



MEMORANDUM

TO: San Diego Gas & Electric **DATE:** November 17, 2016

FROM: Justin W. Griffiths, P.E., CFM, QSD/QSP – NV5

SUBJECT: Sycamore-Penasquitos 230kV Transmission Line Project-TL23071 Underground Segment: Scour Potential Evaluation

This memorandum has been prepared to assist San Diego Gas & Electric Company (SDG&E) in satisfying Mitigation Measure (MM) Hydrology-5: Protection from Scour in the Mitigation Monitoring Compliance and Reporting Program (MMCRP) for the Sycamore-Penasquitos 230-kV Transmission Line Project (Project).

MM Hydrology 5: Protection from Scour states:

“At locations where the buried power line is to be at or adjacent to a stream bed capable of scour, the power line shall be located below the expected depth of scour from a 100-year flood, or otherwise protected from exposure by scour which, for purposes of this mitigations measure, also includes lateral (streambank) erosion and potential scour associated with flows overtopping or bypassing a culvert or bridge crossing. During final design, a registered civil engineer with expertise in hydrology, hydraulics, and river mechanics shall make a determination of where the underground line could be at risk of exposure through scour or erosion from a 100-year event. Plans for burying the line below the 100-year scour depth, or otherwise protecting the line from erosion, shall be submitted to CPUC for review and approval prior to construction.”

This memorandum identifies areas along the entire underground transmission alignment that could potentially be subject to erosion from a 100-year storm event due to their proximity to the current effective (as of the date of this memorandum) Federal Emergency Management Agency (FEMA) 100-year floodplain limits. Two areas where exposure due to scour could potentially occur were identified: 1. Culvert crossings and, 2. Areas adjacent to stream locations. Findings described below are based strictly on the 100-year floodplain limits defined on the current effective FEMA maps. No new hydrologic, hydraulic, or sediment transport analyses were performed for this evaluation. Structural and geotechnical type failures associated with existing facilities were not included in this analysis.

1. Culvert Crossings

Two road culvert crossing locations (see Figures 1 and 2) were identified along the underground transmission alignment where the current effective FEMA 100-year floodplain intersects the trench package. The trench package will cross over the top of the existing reinforced concrete box culverts that allow water to flow under Carroll Canyon Road and Pomerado Road. Scour at each culvert crossing could potentially occur in the upstream and downstream headwall embankment and invert areas or during storm events that produce runoff which exceeds the flood-carrying capacity of the culverts and overtops the roadways. At location 1, the proposed trench section is a minimum of 36 inches deep (top-of-conduit), and will be backfilled with alternating layers of concrete and flowable thermal material. At location 2, the proposed trench section varies between 18 and 24 inches deep and will be backfilled with concrete. See Exhibits 1 and 2 for the specific alignment location and profile view.

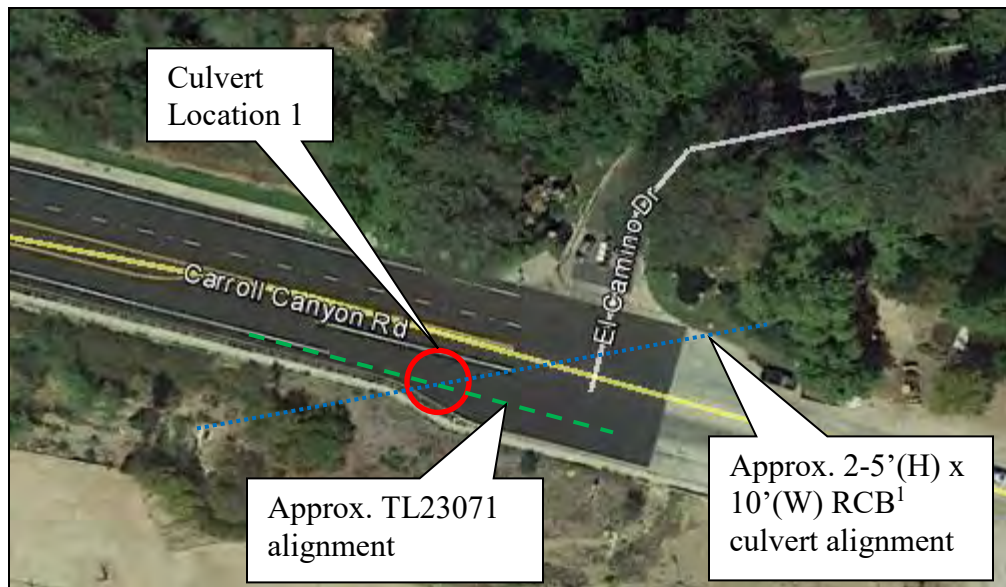


Figure 1: Culvert Location 1

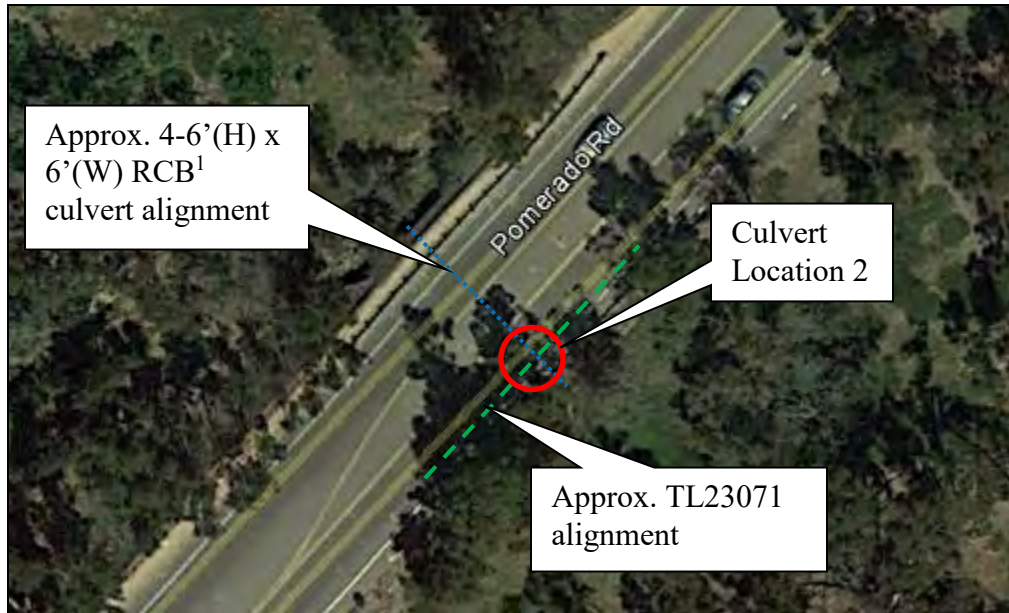


Figure 2: Culvert Location 2

Due to the presence of the concrete encased duct bank (see Exhibit 3 for standard details), the risk for water to scour the concrete and expose the buried conduits is low.

2. Areas Adjacent or Within the FEMA Floodplain Limits

Carroll Canyon Creek flows east to west and parallels the proposed alignment for its entire length. There are three segments where the alignment is directly adjacent to or within the effective FEMA 100-year floodplain limits. These areas are described below:

- Station 16+50 (approximate end of west access road) to 63+00 (approximate location of Culvert Crossing #1). This location is adjacent to the current effective FEMA 100-year floodplain as shown in Figure 3.

¹Culvert dimensions are from the preliminary design plans (attached) and their use in this memorandum does not validate their size.

