN MANHOLE
NTS

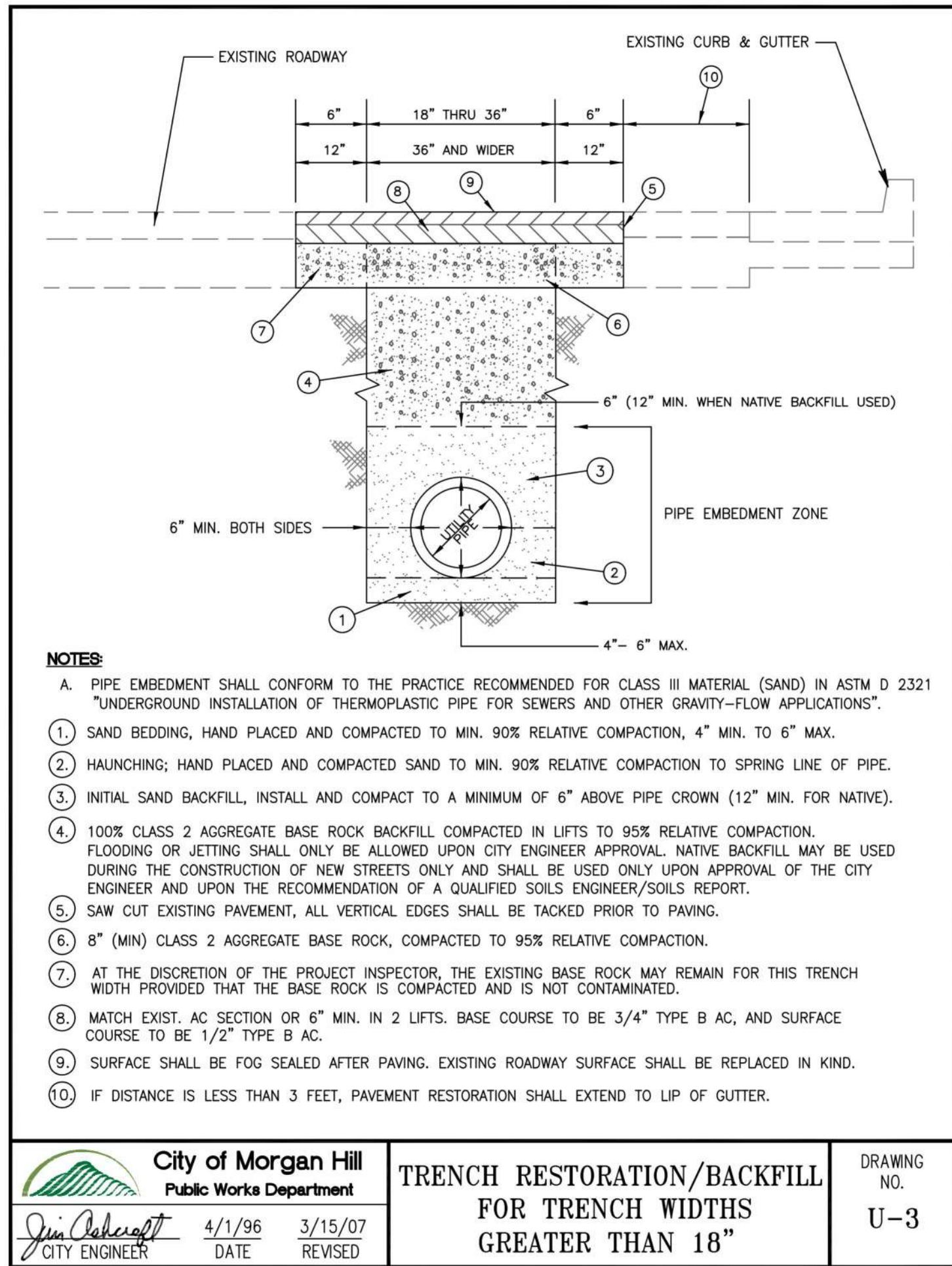
**③ DOUBLE DETECTOR CHECK
VALVE ASSEMBLY**
NTS



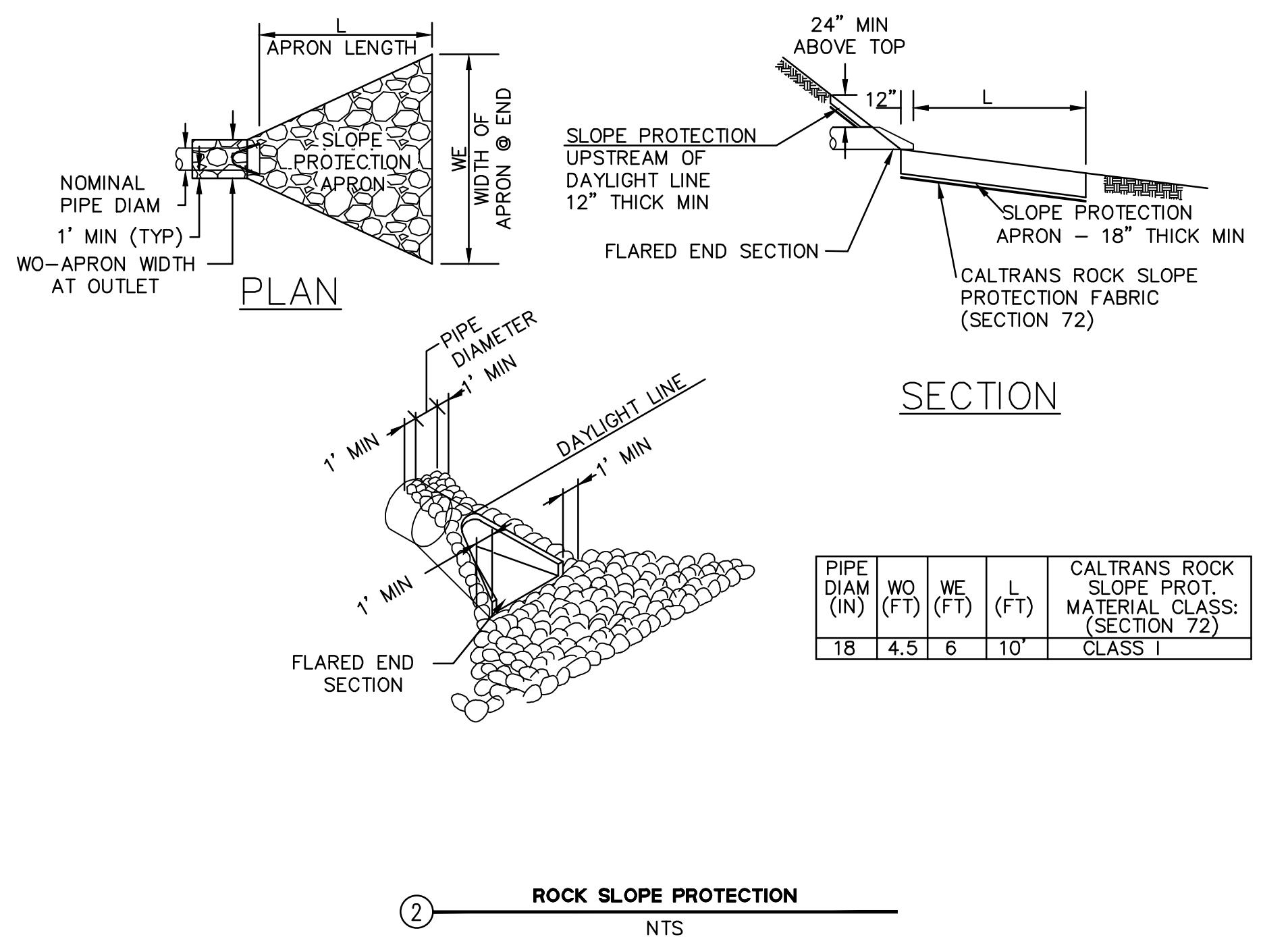
④ WATER LATERAL CONNECTIONS
NTS

⑤ BACKFLOW PREVENTOR
NTS

⑥ THRUST BLOCK
NTS



① TRENCH RESTORATION/BACKFILL
NTS



② ROCK SLOPE PROTECTION
NTS

March 29, 2023

Attachment B





CALCULATION TABLE OF STORMWATER TREATMENT SIZING

[DMA] NAME	(1) Treatment Type	(2) DMA Area (sf)	(3) Pervious Area (sf)	(4) Impervious Area (sf)	(5) Runoff Factor*	(6) DMA Area x Runoff Factor	(7) Facility Sizing Factor	(8) Required Bioretention Area (sf) (6) x (7) = (8)	(9) Available Bioretention Area (sf)
DMA 1	BIO	5,515	1,193	4,135	0.77	4,254.30	0.04	170	179
DMA 2	BIO	10,955	6,096	4,590	0.47	5,199.60	0.04	208	214
DMA 3	BIO	8,734	2,757	5,720	0.69	5,995.87	0.04	240	248
DMA 4	BIO	7,149	3,517	3,392	0.52	3,743.73	0.04	150	202
TOTAL		32,354	13,563	17,837		19,193		618	843

*Runoff factors of 1.0 for impervious area and 0.1 for pervious used (Reference: Santa Barbara County Stormwater Technical Guide, 2014). Calculated as Runoff Factor = (% Impervious x 1) + (% Pervious x 0.1)

CALCULATION TABLE OF STORMWATER DETENTION SIZING

[DMA] NAME	(1) DMA Area (sf)	(2) Pervious Area (sf)	(3) Impervious Area (sf)	(4) Retention Tributary Area* (1) - (2) = (4)	(5) Runoff Coefficient**	(6) 95th Percentile 24-hr Rainfall Depth (in)	(7) Required Retention Volume (cu ft) (4)x(5)x(6)/12=(7)	(8) Available Retention Volume*** (10)x(11)*40%=(8)	(9) % Replacement of Impervious Credit	(10) Available Bioretention Area (sf)	(11) Gravel storage Depth (ft)
DMA 1	5,515	1,193	4,135	2,162	0.54	1.70	166	179	50%	179	2.5
DMA 2	10,955	6,096	4,590	4,427	0.29	1.70	182	214	10%	214	2.5
DMA 3	8,734	2,757	5,720	4,466	0.45	1.70	287	297	35%	248	3.0
DMA 4	7,149	3,517	3,392	3,416	0.32	1.70	156	162	5%	202	2.0
TOTAL	32,354	13,563	17,837	14,470			635	852	100%	843	

* Sized reduced by 0.5 x (8,641 SF x % Replacement of impervious Credit (9)) to calculate Retention Tributary Area