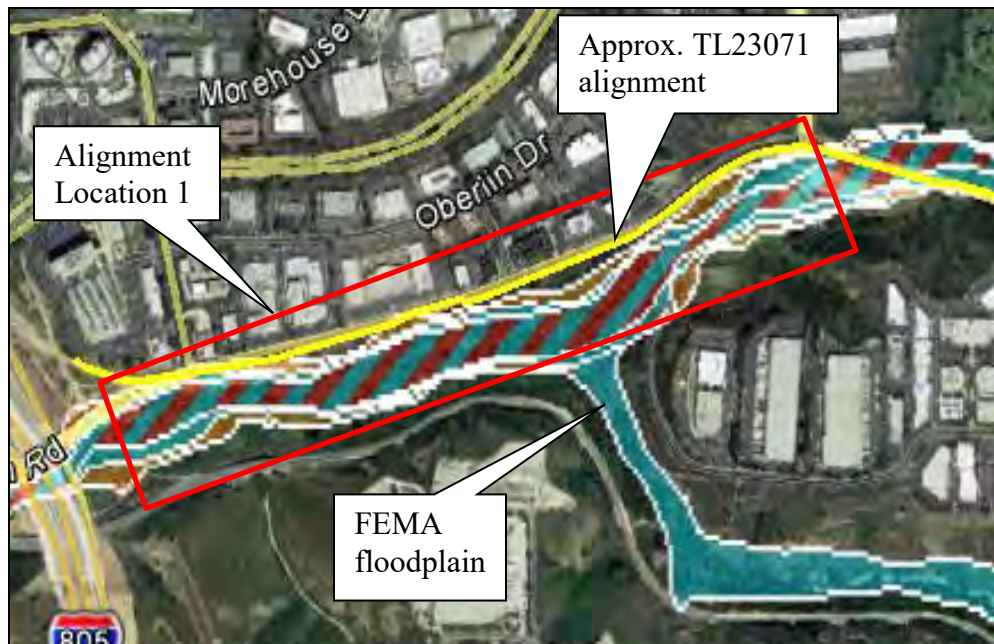


Figure 3: Alignment Location 1

- Approximate Station 200+00 to 204+00 (on Trade Street between Silverton Avenue and Dunbrook Road). The current effective FEMA Zone A floodplain limits associated with a tributary branch of Carroll Canyon Creek intersects the trench package on Trade Street (Figure 4).

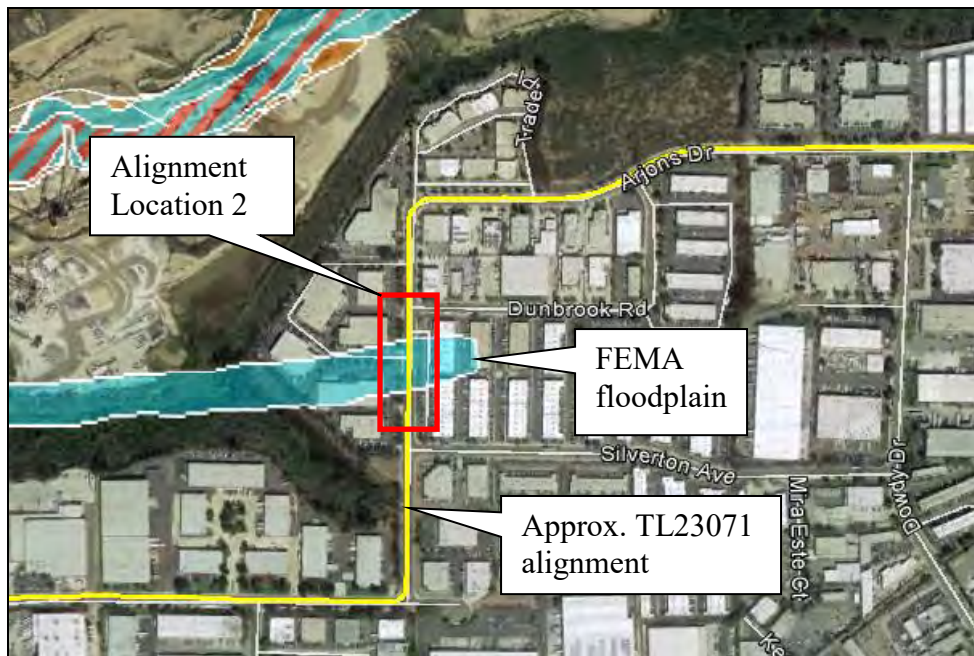


Figure 4: Alignment Location 2

- Station 348+00 (near I-15) to 581+00 (upstream of Semillon Boulevard). The majority of this segment is adjacent to FEMA floodplain limits; however, a small portion on the eastern end of this segment intersects the FEMA floodplain zone (Figure 5).

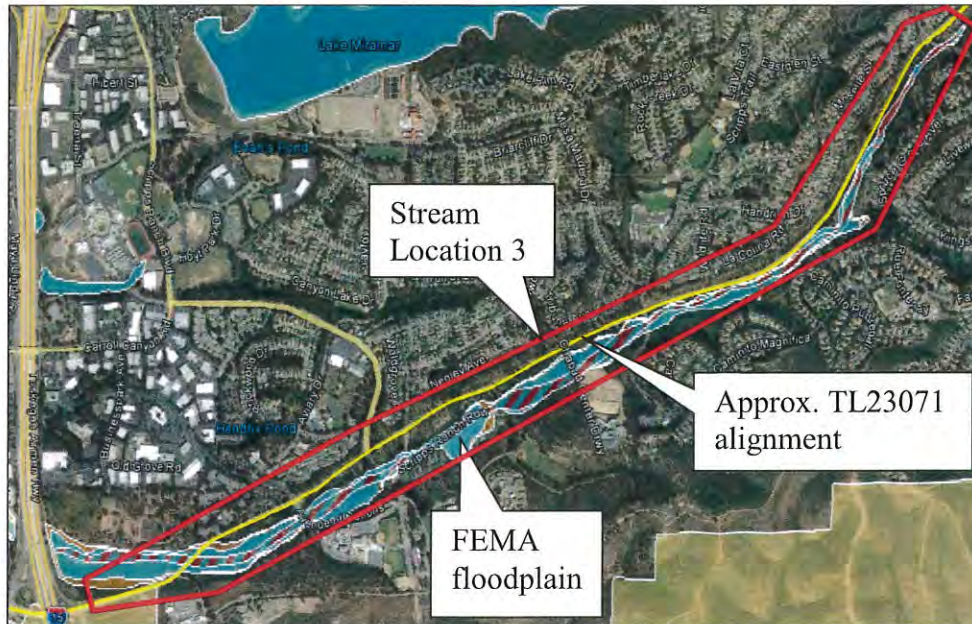
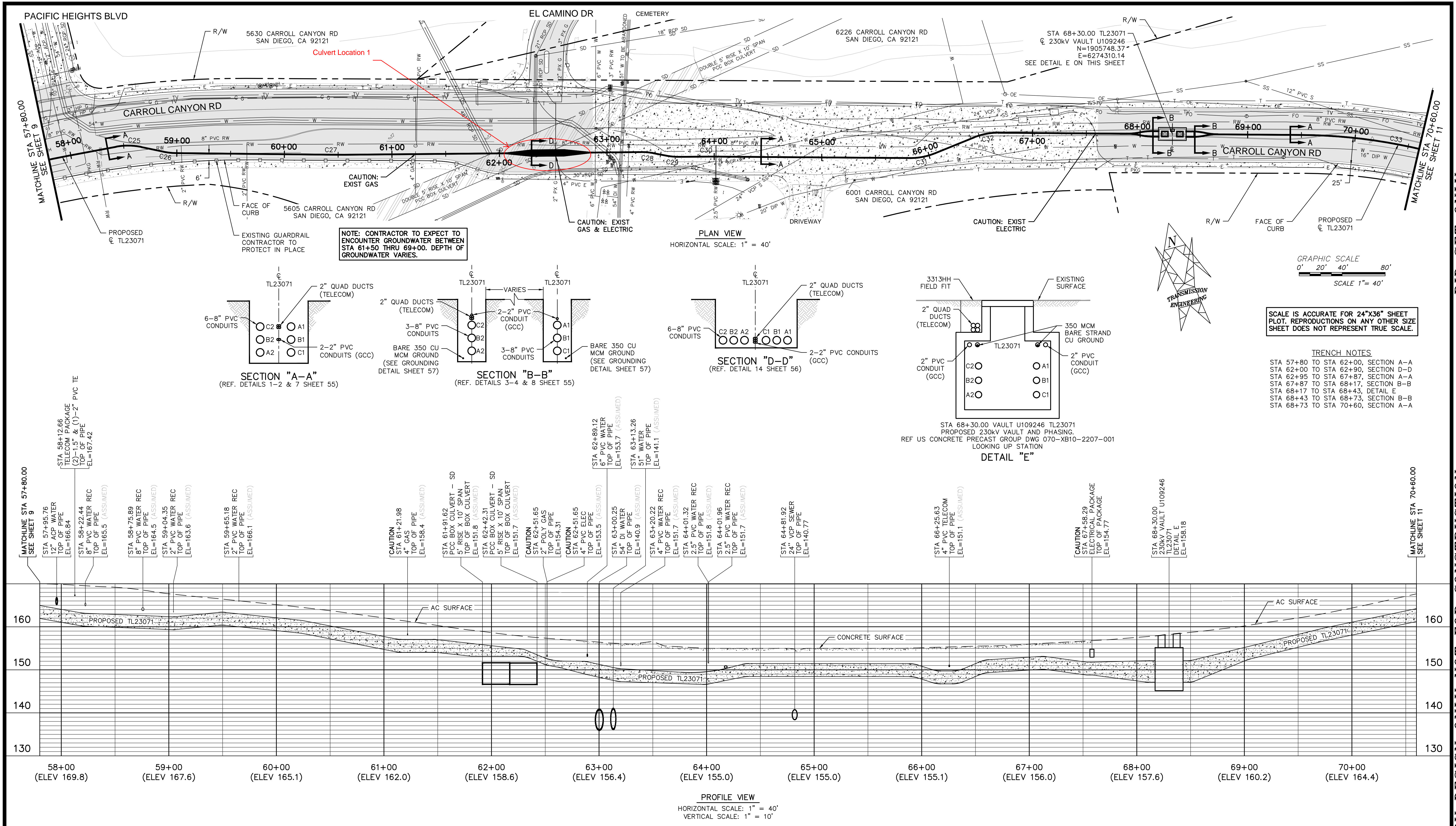