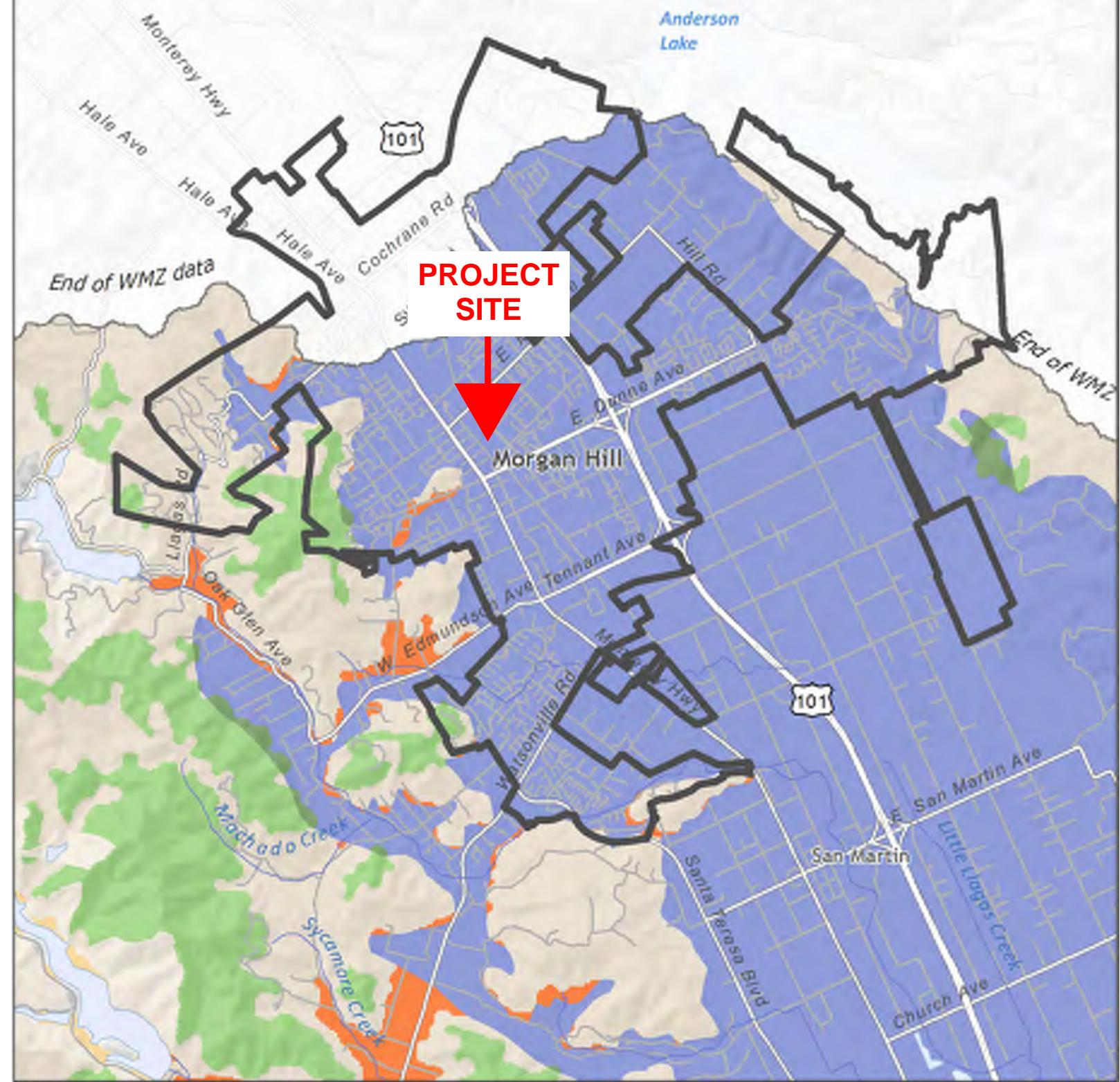
** Runoff factor calculated using WEF Manual of Practice Equation C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04 where "i" is %Impervious

*** Prostity of gravel assumed to be 40%

March 29, 2023

Attachment C





CENTRAL COAST JOINT EFFORT

Watershed management zones

1	5	9
2	6	10
3	7	
4	8	

Urban area boundary

Data sources

Watershed management zones: Stillwater Sciences, 2012

Base data: ESRI 2010

0 0.25 0.5 1 Miles
0 0.5 1 2 km

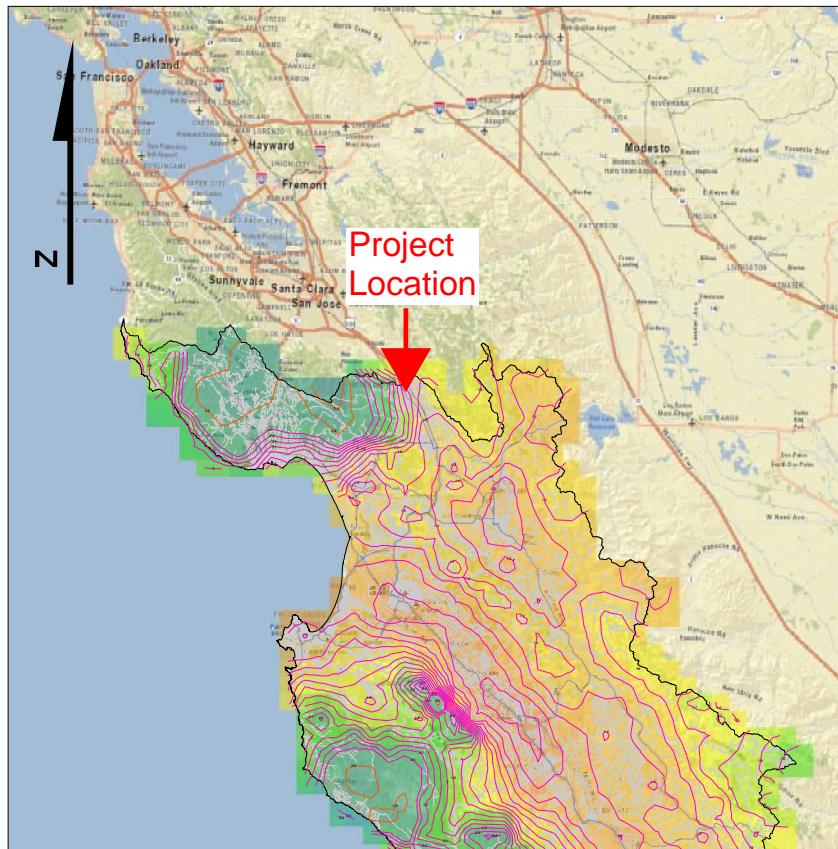


Stillwater Sciences
www.stillwatersci.com

March 29, 2023

Attachment D





Legend

Isohyetal

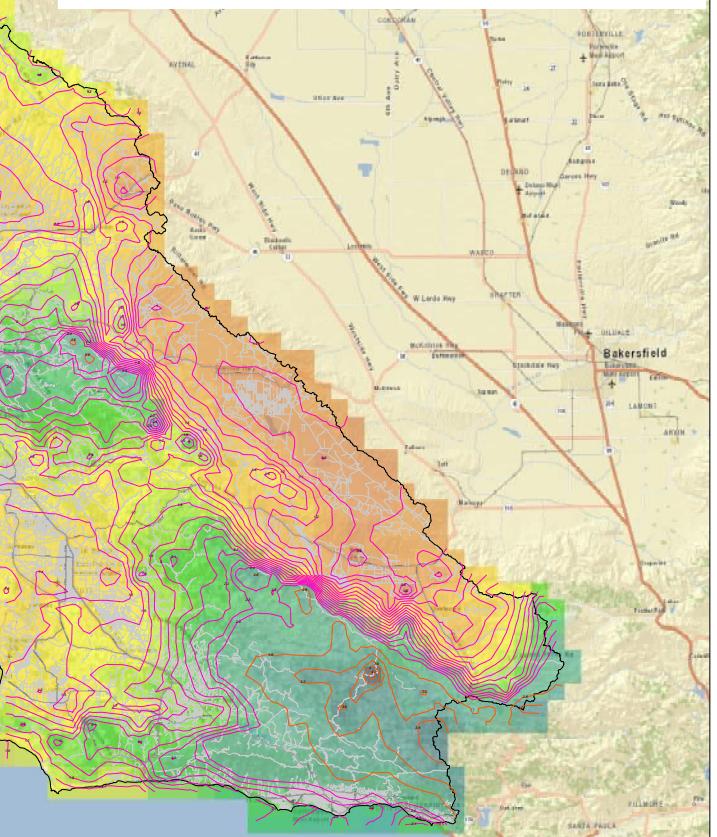
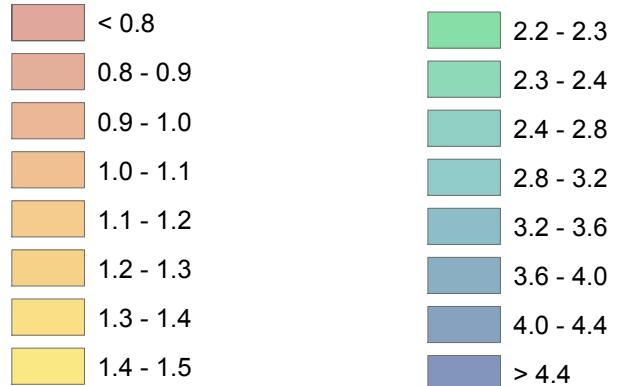
- 0.1 inch interval (pink wavy line)
- 0.4 inch interval (orange wavy line)

Roads

Project Boundary

Precipitation (inch)

95th Percentile (1949 - 2010)



Data Source (for spatial variation):

PRISM Climate Group
Oregon State University
<http://prism.oregonstate.edu>

Central Coast Region
95th Percentile 24-hour Rainfall Depth

NAD 1983 California Teale Albers

0 20 40 80 Kilometers

0 20 40 80 Miles



March 29, 2023

Attachment E



PERFORMANCE REQUIREMENT NO. 1 SITE DESIGN AND RUNOFF REDUCTION

CERTIFICATION

DESIGN STRATEGY	INCORPORATED?
1. Limit disturbance of creeks and natural drainage features.	YES
2. Minimize compaction of highly permeable soils.	YES
3. Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection.	YES
4. Minimize impervious surfaces by concentrating improvements on the least sensitive areas of the site, while leaving the remaining land in a natural undisturbed state.	YES
5. Minimize stormwater runoff by implementing one or more of the following design measures: <ul style="list-style-type: none"> a) Direct roof runoff into cisterns or rain barrels for reuse. b) Direct roof runoff onto vegetated areas safely away from building foundations and footings. c) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings. d) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings. e) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces. 	YES

I, Nicholas Gomez, acting as the Project Engineer for BKF Engineers project, located at 17295 Butterfield Blvd, hereby state that the Site Design and Runoff Reduction design strategies indicated above have been incorporated into the design of the project.

Nicholas Gomez

03/29/2023

Signature

Date

March 29, 2023

Attachment F

PERFORMANCE REQUIREMENT NO. 2: WATER QUALITY TREATMENT

CERTIFICATION

	ON-SITE WATER QUALITY TREATMENT MEASURES (IN ORDER OF PRIORITY)	INCORPORATED?
1.	<p>Low Impact Development (LID) Treatment Systems designed to retain stormwater runoff generated by the 85th percentile 24-hour storm. Stormwater Control Measures implemented (circle all that apply, design documentation is required):</p> <ul style="list-style-type: none"> • Harvesting and Use, • Infiltration, • Evapotranspiration 	YES
2.	<p>Biofiltration Treatment Systems – with the following design parameters:</p> <ol style="list-style-type: none"> a) Maximum surface loading rate appropriate to prevent erosion, scour and channeling within the biofiltration treatment system itself and equal to 5 inches per hour, based on the flow of runoff produced from a rain event equal to or at least: <ol style="list-style-type: none"> i. 0.2 inches per hour intensity; or ii. Two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depth b) Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches c) Minimum planting medium depth of 24 inches. The planting medium must sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal. A mixture of sand (60%-70%) meeting the specifications of American Society for Testing and Materials (ASTM) C33 and compost (30%-40%) may be used. A Regulated Project may utilize an alternative planting medium if it demonstrates its planting medium is equal to or more effective at attenuating pollutants than the specified planting medium mixture. d) Proper plant selection¹³ e) Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches f) Underdrain with discharge elevation at top of gravel layer g) No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted) h) No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible 	YES

¹³ Technical guidance for designing bioretention facilities is available from the Central Coast LID Initiative. The guidance includes design specifications and plant lists appropriate for the Central Coast climate:
http://www.centralcoastlidi.org/Central_Coast_LIDI/LID_Structural_BMPs.html

3.	<p>Non-Retention Based Treatment Systems – designed to meet at least one of the following hydraulic sizing criteria:</p> <p>(a) Volume Hydraulic Design Basis – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.</p> <p>(b) Flow Hydraulic Design Basis – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:</p> <p>(i) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or</p> <p>(ii) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.</p>	YES
----	--	-----

I, Nicholas Gomez, acting as the Project Engineer for BKF Engineers project, located at 17295 Butterfield Blvd, hereby state that the On-Site Water Quality Treatment Measures indicated above have been incorporated into the design of the project.