Figure 5: Alignment Location 3

Exhibit 3 shows the trench sections and duct bank conduits proposed to be used throughout the alignment. The duct bank conduits shown in these details are encased in concrete and typically feature a flowable thermal material backfill (FTB) on top of the encasement. The presence of the concrete encasement and hardened FTB will serve to protect the conduits from exposure due to scour should flowing water ever contact the proposed trench sections. The risk for water to scour the concrete and expose the buried conduits as a result of lateral stream migration (i.e. changes in the geomorphology of Carroll Canyon Creek and its tributaries that would cause floodplain limits to shift) is low.

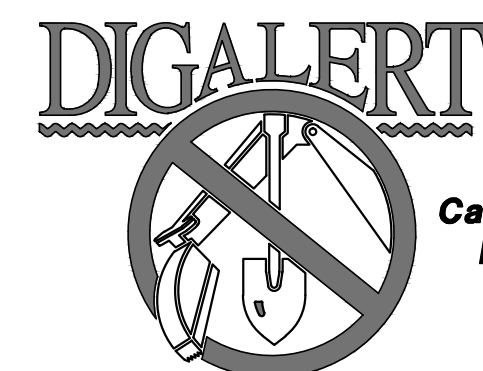


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VERTICAL: 1"=10'	REV	BUDGET	CONST ORDER

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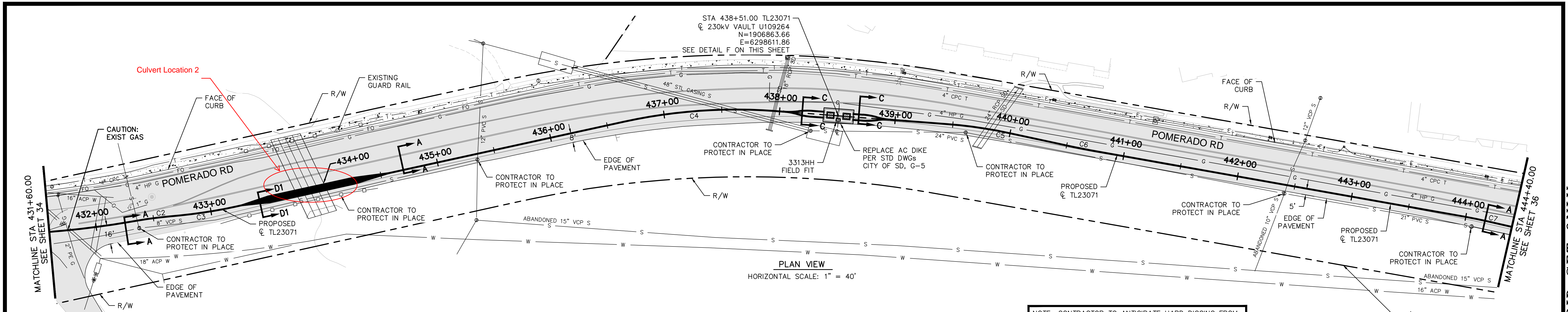
SCALE: H 1"=40' V 1"=10'