Nicholas Gomez
Signature

03/29/2023
Date

March 29, 2023

Attachment G



GEOTECHNICAL INVESTIGATION

**Butterfield Fire Station
17285 Butterfield Boulevard
Morgan Hill, California**

PREPARED FOR:

COAR DESIGN GROUP
200 E STREET
SANTA ROSA, CALIFORNIA 95404



PREPARED BY:

GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA 94550





Project No. E9291-04-01

May 18, 2022

COAR Design Group
200 EAST Street
Santa Rosa, California 95404

Attention: Mr. Jeff Katz

Subject: BUTTERFIELD FIRE STATION
17285 BUTTERFIELD BOULEVARD
MORGAN HILL, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Dear Mr. Katz:

In accordance with your authorization, we have performed a design-level geotechnical investigation for the subject fire station in Morgan Hill, California. Our investigation was performed to observe the soil and geologic conditions that may impact site development for the project as presently planned. The accompanying report presents the results of our investigation and conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The findings of this study indicate the site is suitable for development as planned provided the recommendations of this report are implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

DRAFT

Andre E. Ashour, PE
Senior Project Engineer

DRAFT

Shane Rodacker, GE
Senior Engineer

(1/e-mail) Addressee

Disclaimer: This DRAFT is intended for the use of the project team to help with the on-going design of the project and provided as a courtesy for review only. This DRAFT should not be relied upon for final design nor produced and submitted to regulatory agencies until a FINAL document is completed with the signatures and stamps of the design professionals.

TABLE OF CONTENTS

1. PURPOSE AND SCOPE	1
2. SITE CONDITIONS AND PROJECT DESCRIPTION	1
3. GEOLOGIC SETTING	2
4. GEOLOGIC HAZARDS.....	2
4.1 Faulting and Seismicity	2
4.2 Surface Fault Rupture	3
4.3 Ground Shaking.....	3
4.4 Liquefaction and Dynamic Compaction.....	3
4.5 Landslides.....	4
4.6 Seiches	4
5. SOIL AND GROUNDWATER CONDITIONS.....	4
5.1 Undocumented Fill	4
5.2 Alluvium	4
5.3 Groundwater.....	4
5.4 Soil Corrosion Screening	4
6. CONCLUSIONS AND RECOMMENDATIONS	6
6.1 General	6
6.2 Seismic Design Criteria	6
6.3 Soil and Excavation Characteristics	7
6.4 Materials for Fill	8
6.5 Grading	8
6.6 Temporary Excavations	9
6.7 Shallow Foundations	9
6.8 Underground Utilities.....	10
6.9 Concrete Slabs-on-Grade	10
6.10 Moisture Protection Considerations.....	11
6.11 Pavement Recommendations.....	11
6.12 Retaining Wall Design	13
6.13 Surface Drainage.....	14
7. FURTHER GEOTECHNICAL SERVICES.....	15
7.1 Plan and Specification Review	15
7.2 Testing and Observation Services.....	15

LIMITATIONS AND UNIFORMITY OF CONDITIONS

FIGURES

- Figure 1, Vicinity Map
- Figure 2, Site Plan

APPENDIX A – FIELD INVESTIGATION

- Figure A1, Key to Boring Logs
- Figures A2 through A7, Logs of Exploratory Borings B1 through B6

TABLE OF CONTENTS (cont.)

APPENDIX B – LABORATORY TESTING

- Table B-I, Summary of Laboratory Atterberg Limits Test Results
- Table B-II, Summary of Laboratory Expansion Index Test Results
- Table B-III, Summary of Laboratory Grain Size Analyses - No. 200 Wash
- Table B-IV, Summary of Soil Corrosion Parameters
- Figures B1 and B2, Summary of Laboratory Particle Size Analyses
- Figure B3, Laboratory Unconfined Compressive Strength Test Results

LIST OF REFERENCES

GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for a planned fire station at 17285 Butterfield Boulevard in Morgan Hill, California (See Vicinity Map, Figure 1). The purpose of this investigation was to evaluate the subsurface soil and geologic conditions in the area of planned development and provide conclusions and geotechnical recommendations for project design and construction, based on the conditions encountered during our study.

The scope of this investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Our field exploration included six soil borings performed on December 21, 2021. Our soil borings were advanced to depths ranging from approximately 5 to 30 feet below existing grade. The locations of our explorations are depicted on the Site Plan, Figure 2. A detailed discussion of our field investigation and boring logs are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent geotechnical parameters. In addition, two soil samples were submitted to our laboratory for screening-level corrosion testing. Appendix B presents the laboratory test results in tabular and graphical format.

The opinions expressed herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE CONDITIONS AND PROJECT DESCRIPTION

The project site is an approximately 1 ¾-acre parcel (Santa Clara County APN 726-15-072) fronting the southwest side of Butterfield Boulevard, approximately ¼ mile north of East Dunne Avenue. The parcel is occupied by a community park with concrete walkways, benches and landscaping, and a former community garden. To the northwest, the site is bordered by a surface parking lot for the nearby transit center. A Santa Clara County courthouse is present to the southeast. The back (southwest side) of the parcel abuts the Caltrain rail line. Topographically, the site is relatively flat with ground surface elevations of approximately 350 feet MSL based on web-based mapping.

Based on the information provided by JKA Architecture, the project will include the design and construction of a new one- to two-story fire station. The new station will be designed to accommodate up to three fire apparatus. The layout of the station includes three drive-through apparatus bays, a separate workshop area, living quarters and administrative/conference room areas. No subterranean levels are anticipated but a localized deeper excavation may be needed if the two-story portion of the building includes an elevator. Ancillary site improvements such as new pavements, exterior flatwork and underground utilities are also planned.

Civil plans were not available at the time of this report, but we anticipate cuts and fills in order of 2 feet or less will be required to establish design subgrade elevation for the fire station building pad. The proposed site configuration is depicted on Figure 2.

3. GEOLOGIC SETTING

Morgan Hill is located within the Coast Ranges Geomorphic Province of California, which is characterized by a series of northwest trending mountains and valleys along the north and central coast of California. Topography is controlled by the predominant geological structural trends within the Coast Range that generally consist of northwest trending synclines, anticlines and faulted blocks. The dominant structure is a result of both active northwest trending strike-slip faulting, associated with the San Andreas Fault system, and east-west compression within the province.

The San Andreas Fault (SAF) is a major right-lateral strike-slip fault that extends from the Gulf of California in Mexico to Cape Mendocino in northern California. The SAF forms a portion of the boundary between two tectonic plates on the surface of the earth. To the west of the SAF is the Pacific Plate, which moves north relative to the North American Plate, located east of the fault. In the San Francisco Bay Area, movement across this plate boundary is concentrated on the SAF but also distributed, to a lesser extent, across several other faults including the Hayward and Calaveras faults, among others. Together, these faults are referred to as the SAF system.

Basement rock west of the SAF is generally granitic, while to the east it consists of a chaotic mixture of highly deformed marine sedimentary, submarine volcanic and metamorphic rocks of the Franciscan Complex. Both are typically Jurassic to Cretaceous in age (205 to 65 million years old). Overlying the basement rocks are Cretaceous (about 140 to 65 million years old) marine, as well as Tertiary (about 65 to 1.6 million years old) marine and non-marine sedimentary rocks with some continental volcanic rock. These Cretaceous and Tertiary rocks have typically been extensively folded and faulted largely because of movement along the SAF system, which has been ongoing for about the last 25 million years, and regional compression during the last about 4 million years. The inland valleys, as well as the structural depression within which San Francisco Bay is located, are filled with unconsolidated to semi-consolidated deposits of Quaternary age (about the last 1.6 million years). Continental deposits (alluvium) consist of unconsolidated to semi-consolidated sand, silt, clay and gravel, while the bay deposits typically consist of soft organic-rich silt and clay (bay mud) or sand.

Geologic mapping by the California Geological Survey indicates the site is underlain by Pleistocene-age alluvial fan deposits. Artificial fills from past episodes of site development are also present.

4. GEOLOGIC HAZARDS

4.1 Faulting and Seismicity

Geologists and seismologists recognize the San Francisco Bay Area as one of the most seismically active regions in the United States. The significant earthquakes that occur in the Bay Area are associated with crustal movements along well-defined active fault zones that generally trend in a northwesterly direction.

The site and greater Bay Area are seismically dominated by the presence of the active San Andreas Fault System. In the theory of plate tectonics, the San Andreas Fault System is a transform fault that forms the boundary between the northward moving Pacific Plate (west of the fault) and the southward moving North American Plate (east of the fault). Locally, the movement is distributed across a complex system of strike-slip, right lateral parallel and subparallel faults – including the San Andreas, Hayward and Calaveras faults.

The table below presents approximate distances to active faults within approximately 20 miles of the site based on web-based mapping by CGS, as previously published by Caltrans. Site coordinates are N 37.1297 and W 121.6493°.

TABLE 4.1
REGIONAL FAULT SUMMARY

Fault Name	Approximate Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
Silver Creek	3	6.9
Calaveras (Central)	3 1/2	6.9
Sargent	7 1/2	7.0
Hayward (Southern Extension)	8 1/4	6.7
San Andreas	10	8.0
Zayante-Vergelas (Upper)	13 3/4	7.0
Monte Vista-Shannon	15	6.4
Zayante-Vergelas (Lower)	16 1/2	7.0

Faults tabulated above and many others in the Bay Area are sources of potential ground motion. However, earthquakes that might occur on other faults within the northern California area are also potential generators of significant ground motion and could cause ground shaking at the site.

4.2 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards. No active or potentially active faults are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. The California Geological Survey defines an active fault as a fault that shows evidence for activity within the last 11,000 years. A potentially active fault is generally defined as a fault that has shown evidence of displacement between 11,000 and 1.6 million years ago. Faults that have not demonstrated evidence of movement with the past 1.6 million years are generally considered inactive.

4.3 Ground Shaking

We used the USGS web-based *Unified Hazard Tool* to estimate the peak ground acceleration (PGA) and modal (most probable) magnitude associated with a 2,475-year return period. This return period corresponds to an event with 2% chance of exceedance in a 50-year period. The USGS estimated PGA is 0.99g and the modal magnitude is 7.3 for Seismic Site Class D ($V_{s30} = 259$ m/sec) based on a 2014 model within the application.

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

4.4 Liquefaction and Dynamic Compaction

The site is not located within a CGS Seismic Hazard Zone for liquefaction, nor within a Santa Clara County Geologic Hazard Zone for the same. In addition, web-based hazard mapping by the Association of Bay Area Governments indicates a low susceptibility to liquefaction at the site. Our soil borings did not encounter soils susceptible to liquefaction or dynamic compaction (dry sand settlement) at the intervals sampled.

4.5 Landslides

There are no known landslides near the site, nor is the site in the path of any known or potential landslides. We do not consider the potential for a landslide to be a significant hazard to this project.

4.6 Seiches

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically-induced seiche is considered unlikely.

5. SOIL AND GROUNDWATER CONDITIONS

5.1 Undocumented Fill

We encountered undocumented fill materials to depths up to approximately 2 ½ feet below existing grade in Borings B4 through B6. The source of the fill materials is unknown. As observed in our soil borings, the fill materials consisted of stiff silty clay with various amount of sand and gravel and loose silty/clayey sand with various amount of gravel. Based on our laboratory test results, the undocumented fills are low plasticity clays that possess low expansion potential.