SHEET 10 OF 65

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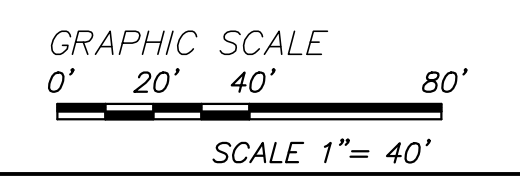
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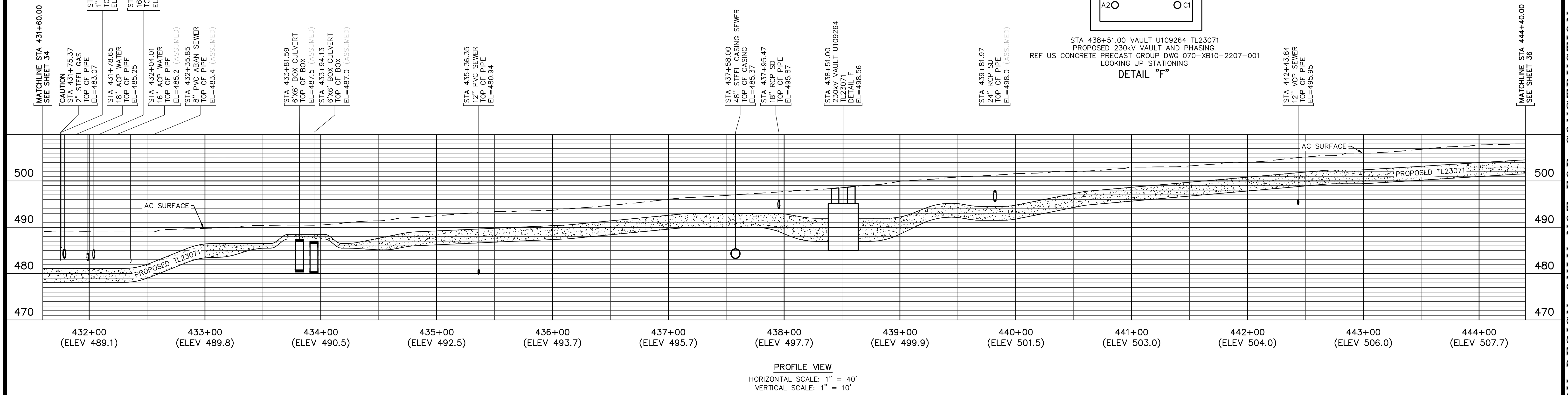
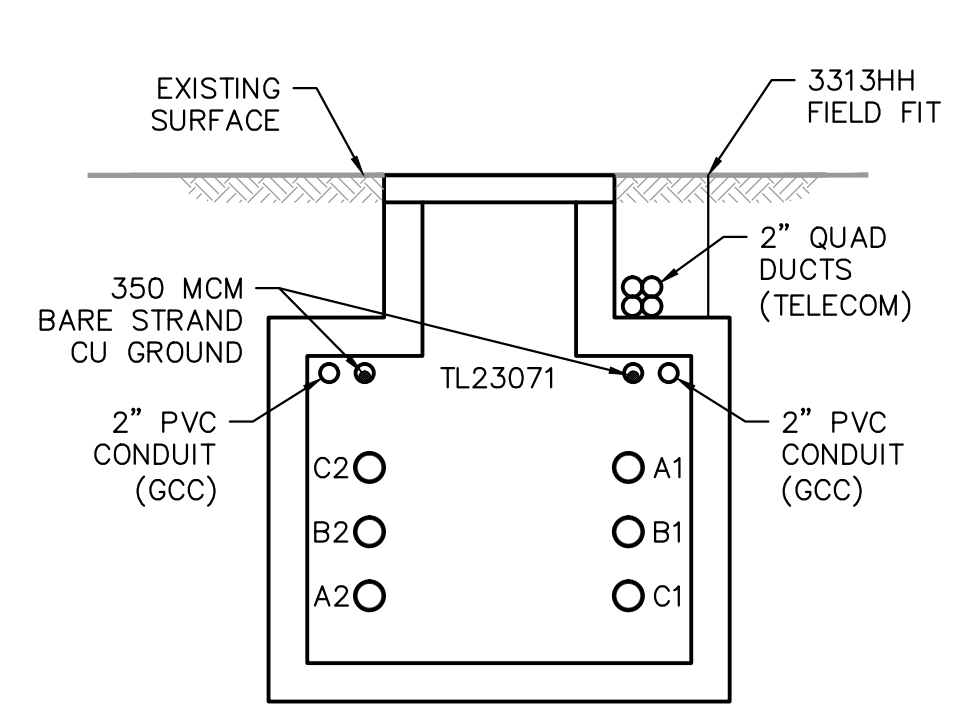
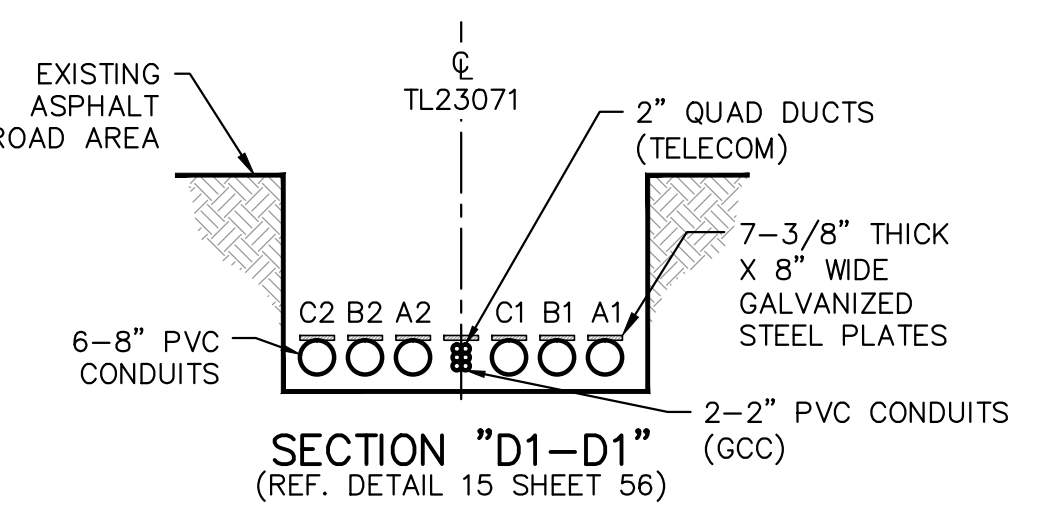
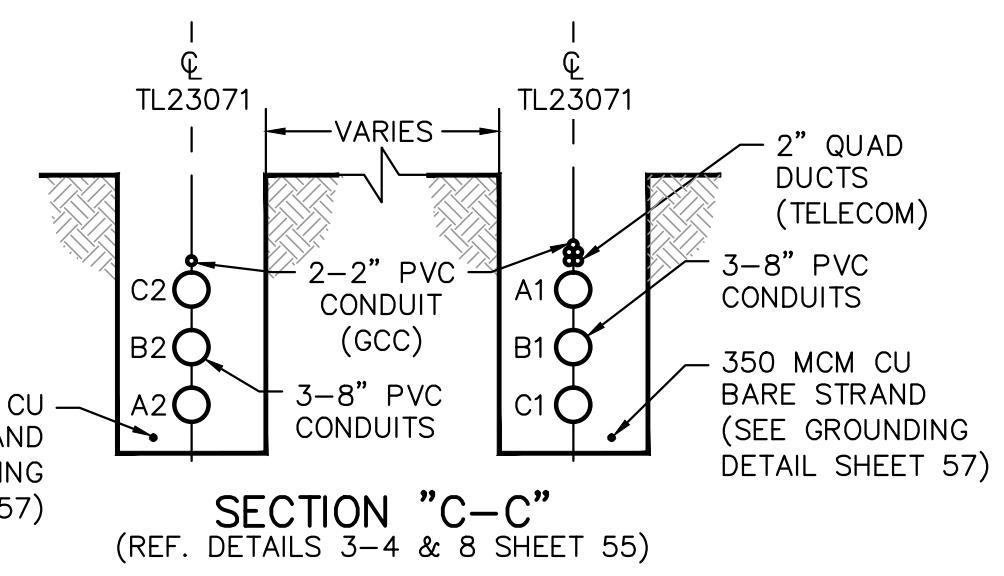
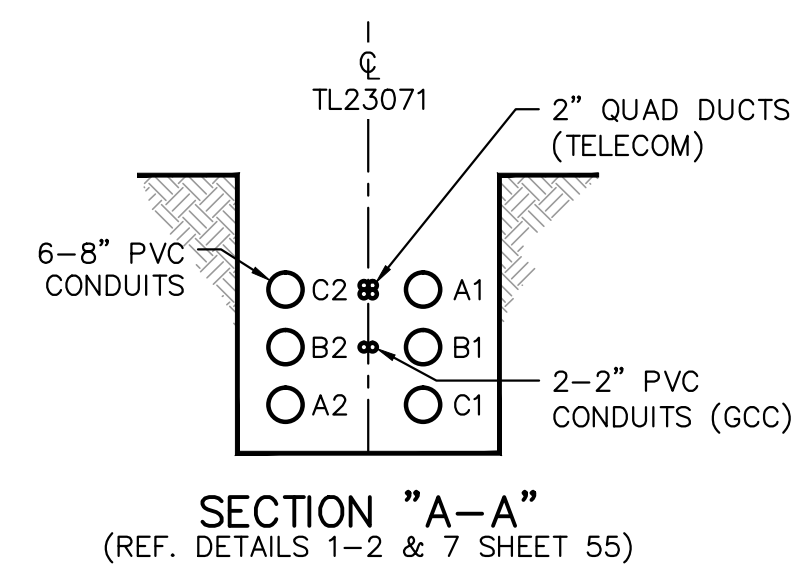
PLAN VIEW
HORIZONTAL SCALE: 1" = 40'

NOTE: CONTRACTOR TO ANTICIPATE HARD DIGGING FROM STA 440+00 TO STA 460+00. TRENCHING ANTICIPATED TO BE ACCOMPLISHED WITH TRADITIONAL METHODS.



SCALE IS ACCURATE FOR 24"x36" SHEET PLOT. REPRODUCTIONS ON ANY OTHER SIZE SHEET DOES NOT REPRESENT TRUE SCALE.

TRENCH NOTES
 STA 431+60 TO STA 433+10, SECTION A-A
 STA 433+10 TO STA 434+65, SECTION D1-D1
 STA 434+65 TO STA 438+01, SECTION A-A
 STA 438+01 TO STA 438+38, SECTION C-C
 STA 438+38 TO STA 438+64, DETAIL F
 STA 438+64 TO STA 438+97, SECTION C-C
 STA 438+97 TO STA 444+40, SECTION A-A