5.2 Alluvium

Alluvial deposits at the site generally extend from below the undocumented fill to the maximum depths explored – approximately 30 feet below existing grade. The alluvium generally comprises stiff to hard silty clay with variable amounts of sand and gravel and dense clayey sand with occasional sandstone fragments. A medium dense clayey sand layer with silt and gravel was encountered at depths between approximately 2 ½ to 5 feet in Boring B1 and to a depth of approximately 3 ½ feet in Boring B2. In Boring B4, we encountered a layer of medium stiff sandy clay between approximately 2 ½ and 7 feet below existing grade.

Soil conditions described in the previous paragraphs are generalized. Therefore, we advise the reader to consult the exploratory boring logs included in Appendix A.

5.3 Groundwater

Groundwater was not encountered in our soil borings to the maximum depth explored – approximately 30 feet below existing grade. Historic high groundwater levels are approximately 20 to 25 feet below natural grade per CGS mapping. Information maintained online by Santa Clara Valley Water District indicates historic high groundwater levels are about 20 feet below grade in the site vicinity. Actual groundwater levels will fluctuate seasonally and with variations in rainfall, temperature and other factors and may be higher or lower than observed during our study. Additionally, areas of seepage may develop where not previously observed, particularly during or after periods of heavy precipitation.

5.4 Soil Corrosion Screening

Two soil samples obtained during our field exploration were subjected to laboratory testing for minimum resistivity, pH, and chloride and water-soluble sulfate. The laboratory test results and published screening levels

are presented in Appendix B. Soil corrosivity should be considered in the design of buried metal pipes, underground structures, etc.

Water-soluble sulfate test results on the selected sample of site soils indicate an S0 exposure classification for sulfate attack on normal portland cement concrete (PCC) as defined in Chapter 318, Table 19.3.1.1 of the *ACI Building Code Requirements for Structural Concrete*. ACI does not set forth requirements for S0 sulfate exposure classification. In addition, the soil samples that we tested would not be classified as corrosive to buried metal improvements based on Caltrans criteria.

Geocon does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

- 6.1.1 No overriding geotechnical constraints were encountered during our investigation that would preclude the project as presently proposed. Primary geotechnical considerations are the presence undocumented fill materials and the potential for strong seismic shaking. Remedial grading will be required to remove and recompact undocumented fill materials in areas to receive settlement sensitive improvements.
- 6.1.2 Based on the observed soil conditions and the assumed structural loading, we anticipate that a conventional shallow foundation system (strip and spread footings) used in conjunction with the recommended remedial grading presented herein can be used to support the proposed fire station building.
- 6.1.3 The proposed project redevelops a site with past episodes of site development. As such, unknown underground improvements and/or areas of undocumented fill materials may be present. Supplemental recommendations may be provided during site development.
- 6.1.4 For shallow foundation systems designed and constructed as recommended herein, estimated post-construction settlement due to dead + live loads should be $\frac{3}{4}$ inch or less with differential settlements of approximately $\frac{1}{2}$ inch or less across a horizontal distance of 50 feet.
- 6.1.5 Project grading plans were not available at the time of this report. We should review grading plans once available to determine applicability of the recommendations provided herein, particularly those related to site grading and building pad preparation. Updated or supplemental recommendations may be necessary.
- 6.1.6 Any changes in the design, location or elevation of the proposed improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.
- 6.1.7 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

6.2 Seismic Design Criteria

- 6.2.1 We understand that seismic structural design will be performed in accordance with the provisions of the 2019 CBC which is based on the American Society of Civil Engineers (ASCE) publication *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-16). We derived the following seismic design parameters using the web-based Structural Engineers Association of California application *U.S. Seismic Design Maps*. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE_R) and Seismic Risk Category IV.

TABLE 6.2.1
2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE _R Ground Motion Spectral Response Acceleration – Class B (short), S _s	1.606g	Figure 1613.2.1(1)
MCE _R Ground Motion Spectral Response Acceleration – Class B (1 sec), S ₁	0.6g	Figure 1613.2.1(2)
Site Coefficient, F _A	1.0	Table 1613.2.3(1)
Site Coefficient, F _V	1.7*	Table 1613.2.3(2)
Site Class Modified MCE _R Spectral Response Acceleration (short), S _{MS}	1.606g	Section 1613.2.3 (Eq. 16-36)
Site Class Modified MCE _R Spectral Response Acceleration – (1 sec), S _{M1}	1.02*	Section 1613.2.3 (Eq. 16-37)
5% Damped Design Spectral Response Acceleration (short), S _{DS}	1.07g	Section 1613.2.4 (Eq. 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S _{D1}	0.68g*	Section 1613.2.4 (Eq. 16-39)

Note:
*Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with S_s greater than or equal to 1.0g and for Site Class "D" and "E" sites with S₁ greater than 0.2g. Section 11.4.8 also provides exceptions where ground motion hazard analysis may be waived. Using the code based values presented in the table above, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed in project design.

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-16 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
2019 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-16 Reference
Mapped MCE _G Peak Ground Acceleration, PGA	0.67g	Figure 22-7
Site Coefficient, F _{PGA}	1.1	Table 11.8-1
Site Class Modified MCE _G Peak Ground Acceleration, PGA _M	0.737g	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil and Excavation Characteristics

6.3.1 The onsite soils can be excavated with moderate effort using conventional excavation equipment. We do not anticipate excavations in the native alluvium at the site will generate oversize material

(greater than 3 inches in nominal dimension). However, unknown or unanticipated constituents may exist, especially within areas of undocumented fill.

- 6.3.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.
- 6.3.3 The recommendations of this report assume the foundation system for the fire station will derive support in engineered fill or competent alluvium.

6.4 Materials for Fill

- 6.4.1 Excavated soils generated from cut operations at the site are suitable for use as engineered fill in structural areas provided they do not contain deleterious matter, organic material, or cementsations larger than 3 inches in maximum dimension.
- 6.4.2 If needed, import material should possess a “low” expansion potential (Expansion Index less than 50), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock larger than 3 inches in greatest dimension.
- 6.4.3 Environmental characteristics and corrosion potential of import soil materials may also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

- 6.5.1 All clearing operations and earthwork (including over-excavation, scarification, and recompaction) should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.
- 6.5.2 Structural areas should be considered as areas extending a minimum of 5 feet horizontally from a foundation or beyond the outside dimensions of building, including footings and overhangs carrying structural loads, and where not restricted by property boundaries.
- 6.5.3 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance. Special soil handling requirements can be discussed at that time.
- 6.5.4 The site should be stripped of all surface vegetation and pavement from the area to be removed. All active or inactive utilities within the construction area should be protected, relocated, or abandoned. Any pipelines to be abandoned that are greater than 2 inches and less than 18 inches in diameter should be removed or filled with sand-cement slurry. Utilities larger than 18 inches in diameter should be removed. Excavations or depressions resulting from demolition and site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.
- 6.5.5 After stripping and cleaning the site, the exposed subgrade in the building pad, exterior flatwork and pavement areas should be over-excavated to a depth of 12 inches below existing grade or proposed subgrade (whichever is lower). The resultant bottom should then be scarified to a depth of

approximately 1 foot, moisture conditioned above optimum moisture and recompacted to at least 90% relative compaction.

- 6.5.6 Over-excavation, exposed bottom surfaces and bottom processing should be observed by our representatives on a full-time basis. Undocumented fills in the building pad should be completely removed to expose a competent native bottom and replaced with properly compacted fill. Supplemental recommendations may be provided based site conditions during grading. Based on the subsurface conditions encountered in our soil borings, over-excavations on the order of 3 feet below existing grade may be required to remove existing undocumented fill materials in the building pad. Over-excavation depths in pavement and exterior flatwork areas may be relaxed at the sole discretion of Geocon based on the conditions encountered during grading.
- 6.5.7 In general, over-excavated materials may be used for new engineered fill provided they do not contain deleterious matter, organic material, or cementations larger than 3 inches in maximum dimension.
- 6.5.8 All structural fill and backfill should be placed in layers no thicker than will allow for adequate bonding and compaction (typically 8 to 12 inches). Fill soils should be placed and compacted to at least 90% relative compaction at slightly above optimum moisture.

6.6 Temporary Excavations

- 6.6.1 We anticipate that the majority of the site alluvial soils will be classified as Cal-OSHA “Type B” soil when encountered in excavations during site development and construction. If active seepage, loose gravelly or sandy soil, or undocumented fills are encountered, the Cal-OSHA classification should be downgraded to “Type C”. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved “competent person” onsite during excavation to evaluate trench conditions and make appropriate recommendations where necessary.
- 6.6.2 It is the contractor’s responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.

6.7 Shallow Foundations

- 6.7.1 The fire station may utilize conventional shallow foundations consisting of continuous strip footings and isolated spread footings bearing in competent alluvium or in properly compacted fill following the remedial grading discussed in Section 6.5.5. Continuous strip footings may be used for the ancillary site structures such as short retaining walls, screen walls, or trash enclosures.
- 6.7.2 Strip and spread footings should have a minimum embedment depth of 18 inches below the lowest adjacent pad grade, which is not to be confused with finished floor elevation. The strip footings should be at least 15 inches wide. Spread footings should be at least 4 feet square and founded at least 18 inches below the lowest adjacent pad grade. Perimeter footings for the fire station should consist of continuous strip footings. Any column footings at the perimeter should be integral with the strip footing.
- 6.7.3 Footings proportioned as recommended may be designed for a net allowable soil bearing pressure of 3,000 pounds per square foot (psf). The allowable bearing pressure is for dead + live loads and may be increased by up to one-third for transient loads due to wind or seismic forces.

- 6.7.4 The allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The allowable coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided the frictional resistance is reduced by 50%. Where not protected by pavement or flatwork, the upper one foot of soil should be ignored when calculating passive resistance.
- 6.7.5 Minimum reinforcement for continuous footings should consist of four No. 4 steel reinforcing bars; two placed near the top of the footing and two near the bottom. Reinforcement for isolated column footings should be determined by the structural engineer.
- 6.7.6 The foundation dimensions and minimum reinforcement recommendations presented herein are based upon soil conditions only and are not intended to be used in lieu of those required for structural purposes.
- 6.7.7 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.
- 6.7.8 Footing bottoms and walls should be sprinkled as necessary to maintain a moist condition as would be expected in any concrete placement. Our representative should observe all footing excavations prior to placing reinforcing steel.

6.8 Underground Utilities

- 6.8.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as backfill provided it does not contain deleterious matter, vegetation or rock larger than six inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding eight inches and should be compacted to at least 90% relative compaction above optimum moisture.
- 6.8.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to a minimum of 6 inches above the crown of the pipe. Pipe bedding material should consist of crushed aggregate, clean sand or similar open-graded material. Proposed bedding and pipe zone materials should be reviewed by Geocon prior to construction; open-graded materials such as 3/4 inch drain rock may require wrapping with filter fabric to mitigate the potential for piping. Pipe bedding and backfill should also conform to the requirements of the governing utility agency.

6.9 Concrete Slabs-on-Grade

- 6.9.1 Concrete slabs-on-grade subject to vehicle loading are considered pavements and should be designed in accordance with the recommendations in Section 6.11 of this report.
- 6.9.2 Concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 5 inches thick. Minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint.
- 6.9.3 Interior slabs in areas with floor coverings or slabs in areas where moisture would be objectionable should be underlain by 3 inches of 1/2-inch or 3/4-inch crushed rock with no more than 5% passing the No. 200 sieve to serve as a capillary break.