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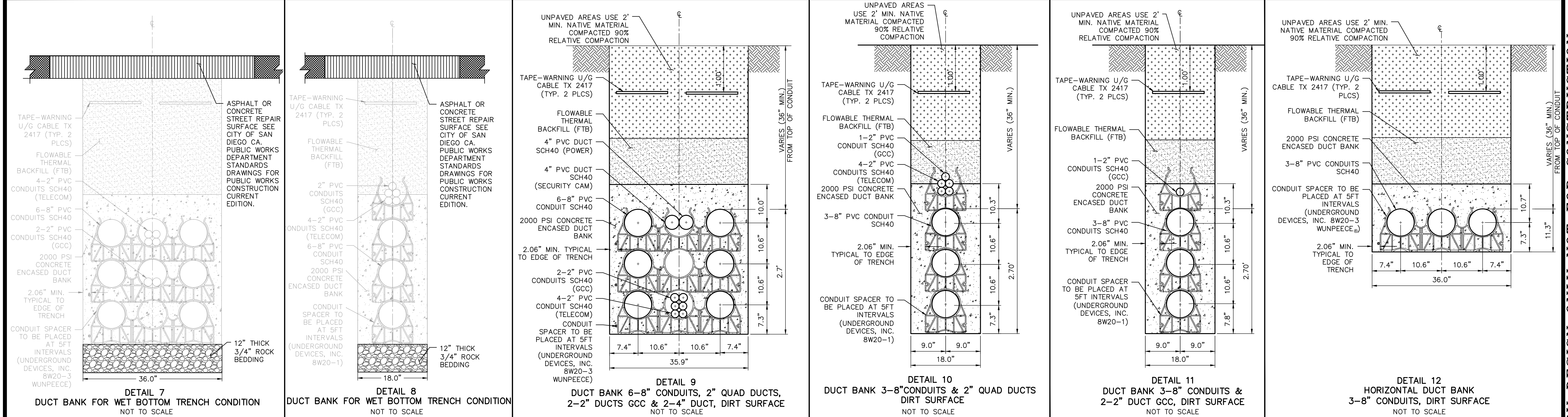
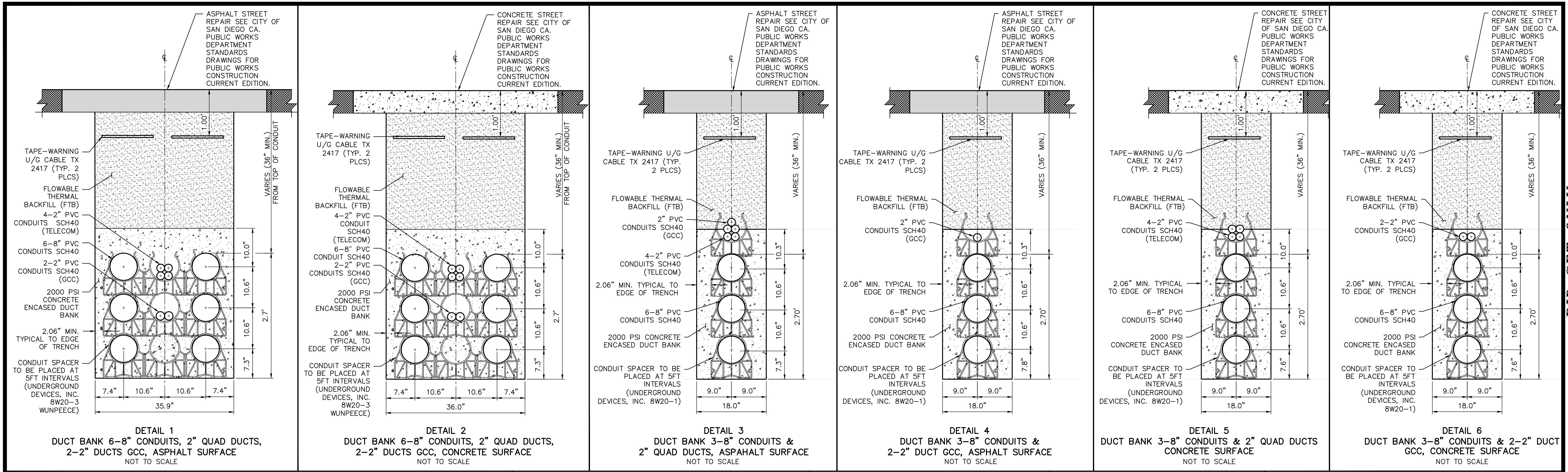
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EXHIBIT 3



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SECTION DETAILS
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SCALE: N/A