- 6.9.4 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions, positioned near the slab midpoint. The subgrade should be scarified 12 inches, moisture conditioned to slightly above optimum moisture content and recompacted to at least 90% relative compaction.
- 6.9.5 In lieu of specific recommendations from the structural or civil engineer, we recommend that crack control joints be spaced at intervals not greater than 8 feet for 4-inch-thick slabs (10 feet for 5-inch-thick slabs). Crack control joints should extend a minimum depth of one-fourth the slab thickness and should be constructed using saw-cuts or other methods as soon as practical after concrete placement. Construction joints should be designed by the project structural engineer.
- 6.9.6 The recommendations of this report are intended to reduce the potential for cracking of slabs due to soil movement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to soil movement. This is common since designing to eliminate potential soil movement is cost prohibitive. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.10 Moisture Protection Considerations

- 6.10.1 A vapor barrier is not required beneath interior slabs-on-grade for geotechnical purposes. Further, the migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.
- 6.10.2 A vapor barrier meeting ASTM E 1745-09 Class C requirements may be placed directly below the slab, without a sand cushion. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) should be used. The vapor barrier, if used, should extend to the edges of the slab, and should be sealed at all seams and penetrations.
- 6.10.3 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.
- 6.10.4 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.11 Pavement Recommendations

- 6.11.1 The upper 12 inches of pavement subgrade should be scarified, moisture conditioned slightly above optimum moisture and compacted to at least 95% relative compaction. Prior to placing aggregate base, the finished subgrade should be proof-rolled with a laden water truck (or similar equipment with high contact pressure) to verify stability.

6.11.2 Sidewalk, curb and gutter, and driveway encroachments should be designed and constructed in accordance with City of Morgan Hill requirements, as applicable.

6.11.3 We recommend the following asphalt concrete (AC) pavement sections for design to establish subgrade elevations in pavement areas. The project civil engineer should determine the appropriate Traffic Index (TI) based on anticipated traffic conditions. The flexible pavement sections below are based on estimated design TIs. We can provide additional sections based on other TIs if necessary.

TABLE 6.11
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

Location	Estimated Traffic Index (TI)	AC Thickness (inches)	Class 2 Aggregate Base Thickness (inches)
Parking Stalls	4.5	3	8
Driveways	6.0	3 ½	12 ½
Heavy-Duty	7.0	4	15 ½

Note: The recommended flexible pavement sections are based on the following assumptions:

1. Subgrade soil has an R-Value of 5.
2. Class 2 AB has a minimum R-Value of 78 and meets the requirements of Section 26 of the latest Caltrans Standard Specifications.
3. Class 2 AB and subgrade is compacted to 95% or higher relative compaction at or near optimum moisture content. Prior to placing AC, the AB should be proof rolled with a loaded water truck to verify stability.
4. Asphalt concrete should conform to local agency standards.

6.11.4 The AC sections in Table 6.11 are final, minimum thicknesses. If staged pavements are used, the construction bottom AC lift should be at least 2 inches thick. Following construction, the finish top AC lift should be at least 1.5 inches thick.

6.11.5 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles, we recommend the concrete be a minimum of 6 inches thick and reinforced with No. 3 steel reinforcing bars placed 24 inches on center in both horizontal directions. Where heavy truck or apparatus traffic is anticipated, the minimum concrete thickness should be increased to 8 inches. In addition, doweling, reinforcing steel or other load-transfer mechanism should be provided at joints if desired to reduce the potential for vertical offset. The concrete should have a minimum 28-day compressive strength of 3,500 psi.

6.11.6 We recommend that at least 6 inches and 12 inches of Class 2 Aggregate Base be used below rigid concrete pavements for light and heavy traffic, respectively. The aggregate base should be compacted to at least 95% relative compaction near optimum moisture content.

6.11.7 In general, we recommend that concrete pavements be designed, constructed and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.11.8 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 6 inches below the bottom of the aggregate base to minimize the introduction of water beneath

the paving. Alternatives such as plastic moisture cut-offs or modified drop-inlets may also be considered in lieu of deepened curbs.

6.11.9 Asphalt pavement section recommendations for driveways and parking areas are based on Caltrans design procedures. It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and, hence, may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The HDM indicates that the resulting pavement sections for parking lots are minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems. It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas, therefore, should be anticipated.

6.12 Retaining Wall Design

6.12.1 Lateral earth pressures may be used in the design of retaining walls. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. Table 6.12 summarizes the weights of the equivalent fluid based on the different design conditions.

TABLE 6.12
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active	45 pcf
At-Rest	60 pcf

6.12.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than $0.01H$ (where H is the height of the wall). The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area.

6.12.3 Unless project-specific loading information is provided by the structural engineer, where vehicle loads are expected atop the wall backfill, an additional uniform surcharge pressure equivalent to 2 feet of backfill soil should be used for design. Where the vehicle loading will be limited to passenger cars, the additional uniform surcharge equivalent may be reduced to 1 foot of backfill soil.

6.12.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

6.12.5 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

6.13 Surface Drainage

6.13.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

6.13.2 All site drainage should be collected and transferred to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundations or retaining walls. Drainage should not be allowed to flow uncontrolled over any descending slope. The proposed structures should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers not permitted onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed or properly drained to prevent moisture intrusion into the materials providing foundation support. Landscape irrigation within five feet of the building perimeter footings should be kept to a minimum to just support vegetative life.

6.13.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond. Final soil grade should slope a minimum of 2% away from structures.

6.13.4 We recommend implemented measures to reduce infiltrating surface water near buildings and slabs-on-grade. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 5 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers and automatic timers for irrigation systems.
- Appropriately spaced area drains.
- Hard-piping roof downspouts to appropriate collection facilities.

7. FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

We should review project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase and provide compaction testing and observation services and foundation observations throughout the project. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Consultants, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the geotechnical scope of services provided by Geocon Consultants, Inc.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.



GEOCON
CONSULTANTS, INC.

6671 BRISA STREET - LIVERMORE, CA 94550
PHONE 925.371.5900 - FAX 925.371.5915

Butterfield Fire Station

17285 Butterfield Boulevard
Morgan Hill, California

VICINITY MAP

E9291-04-01

May 2022

Figure 1

0 1/2
Scale in Miles



LEGEND:

B6 Approximate Boring Location

0 40
Scale in Feet



GEOCON
CONSULTANTS, INC.

6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

Butterfield Fire Station

17285 Butterfield Boulevard
Morgan Hill, California

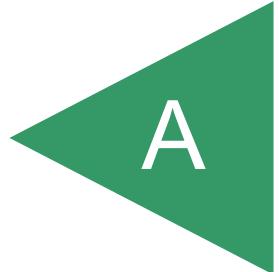
SITE PLAN

E9291-04-01

May 2022

Figure 2

APPENDIX



APPENDIX A FIELD EXPLORATION

Fieldwork for our investigation included a site visit, subsurface exploration, and soil sampling. The locations of our exploratory borings are shown on the Site Plan, Figure 2. Soil boring logs for our exploration are presented as figures following the text in this appendix. The borings were located by pacing from existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our field exploration included six exploratory soil borings to depths ranging from approximately 5 to 30 feet. Our borings were performed on December 21, 2021 by Cenozoic Exploration of Los Gatos, California using a truck-mounted Simco 2400-SKJ drill rig equipped with 6-inch solid-flight augers under Geocon supervision. Sampling in the borings was accomplished using a 140-pound Cathead hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD). The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT “N” values; corrections have not been applied.

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

Upon completion of drilling, the borings are backfilled with cuttings and lean cement grout. Borings in pavement areas capped with asphalt cold patch.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS			TYPICAL NAMES		
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND	
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND	
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES	
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES	
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL	
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL	
			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS	
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS	
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY	
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY	
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

BORING/TRENCH LOG LEGEND

	PENETRATION RESISTANCE						
	SAND AND GRAVEL		SILT AND CLAY				
	RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
— No Recovery	VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
— Shelby Tube Sample	LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
— Bulk Sample	MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
— SPT Sample	DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
— Modified California Sample	VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
▼ — Groundwater Level (At Completion)							
▼ — Groundwater Level (Seepage)							

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30
INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER



BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	descriptor
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 1/2 INCH TO 1 FOOT	MODERATELY BEDDED
1 1/2 INCH TO 3 1/2 INCH	THINLY BEDDED
1/2 INCH TO 1 1/2 INCH	VERY THINLY BEDDED
LESS THAN 1/2 INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST $\frac{1}{2}$ -INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN $\frac{1}{2}$ -INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMPLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMPLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMPLES WITH BARE HAND	WEAK
MATERIAL CRUMPLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
$\frac{1}{2}$ -INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH ONE BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH COUPLE BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH MANY BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOTICABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINED

KEY TO LOGS

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B1				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
MATERIAL DESCRIPTION											
0	B1-0-5			CL-ML	ALLUVIUM Very stiff, damp to moist, brown, (f-c) Gravelly Silty CLAY with little (f-c) sand -wood chips at surface -pp>4½						
1	B1-1.5-2			SC	Medium dense, moist, brown, Clayey SAND with little gravel			34	134.4	8.0	
2	B1-2										
3	B1-4-4.5										
4	B1-4.5							15	118.4	10.1	
5					END OF BORING AT APPROXIMATELY 5 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS AND GROUT						

Figure A2, Log of Boring B1, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL ... DISTURBED OR BAG SAMPLE ... STANDARD PENETRATION TEST ... CHUNK SAMPLE ... DRIVE SAMPLE (UNDISTURBED) ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B2				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
					ENG./GEO.	DRILLER	Cenezoic				
EQUIPMENT											
					Simco 2400-SK1 w/ 6" SFA	HAMMER TYPE	Cathead				
MATERIAL DESCRIPTION											
0				SC-SM	ALLUVIUM Medium dense, damp to moist, brown, Silty Clayey (f-c) SAND with few (f) gravel -woodchips at surface						
1	B2-1.5-2								38		
2	B2-2										8.6
3											
4	B2-4-4.5			CL	Very stiff, moist, brown, (f-c) Sandy CLAY with little (f) gravel -less gravel -pp>4½			37			
5	B2-4.5								110.2	11.0	
6											
7				SC	Dense, moist, brown, Clayey (f-c) SAND with few sandstone fragments						
8											
9	B2-9-9.5								53		
10	B2-9.5										12.1
11											
12											
13											
14	B2-14-14.5			CL	Hard, moist, brown, Sandy CLAY with trace sandstone fragments -pp>4½			48			
15	B2-14.5								123.2	12.2	
16											
17											
18											
19	B2-19-19.5				-with few (f-c) rounded gravels -pp>4½ -(c) gravel in shoe			52			
20	B2-19.5										
21											
22											
23											
24	B2-24-24.5				-more sand			78/12"			
25	B2-24.5										

Figure A3, Log of Boring B2, Page 1 of 2

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

□ ... STANDARD PENETRATION TEST

■ ... DRIVE SAMPLE (UNDISTURBED)

□ ... DISTURBED OR BAG SAMPLE

■ ... CHUNK SAMPLE

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B2	DATE COMPLETED <u>12/21/2021</u>	PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____ ENG./GEO. _____ JBM EQUIPMENT _____ Simco 2400-SK1 w/ 6" SFA	DRILLER _____ Cenezoic HAMMER TYPE _____ Cathead			
MATERIAL DESCRIPTION									
25					-pp>4½				
26									
27									
28									
29	B2-29-29.5 B2-29.5				-sand (c), more gravels		65		
30					END OF BORING AT APPROXIMATELY 30 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS AND GROUT				