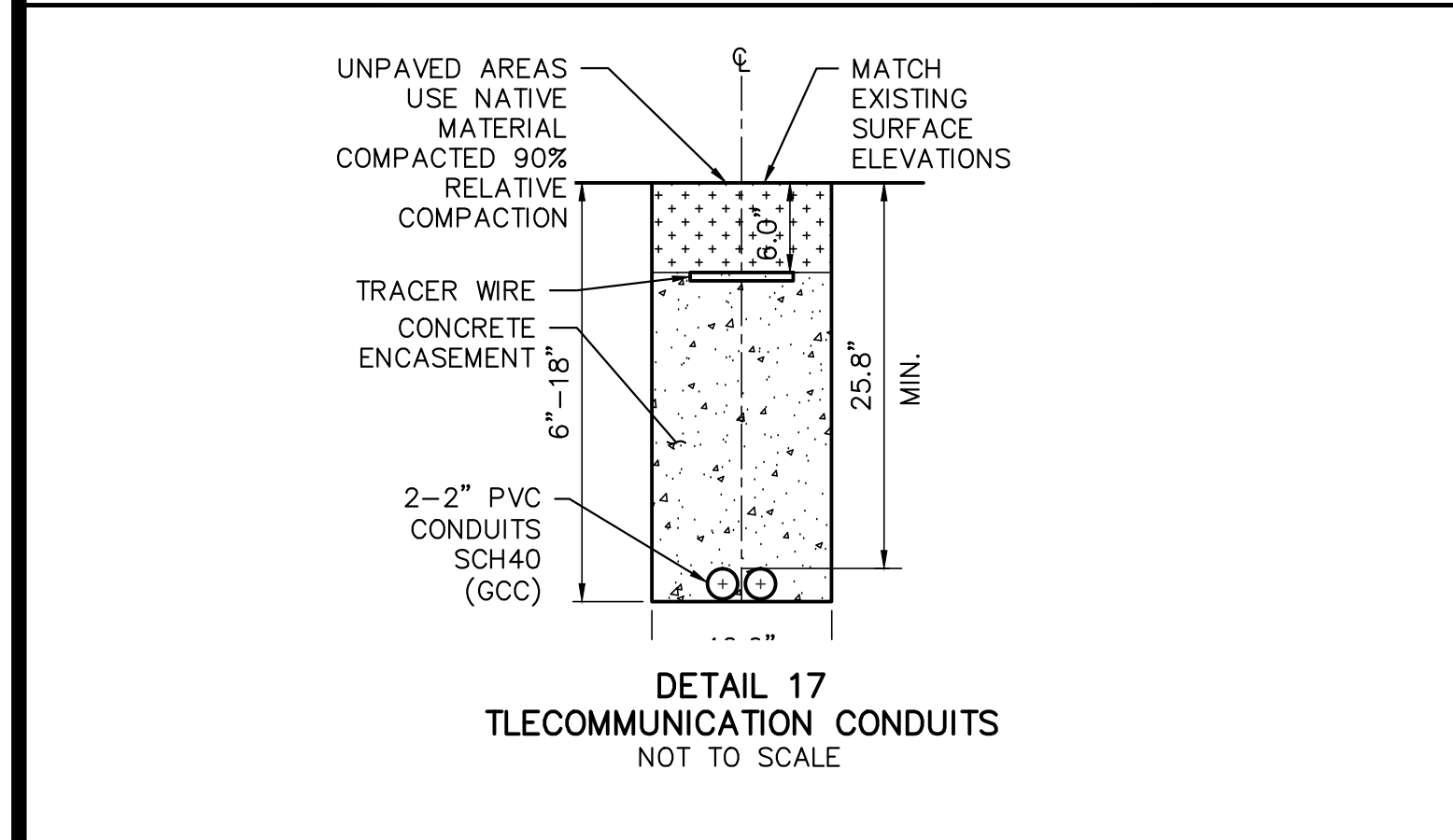
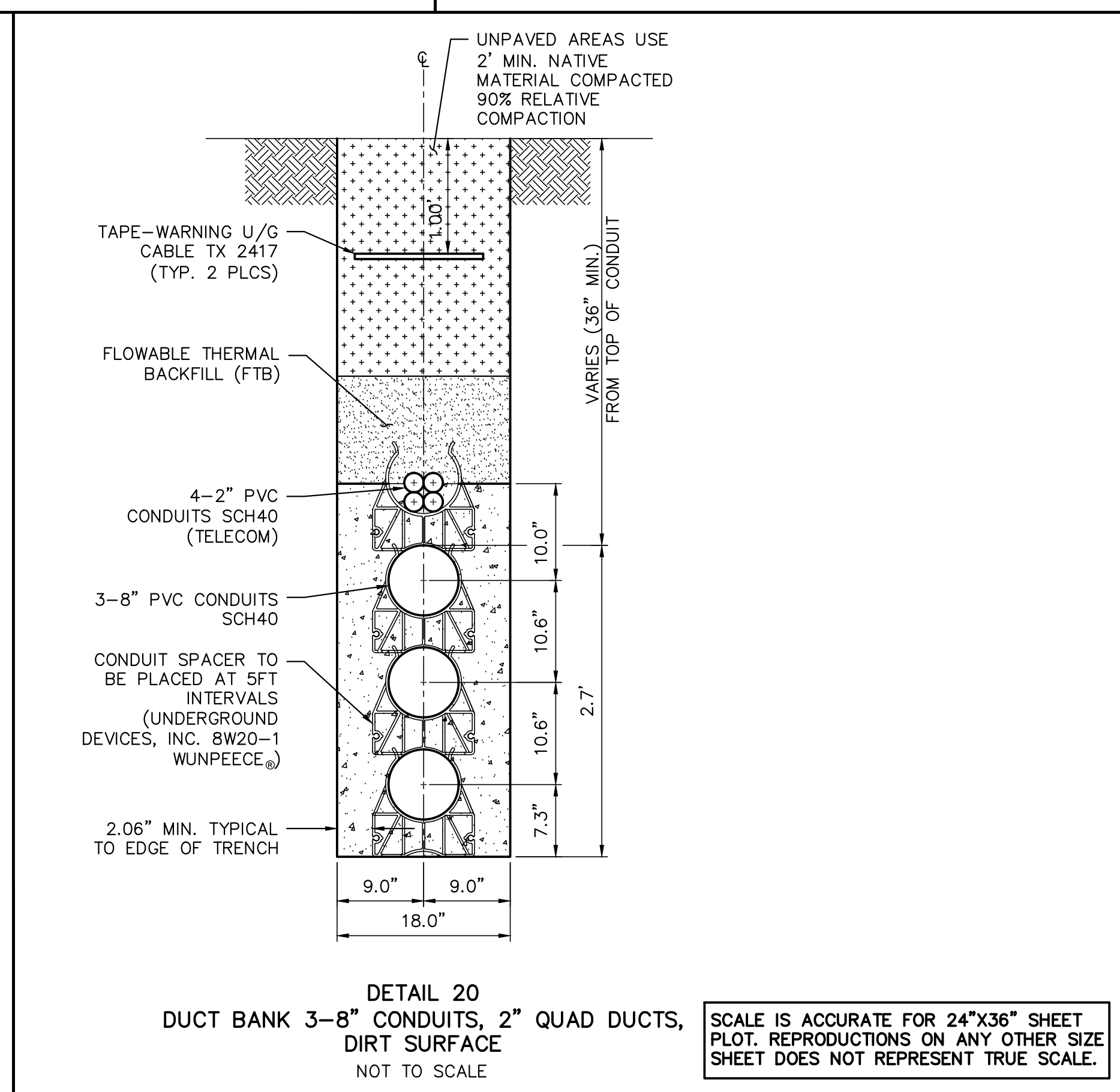
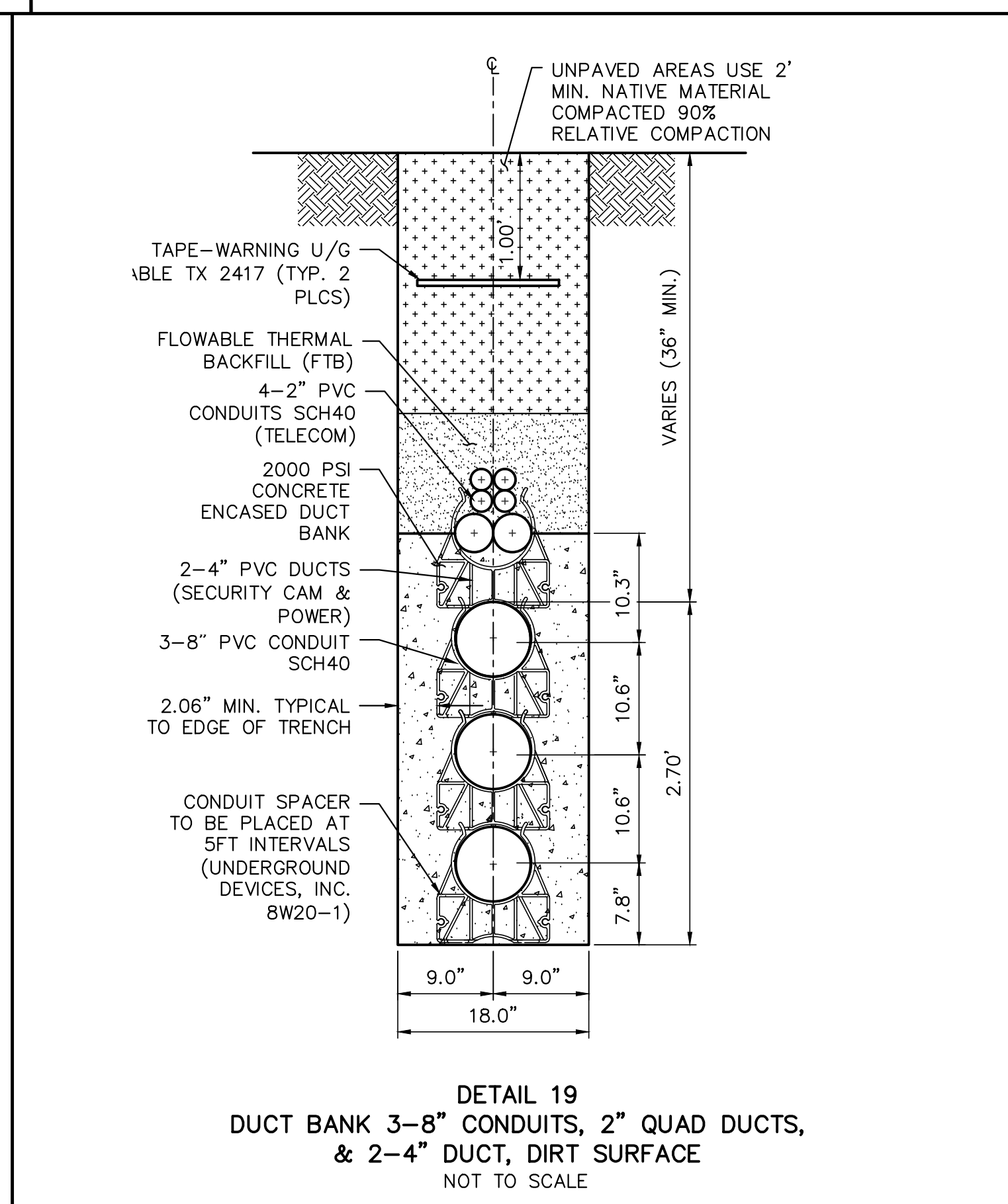
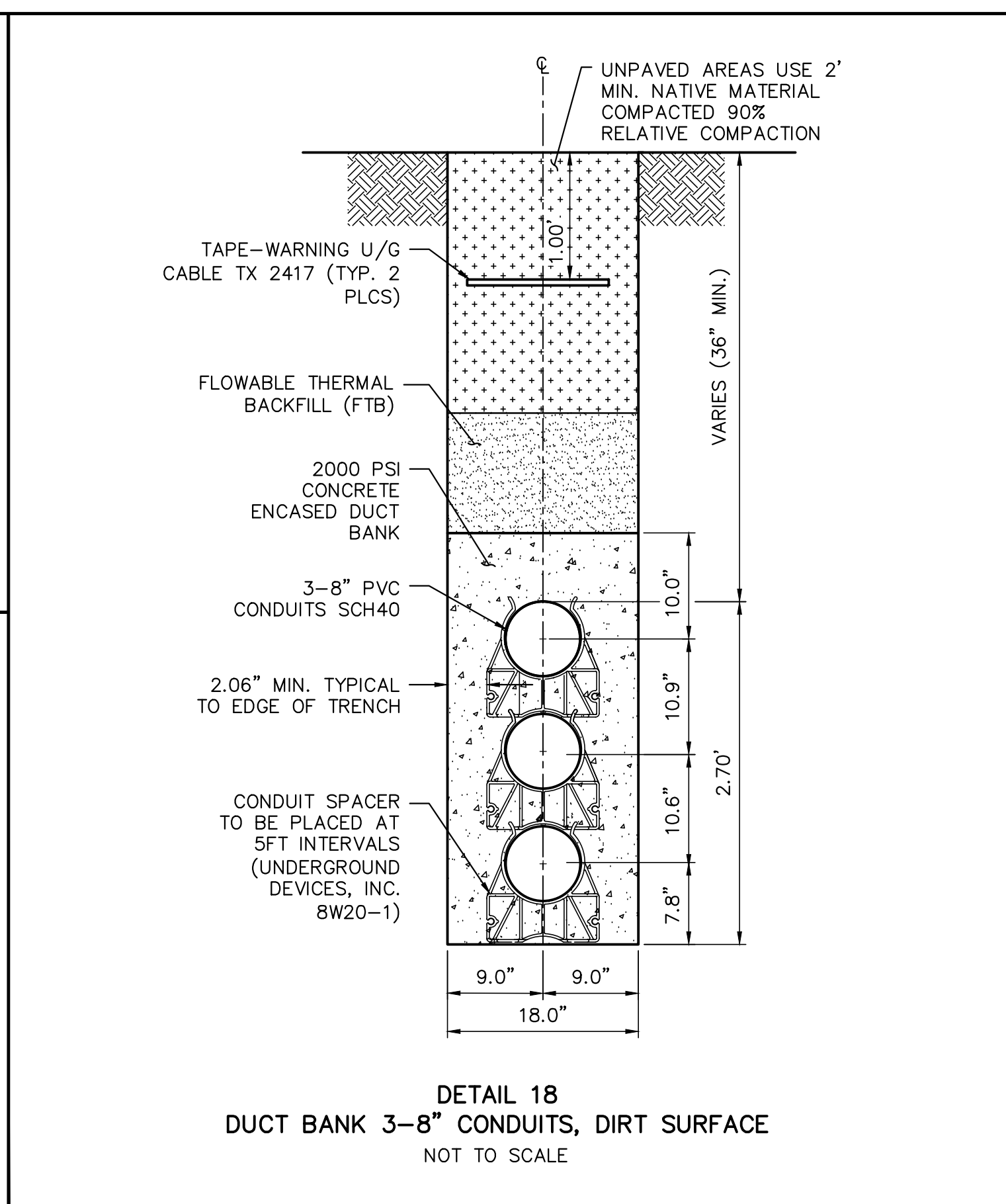
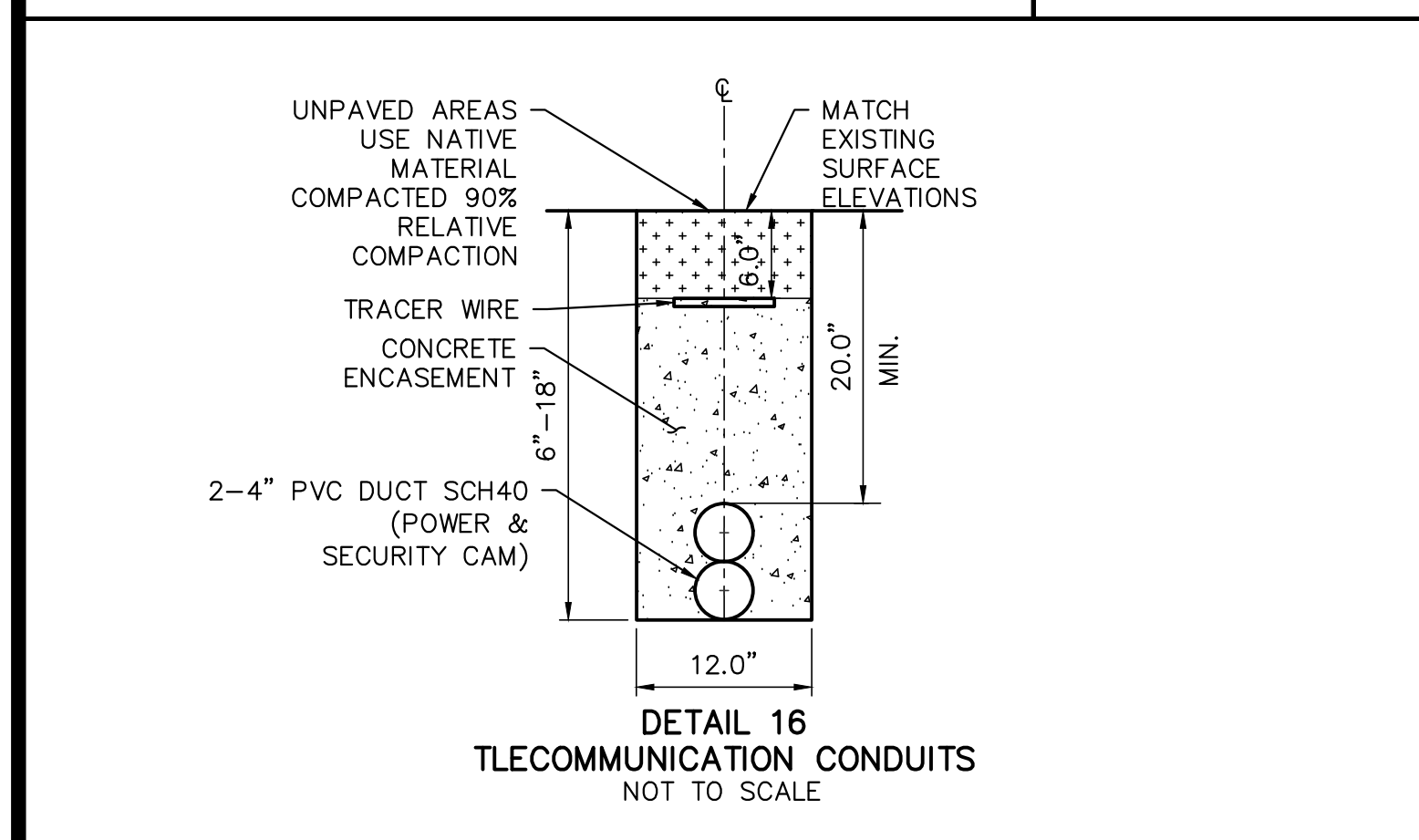
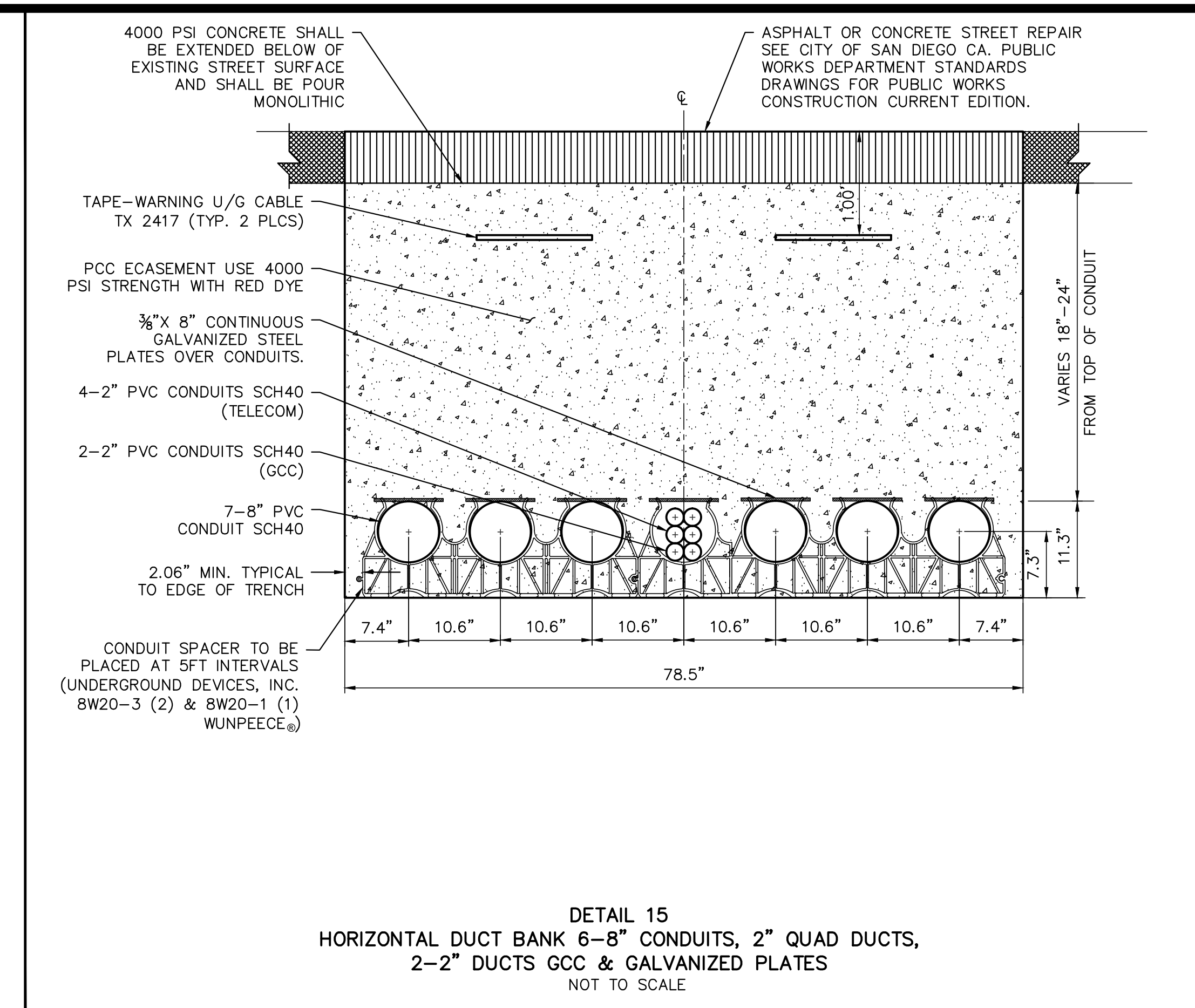