Figure A3, Log of Boring B2, Page 2 of 2

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL ... STANDARD PENETRATION TEST ... DRIVE SAMPLE (UNDISTURBED) ... DISTURBED OR BAG SAMPLE ... CHUNK SAMPLE ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B3				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
MATERIAL DESCRIPTION											
0	B3-0-5			CL-ML	FILL Very stiff, damp, brown, Silty (f-c) Sandy CLAY with little (f) gravel -woodchips at surface -pp>4½			27	128.9	8.9	
1	B3-1.5-2										
2	B3-2										
3				CL	ALLUVIUM Stiff, damp, brown, Sandy CLAY			21			
4											
5											
6											
7											
8											
9	B3-9-9.5				-very stiff, gravelly			43	129.1	8.8	
10	B3-9.5										
11											
12											
13											
14	B3-14-14.5				-hard			70			
15	B3-14.5										
16											
17											
18											
19	B3-19-19.5							50	130.3	9.7	
20	B3-19.5				END OF BORING AT APPROXIMATELY 20 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS AND GROUT						

Figure A4, Log of Boring B3, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

□ ... STANDARD PENETRATION TEST

■ ... DRIVE SAMPLE (UNDISTURBED)

■ ... DISTURBED OR BAG SAMPLE

■ ... CHUNK SAMPLE

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B4				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
MATERIAL DESCRIPTION											
0					Approximately 2 inches asphalt						
1				CL-ML	Approximately 6 inches aggregate base				20	124.8	9.6
2	B4-1.5-2 B4-2			CL	FILL Stiff, damp, brown, Silty CLAY with (f) sand and few (f) rounded gravels -pp=3-4½						
3	B4-4-4.5 B4-4.5			CL	ALLUVIUM Medium stiff, moist, brown, (f) Sandy CLAY with trace (f) rounded gravels				7	117.7	16.0 14.3
4					-pp=1½						
5					-hard						
6											
7											
8											
9	B4-9-9.5 B4-9.5			SC	-some sandstone fragments -damp				65	121.5	8.7
10											
11											
12											
13											
14	B4-14-14.5 B4-14.5			SC	Dense, moist, brown, Clayey (f-c) SAND with few sandstone fragments				70		8.9
15					END OF BORING AT APPROXIMATELY 15 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS, GROUT AND AC PATCH						

Figure A5, Log of Boring B4, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL ... STANDARD PENETRATION TEST ... DRIVE SAMPLE (UNDISTURBED) ... DISTURBED OR BAG SAMPLE ... CHUNK SAMPLE ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B5				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
MATERIAL DESCRIPTION											
0					Approximately 2 inches asphalt						
1	B5-1.5 B5-1.5-2 B5-2			SC-SM	Approximately 6 inches aggregate base				10		12.8
2					FILL Loose, moist, brown, Silty Clayey (f) SAND with few (f) gravels -rootlets						
3				CL	ALLUVIUM Very stiff, moist, brown, CLAY with sand and gravel -pp>4½				29	121.1	8.8
4	B5-4-4.5 B5-4.5				END OF BORING AT APPROXIMATELY 5 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS AND AC PATCH						
5											

Figure A6, Log of Boring B5, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22



SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL ... DISTURBED OR BAG SAMPLE ... STANDARD PENETRATION TEST ... CHUNK SAMPLE ... DRIVE SAMPLE (UNDISTURBED) ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B6				PENETRATION RESISTANCE (BLOWS/FT)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	12/21/2021				
MATERIAL DESCRIPTION											
0	B6-0-5			CL-ML	FILL						
					Stiff, damp to moist, brown, Silty CLAY with (m-c) sand						
1	B6-1.5-2			CL	ALLUVIUM				20		
2	B6-2				Stiff, moist, brown, CLAY with little (m-c) sand and trace (f) gravels				124.1	11.2	
3	B6-4-4.5										
4	B6-4.5										
5					-very stiff, trace to no sand and gravel -pp=2½-3 -more sand				31	112.5	17.6 16.0
					END OF BORING AT APPROXIMATELY 5 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS						

Figure A7, Log of Boring B6, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9291-04-01 BORING LOGS.GPJ 05/18/22

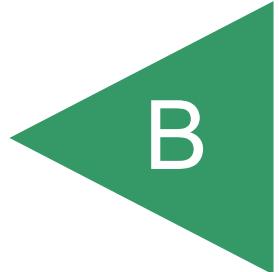


SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL ... DISTURBED OR BAG SAMPLE ... STANDARD PENETRATION TEST ... CHUNK SAMPLE ... DRIVE SAMPLE (UNDISTURBED) ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

APPENDIX



APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for in-situ dry density and moisture content, grain size distribution, plasticity, expansion index, unconfined compressive strength, and screening-level corrosion parameters. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and moisture content test results are included on the boring logs in Appendix A.

TABLE B-I
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
B1-1.5-2	21	16	5
B3-0-5	26	17	9
B4-1.5-2	25	18	7
B5-1.5-2	22	17	5

TABLE B-II
SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829

Sample No.	Moisture Content		Dry Density* (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
B3-0-5	9.3	14.4	113.7	6
B5-1-5	9.9	16.9	108.5	3

*Before saturation.

TABLE B-III
SUMMARY OF LABORATORY GRAIN SIZE ANALYSIS – NO. 200 WASH
ASTM D1140

Boring No.	Sample Depth (feet)	Fraction Passing No. 200 Sieve (%)
B1	4-4.5	33
B2	2	43
B4	4-4.5	62
B5	2	47
B6	4-4.5	74

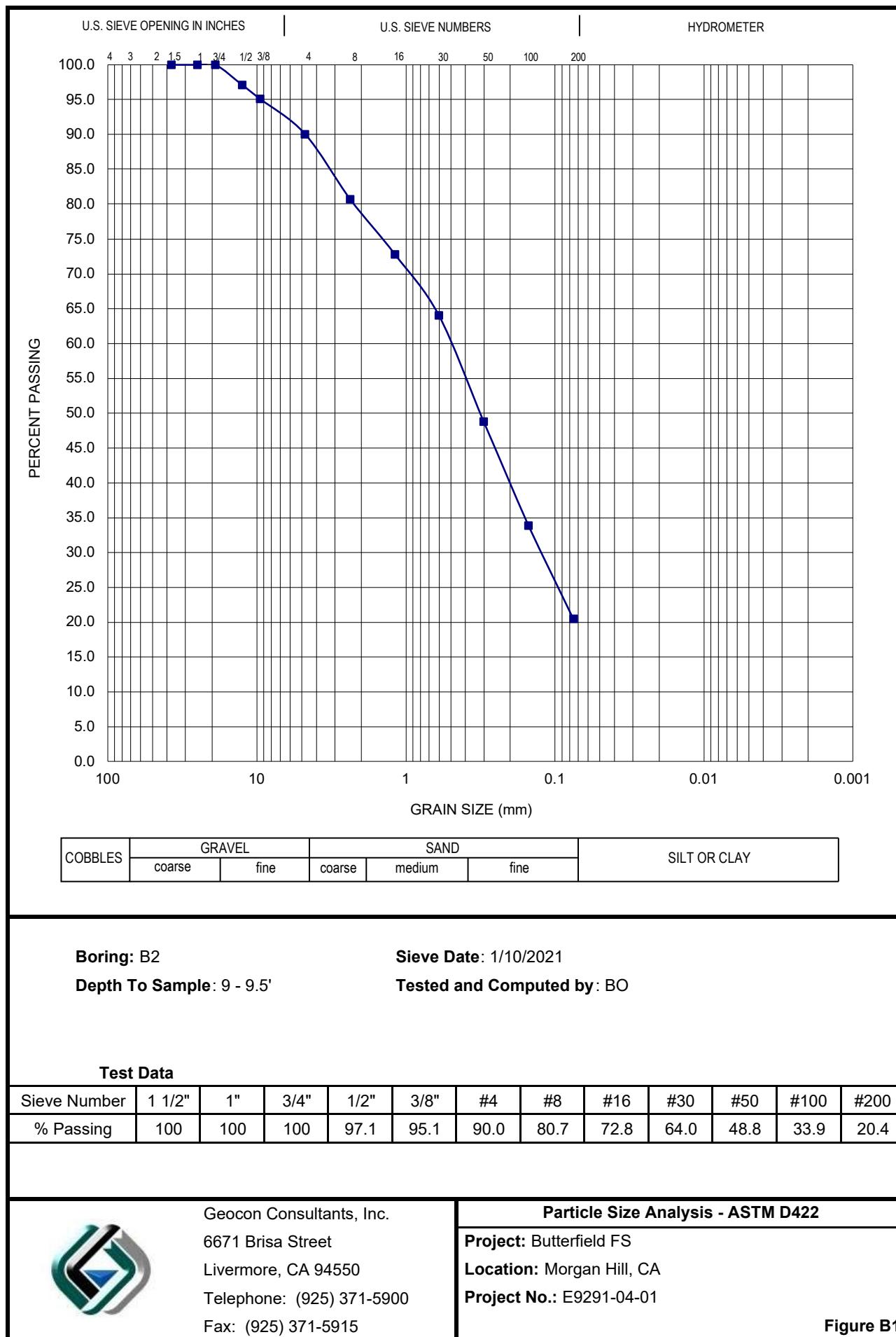
TABLE B-IV
SUMMARY OF SOIL CORROSION PARAMETERS
(CTM 643, CTM 417, CTM 422)

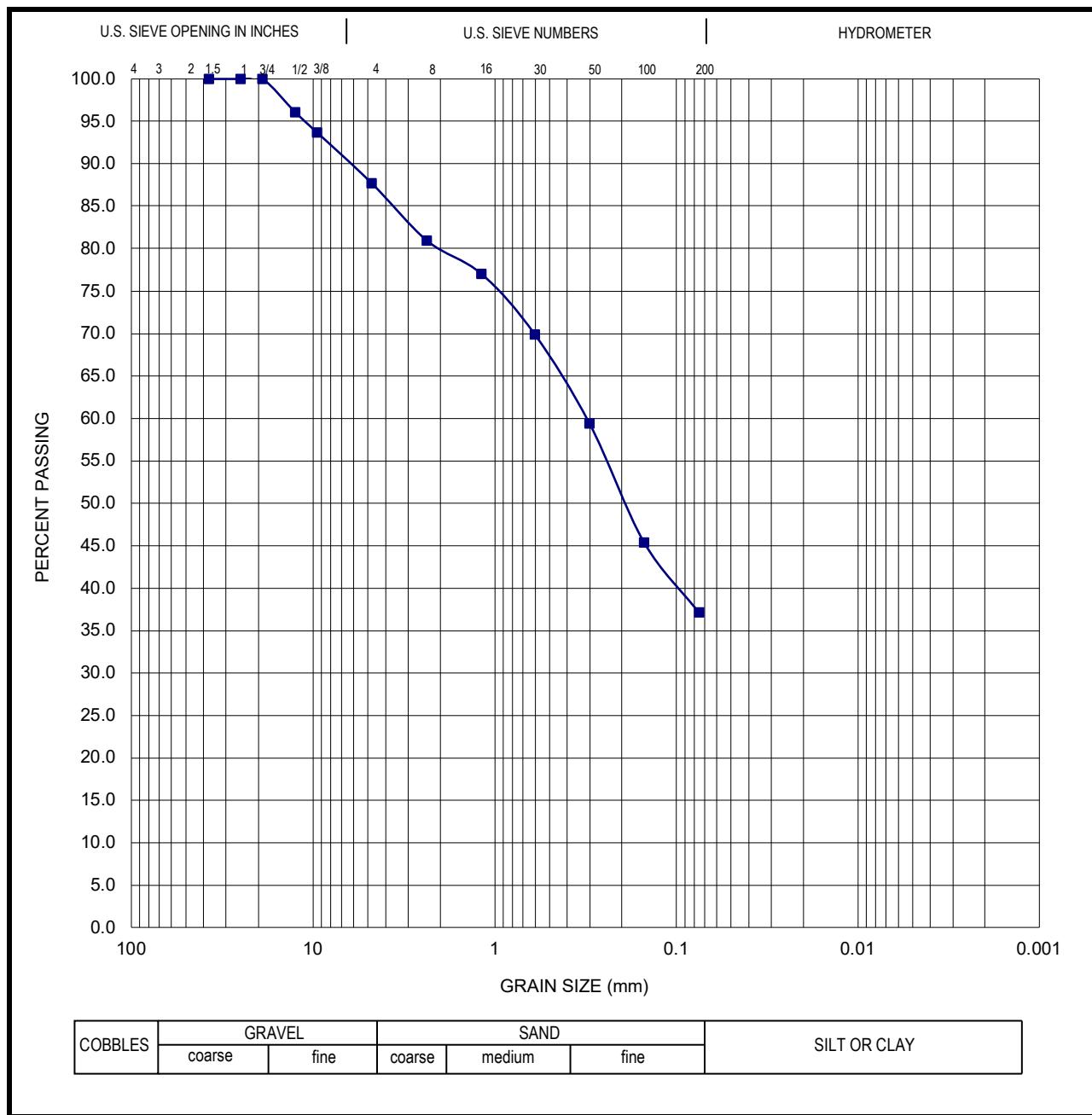
Boring No. (sample depth in feet)	Soil Type (USCS Classification)	Resistivity (ohm-cm)	pH	Chloride (ppm)	Sulfate (ppm)
B2(1.5-2)	Silty Clayey SAND(SC-SM)	3,200	7.1	66	5
B3(1.5-2)	Silty Sandy CLAY(CL-ML)	3,000	7.2	25	1

*Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples at the site:

- The pH is equal to or less than 5.5.
- Chloride concentration is equal to or greater than 500 parts per million (ppm) or 0.05%.
- Sulfate concentration is equal to or greater than 1,500 ppm (0.15%)

**According to the American Concrete Institute 318 Chapter 19, Type II cement may be used where sulfate levels are below 2,000 ppm (0.2%)





Boring: B4

Sieve Date: 1/10/2021

Depth To Sample: 14 - 14.5'

Tested and Computed by: BO

Test Data

Sieve Number	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	96.0	93.7	87.7	80.9	77.0	69.9	59.4	45.4	37.1



Geocon Consultants, Inc.

6671 Brisa Street

Livermore, CA 94550

Telephone: (925) 371-5900

Fax: (925) 371-5915

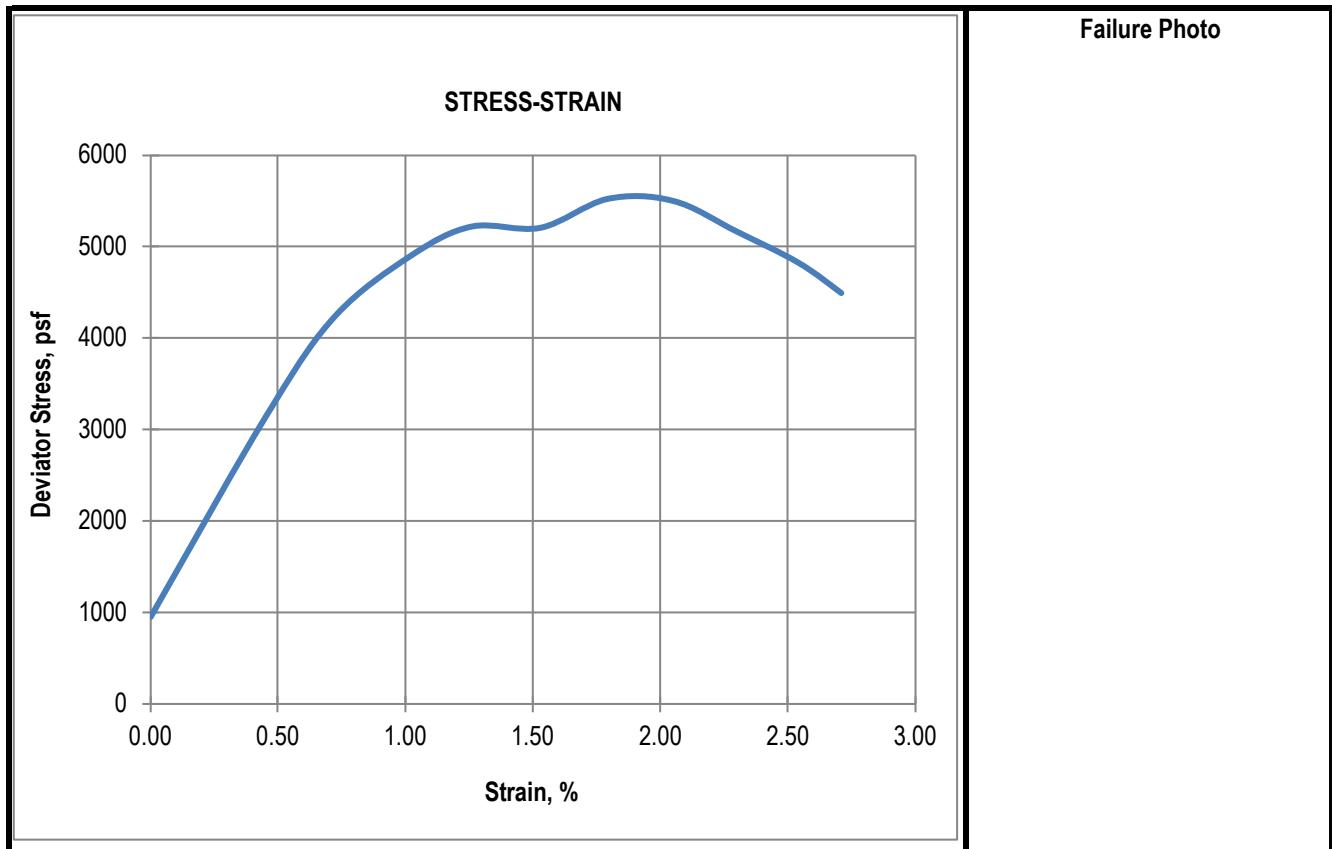
Particle Size Analysis - ASTM D422

Project: Butterfield FS

Location: Morgan Hill, CA

Project No.: E9291-04-01

Figure B2



Sample Description	
Boring Number	B3
Sample Depth (feet)	2'
Material Description	brown & tan sandy CLAY w/ sandstone chunks
Initial Conditions at Start of Test	
Height (inch) average of 3	5.87
Diameter (inch) average of 3	2.38
Moisture Content (%)	8.9
Dry Density (pcf)	128.9
Estimated Specific Gravity	2.7
Saturation (%)	78.4
Shear Test Conditions	
Strain Rate (%/min)	0.4930
Major Principal Stress at Failure (psf)	5520
Strain at Failure (%)	1.8
Test Results	
Unconfined Compressive Strength (tons/ft ²)	2.8
Unconfined Compressive Strength (lbs/ft ²)	5520
Shear Strength (tons/ft ²)	1.4
Shear Strength (lbs/ft ²)	2760
 <p>Geocon Consultants, Inc. 6671 Brisa Street Livermore, CA 94550 Telephone: 925-371-5900 Fax: 925-371-5915</p>	Unconfined Compressive Strength (ASTM D2166)
	Project: Butterfield FS
	Location: Morgan Hill, CA
	Proj. No.: E9291-04-01
	Figure B3

LIST OF REFERENCES

American Concrete Institute, *Building Code Requirements for Structural Concrete and Commentary, ACI 318-14*, 2014.

American Society of Civil Engineers, *Minimum Design Loads for Buildings and Other Structures, ASCE Standard ASCE/SEI 7-16*.

Association of Bay Area Governments, *Interactive Liquefaction Hazard Map*, online: <http://quake.abag.ca.gov/liquefaction/>, accessed May 2022.

California Building Standards Commission, *2019 California Building Code*, based on *2018 International Building Code*, International Code Council.

California Department of Transportation, *Corrosion Guidelines, Version 3.2*, March 2021.

California Geological Survey (CGS) and United States Geological Survey (USGS), *Quaternary Faults and Folds database*, online: <http://geohazards.usgs.gov/qfaults/map.php>

CGS, *Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*, Special Publication 42, Revised 2018.

CGS, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*, Special Publication 117A, 2008.

CGS, *Earthquake Zones of Required Investigation for the Morgan Hill 7.5 Minute Quadrangle, Santa Clara County, California*, 2004.

CGS, *Seismic Hazard Zone Report for the Morgan Hill 7.5 Minute Quadrangle, Santa Clara County, California*, 2004.

County of Santa Clara, *Santa Clara County Geologic Hazard Zones*, 2012.

Dibblee, T.W. and Minch, J.A., *Geologic Map of the Morgan Hill Quadrangle, Santa Clara County, California*, Dibblee Foundation Map DF-159, 2005.

Jennings, C.W. and Bryant, W. A., *2010 Fault Activity Map of California*, CGS Geologic Data Map No. 6, online: <http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html>.

Portland Cement Association, *Concrete Floors on Ground*, 2001.

Pradel, D., *Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils*, ASCE Journal of Geotechnical and Geo-environmental Engineering, April 1998.

Santa Clara Valley Water District, *Santa Clara County Depth to First Groundwater*, https://data-valleywater.opendata.arcgis.com/datasets/6310e5e6ce364c50a4df094332c85b8a_18/ accessed April 2022.

Structural Engineers Association of California, *Seismic Design Maps*: <https://seismicmaps.org/>

USGS, *Liquefaction Susceptibility*: <https://earthquake.usgs.gov/learn/topics/geologicmaps/liquefaction.php>

USGS, *Unified Hazard Tool*: <http://earthquake.usgs.gov/hazards/interactive/>

March 29, 2023

Attachment H



PERFORMANCE REQUIREMENT NO. 3: RUNOFF RETENTION

Design Rainfall Events & Treatment Requirements for WMZs

WMZ ¹	Treatment Options & Design Rainfall	Check Applicable WMZs
WMZ 1	Via optimized infiltration ² , prevent offsite discharge from events up to the 95 th percentile 24-hour rainfall event as determined from local rainfall data.	YES
WMZ 2	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 95 th percentile 24-hour rainfall event as determined from local rainfall data.	
WM 4 *	Via optimized infiltration ² , prevent offsite discharge from events up to the 95 th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 5	Via optimized infiltration ² prevent offsite discharge from events up to the 85 th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 6	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 85 th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 9	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 85 th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 10 *	Via optimized infiltration ² , prevent offsite discharge from events up to the 95 th percentile 24-hour rainfall event as determined from local rainfall data	

Notes:

* Applicable only to those areas that overlay designated Groundwater Basins

1. Includes only those WMZs contained in Santa Clara County.

2. Storage, rainwater harvesting, and/or evapotranspiration may be used when infiltration is optimized.

March 29, 2023

Attachment I



**PERFORMANCE REQUIREMENT NO. 3:
RUNOFF RETENTION**

LID Site Assessment Checklist

ITEMS TO DOCUMENT:	INCLUDED?
1. Site topography	<input checked="" type="checkbox"/>
2. Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs	<input checked="" type="checkbox"/>
3. Depth to seasonal high groundwater	<input type="checkbox"/>
4. Locations of groundwater wells used for drinking water	<input type="checkbox"/>
5. Depth to an impervious layer such as bedrock	<input type="checkbox"/>
6. Presence of unique geology (e.g., karst)	<input type="checkbox"/>
7. Geotechnical hazards	<input type="checkbox"/>
8. Documented soil and/or groundwater contamination	<input type="checkbox"/>
9. Soil types and hydrologic soil groups	<input checked="" type="checkbox"/>
10. Vegetative cover/trees	<input type="checkbox"/>
11. Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)	<input type="checkbox"/>
12. Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains	<input checked="" type="checkbox"/>
13. Structures including retaining walls	<input type="checkbox"/>
14. Utilities	<input checked="" type="checkbox"/>
15. Easements	<input checked="" type="checkbox"/>
16. Covenants	<input type="checkbox"/>
17. Zoning/Land Use	<input checked="" type="checkbox"/>
18. Setbacks	<input checked="" type="checkbox"/>
19. Open space requirements	<input type="checkbox"/>
20. Other pertinent overlay(s)	<input type="checkbox"/>

March 29, 2023

Attachment J



**PERFORMANCE REQUIREMENT NO. 3:
RUNOFF RETENTION**

LID Site Design Measures

	DESIGN MEASURE	INCORPORATED?
1.	Defining the development envelope, identifying the protected areas, and identifying areas that are most suitable for development and areas to be left undisturbed	YES
2.	Identifying conserved natural areas, including existing trees, other vegetation, and soils (shown on the plans)	YES
3.	Limit the overall impervious footprint of the project	YES
4.	Design of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	YES
5.	Set back development from creeks, wetlands, and riparian habitats	YES
6.	Design conforms the site layout along natural landforms	YES
7.	Design avoids excessive grading and disturbance of vegetation and soils	YES

I, Nicholas Gomez, acting as the Project Engineer for BKF Engineers
 project, located at 17295 Butterfield Blvd, hereby state that LID Site
 Design Measures indicated above have been incorporated into the design of the project.

Signature

Nicholas Gomez

03/29/2023

Date

March 29, 2023

Attachment K



Morgan Hill - Fire Station - Maintenance Schedule for Stormwater BMPs
3/29/2023
Stormwater Planters

	General	Stormwater Planters			Responsible Party
		Soil	Plants	Mulch	
Initially	<ul style="list-style-type: none"> Schedule installation following major site grading. 	<ul style="list-style-type: none"> Install per project plans; do not modify or use different soil mixture. 	<ul style="list-style-type: none"> Install per project plans; do not substitute with plants that can not tolerate fluctuating water conditions. Water plant material until established. 	<ul style="list-style-type: none"> Install per project plans; do not use grass clippings or animal waste. 	Contractor
Weekly	<ul style="list-style-type: none"> Remove trash and debris. 		<ul style="list-style-type: none"> Water as needed. Refer to the city of Emeryville watering restriction guidelines. 		City of Morgan Hill
Monthly	<ul style="list-style-type: none"> Inspect surface drainage systems to ensure clear flowlines. Remove trash and debris. 	<ul style="list-style-type: none"> Repair soil surfaces damaged by erosion, vehicles, rodents, etc., as needed. 	<ul style="list-style-type: none"> Check plants for signs of distress (wilting, yellow/brown leaves, pest problems, etc.) Weed by hand for first two years, as needed. Remove plant debris which may contain pollutants. 	<ul style="list-style-type: none"> Check mulch cover & spot mulch by hand to fill in voids, as needed. 	City of Morgan Hill
Annually				<ul style="list-style-type: none"> Inspect during the wet season (October 1 to April 30) to ensure it is being retained. Remove from treatment control measures that drain off-site. 	City of Morgan Hill
Spring Maintenance	<ul style="list-style-type: none"> Inspect and repair irrigation system. Inspect underground proprietary products. Remove sediment buildup and unclog underdrains. 	<ul style="list-style-type: none"> Test soil pH to check for acidity or alkalinity. Soils shall be tested by an analytical lab to provide saturation, pH, E.C., dissolve salts, infiltration rate, organic matter, CEC, and SAR data. Amend soil per soil analysis recommendations. Repair erosion at inflow points. 	<ul style="list-style-type: none"> Replace diseased plating material 	<ul style="list-style-type: none"> Replenish mulch cover with a fresh mulch layer per project plans 	City of Morgan Hill
Fall Maintenance	<ul style="list-style-type: none"> Inspect and repair irrigation system. Inspect underground proprietary products. Remove sediment buildup. 	<ul style="list-style-type: none"> Repair erosion at inflow points. 	<ul style="list-style-type: none"> Clean dead debris. Prune if necessary. Remove severely diseased or dead vegetation. Replace vegetation as needed. 	<ul style="list-style-type: none"> Remove trash and debris 	City of Morgan Hill
Every Five Years		<ul style="list-style-type: none"> Replace soils per project plans; as needed when pollutants reach toxic levels for plants; when sedimentation and/ or compaction reduces effectiveness of BMP. Soils shall be tested by an analytical lab to provide saturation, pH, E.C., dissolve salts, infiltration rate, organic matter, CEC, and SAR data. 	<ul style="list-style-type: none"> Replace vegetation, as needed, depending on sediment load. 	<ul style="list-style-type: none"> Remove and replace entire mulch area, as needed. Dispose of old mulch properly before new mulch is distributed. Replenish mulch per project plans 	City of Morgan Hill

March 29, 2023

Attachment L





coar
DESIGN GROUP
previously **JKA**

200 E STREET, SANTA ROSA, CA 95404
619.698.9177 | www.coargroup.com

BKF
980 19TH STREET
SUITE 2300
SACRAMENTO, CA 95814
(916) 556-5800
www.bkf.com

PROJECT:
CITY OF MORGAN HILL
BUTTERFIELD FIRE
STATION
17285 Butterfield Blvd.
Morgan Hill, CA 95037



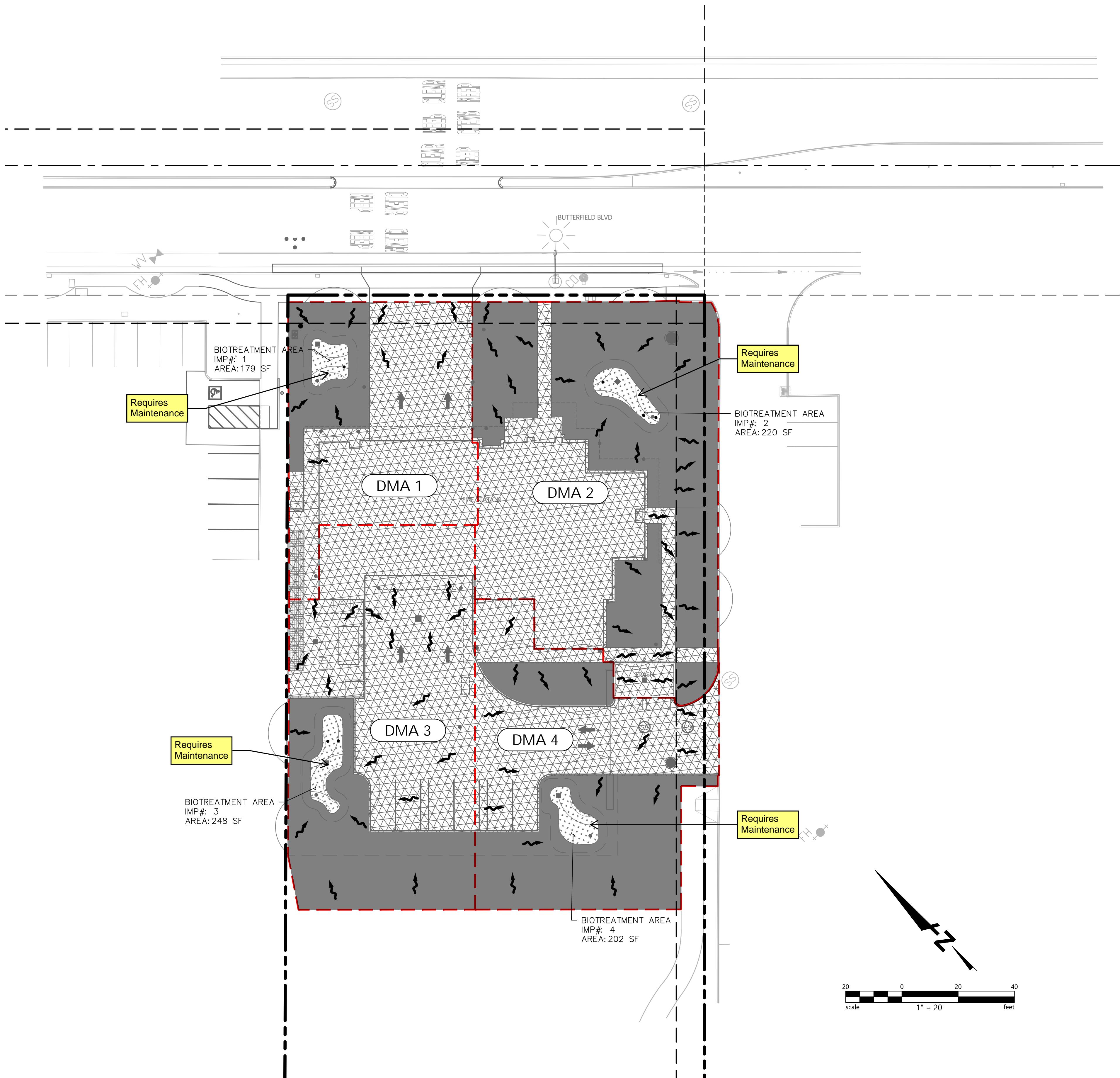
DESCRIPTION: 01/16/23
95% CONSTRUCTION DOCUMENTS
100% CONSTRUCTION DOCUMENTS 03/23/23

PROJECT NUMBER: 211224

SHEET TITLE: STORMWATER MANAGEMENT PLAN

SHEET NUMBER:

C6.0



SURFACE CLASSIFICATION	A	B
	Pre-Project (sq. ft.)	Post-project (sq. ft.)
IMPERVIOUS	8,619	17,866
PERMEABLE	23,762	14,515
Totals:	32,381	32,381

LEGEND:
 IMPERVIOUS SURFACE
 PERVIOUS SURFACE
 BIORETENTION AREA

[DMA] NAME	(1) DMA Area (sf)	(2) Previous Area (sf)	(3) Imperious Area (sf)	(4) Retention Tributary Area* (1) - (2) = (4)	(5) Runoff Coefficient**	(6) 95th Percentile 24-hr Rainfall Depth (in)		(7) Required Retention Volume (cu ft) (4)(5)(6)/12=(7)	(8) Available Retention Volume*** (cu ft) (10)(11)*40%=(8)	(9) % Replacement of Imperious Credit	(10) Available Bioretention Area (sf)	(11) Gravel storage Depth (ft)
						(6) 95th Percentile 24-hr Rainfall Depth (in)	(7) Required Retention Volume (cu ft) (4)(5)(6)/12=(7)					
DMA 1	5,515	1,193	4,135	2,12	0.54	1.70	166	179	50%	179	2.5	
DMA 2	10,955	6,096	4,590	4,427	0.29	1.70	182	214	10%	214	2.5	
DMA 3	8,734	2,757	5,720	4,466	0.45	1.70	287	297	35%	248	3.0	
DMA 4	7,149	3,517	3,392	3,416	0.32	1.70	156	162	5%	202	2.0	
TOTAL	32,354	13,563	17,837	14,470			635	852	100%	843		

* Sized reduced by 0.5 x (8,641 sf x % Replacement of impervious Credit (9)) to calculate Retention Tributary Area

** Runoff factor calculated using WEF Manual of Practice Equation C = 0.858I³ - 0.78I² + 0.774I + 0.04 where "I" is %Imperious

*** Porosity of gravel assumed to be 40%