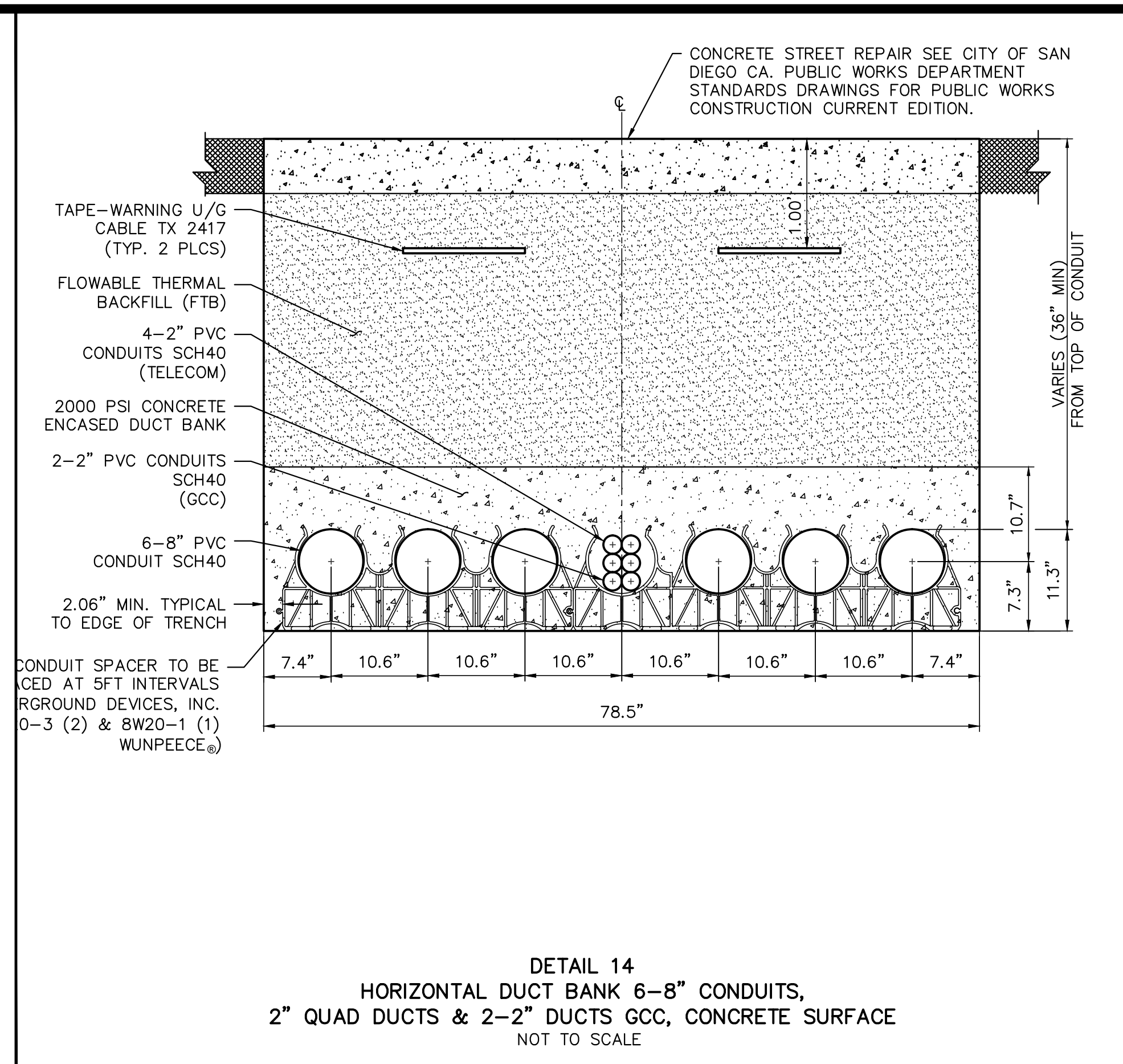
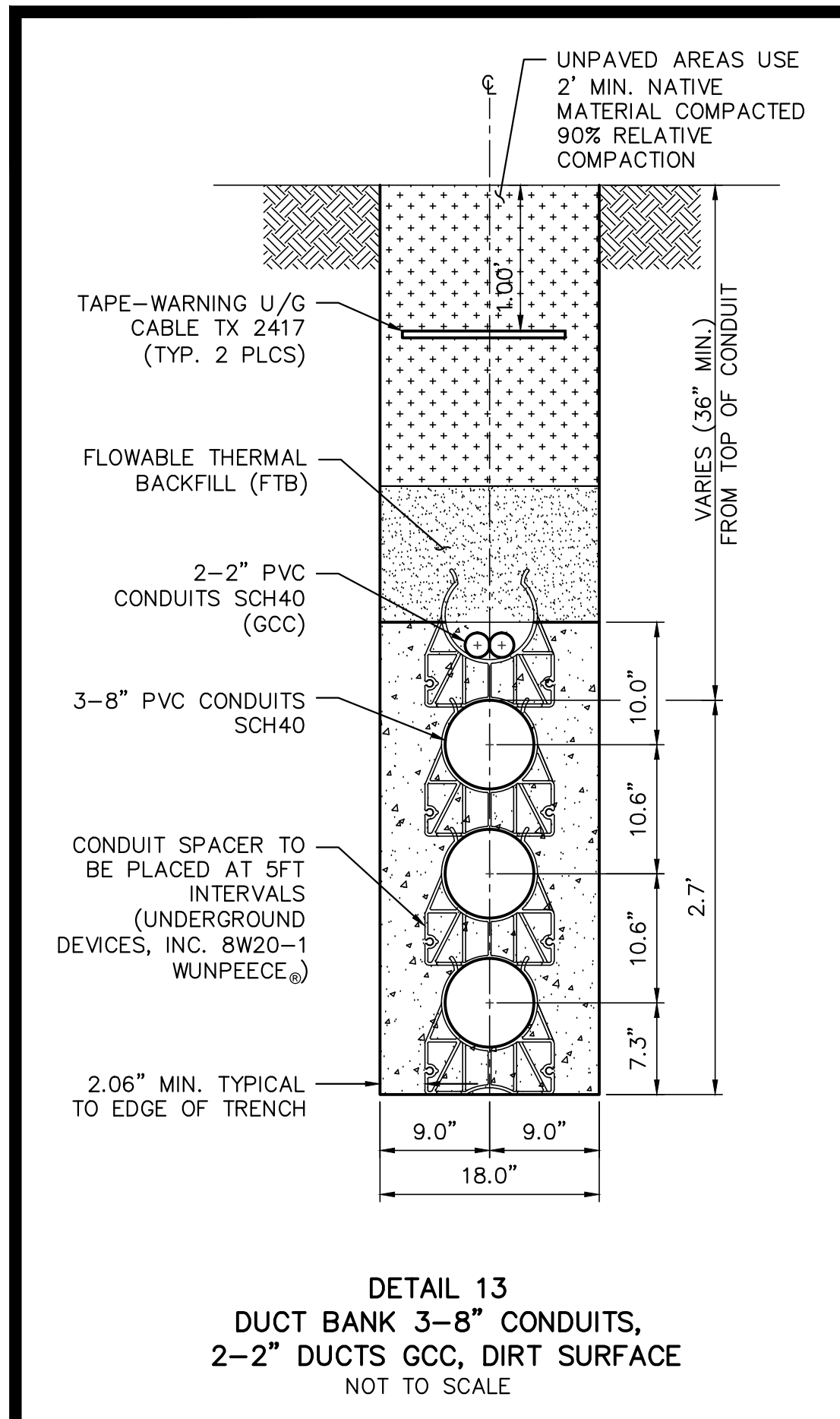
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