ADDENDUM NO. 2

TO: All Planholders and Prospective Bidders

FROM: City of Capitola Public Works

DATE: June 10, 2019

RE: **ADDENDUM NO. 2**
PARK AVENUE SIDEWALKS IMPROVEMENT PROJECT
BIDS DUE JUNE 19, 2019 AT 3:00 P.M.

ADDENDUM NO. 2

City of Capitola, California

This Addendum shall be considered as a part of the bid documents for the subject project as though it had been issued at the same time and shall be incorporated integrally therewith. Where provisions of the following supplementary data differ from those of the original documents, this Addendum shall govern and take precedence.

Contractors are hereby notified that they shall make any necessary adjustments in their proposals on account of this Addendum. It will be construed that each proposal is submitted with full knowledge of all modifications and supplemental data specified herein.

Receipt of this Addendum must be acknowledged on the enclosed Addendum Acknowledgement form. Signature on said Bid Form indicates acknowledgement of receipt of Addendum No. 2, and that said Addendum was properly evaluated in bidder's proposal. Any proposal not in compliance with this requirement may be rejected.

Steven E. Jesberg, Public Works Director

The following is hereby added and/or amended:

Responses to RFI's related to the following Bid Items below
Bid Items 14, 16, 18, 20, 26, 27, 28, 29, 31, 32, 33, 36, 43

Revised/Additional Plan Sheets Provided: L-5, L-6, CD-3, CD-7, DR-2, RW-1, SS-5, SS-6

Revised Specification Sheets Provided

1. Pages 6-7 – bid sheet replaced
2. Page 24 – liquidated damages defined
3. Page 60 – amount for liquidated damages stated
4. Pages 84 & 86 – added text, reconstruct fire hydrant valve
5. Page – 90 – added text for OS inlet and G3 inlet

Bid Item 14 Relocate Water Valve

1. Sheet L-5 Relocate Valve.
    a. See updated Sheets L-5, CD-7, RW-1 and SS-5 (Addendum 2 - Bid Items 14 & 43 Updated Plan Sheets) The existing water valve on Sheet L-5 will remain and be adjusted to grade in the proposed sidewalk per the revised plans.
2. Sheet L-6 Relocate Valve.
    a. See updated Sheets L-6, CD-3, DR-2, and SS-6 (Addendum 2 - Bid Items 14 & 43 Updated Plan Sheets). This work will be a separate bid item titled "Reconstruct Fire Hydrant Valve". Remove existing gate valve and install 18" spool on tee. Install new gate valve into sidewalk curb ramp and reconnect to existing fire hydrant. The existing fire hydrant on Sheet L-6 will need installation of a new spool, gate valve, and lateral connection.
3. Revised Bid Sheet Provided – New **Bid Item 43** "Reconstruct Fire Hydrant Valve"

Bid Item 18 Roadway Excavation

1. Cut and fill quantities
    a. New cross-section details provided as 22 sheets (Addendum 2 - Bid Item 18 Roadway Excavation Cross Sections)

Bid Item 20 Aggregate Base

1. Quantity measurements.
    a. Refer to 2018 Caltrans Standard Specifications Section 26 Aggregate Bases. Quantity is measured by volume (cubic yards).
2. Does the quantity include the quantities under the C&G, Cross Gutters, Driveways, Sidewalk and Curb Ramps?
    a. Total aggregate base quantity includes material under curb & gutter, cross gutters, driveways, sidewalks, and curb ramps

Bid Items 26, 27, 28 & 29

1. Clarification on how quantities for bid items 26 (sidewalk), 27 (depressed driveways), 28 (standard driveways), and 29 (curb ramp) were determined.
    a. See RFI response sheet (Addendum 2 - Bid Items 26, 27, 28 & 29 Quantities)

Bid Item 36 Concrete Ret Wall Type 1

1. Quantity
    a. See updated bid item sheet. The quantity of Concrete Retaining Wall Type 1 is 161 LF.
2. Construction Joint Detail and Spacing
    a. Refer to 2018 Caltrans Standard Plan BO-3 for details and spacing of expansion joints and weakened planes for retaining wall
3. Geotechnical Report Provided (Butano Engineering December 2018)

ID SCHEDULE

ITEM NO.	BID ITEM	UNIT	QTY	UNIT PRICE	UNIT TOTAL
1	Mobilization	LS	1		
2	Construction Area Signs	LS	1		
3	Traffic Control	LS	1		
4	Survey and Construction Staking	LS	1		
5	Survey Monumentation	LS	1		
6	Temporary Water Pollution Control and Erosion Control	LS	1		
7	Lead Compliance Plan	LS	1		
8	Clearing and Grubbing	LS	1		
9	Remove Thermoplastic Traffic Stripe	LF	7,694		
10	Remove Thermoplastic Pavement Marking	SQFT	134		
11	Relocate Roadside Sign	EA	11		
12	Relocate Mailbox	EA	15		
13	Relocate Bench – Bus Stop	EA	1		
14	Relocate Water Valve **/ Water Meter Box**	EA	**3** ~~5~~		
15	Adjust Water Valve **/ Water Meter Box** Cover to Grade	EA	**10** ~~11~~		
16	Remove Inlet	EA	3		
17	Remove Pipe	LF	178		
18	Roadway Excavation	CY	602		
19	Hot Mix Asphalt (Type A)	TON	133		
20	Aggregate Base (Class 2)	CY	450		
21	Minor Concrete (Curb and Gutter)	LF	1,079		
22	Minor Concrete (Cross Gutter)	SQFT	209		
23	Minor Concrete (Driveway Conform)	SQFT	688		
24	Minor Concrete (Retaining Curb)	LF	122		

ITEM NO.	BID ITEM	UNIT	QTY	UNIT PRICE	UNIT TOTAL
25	Minor Concrete (Sidewalk)	SQFT	5,086		
26	Minor Concrete (Depressed Driveway)	SQFT	4,199		
27	Minor Concrete (Standard Driveway)	SQFT	1,551		
28	Minor Concrete (Curb Ramp)	SQFT	1,561		
29	Storm Drain Manhole	EA	1		
30	Modify Drainage Inlet (Manhole top slab on existing inlet)	EA	1		
31	Minor Structure (Type GO Inlet)	EA	2		
32	Minor Structure (Type **OS** ~~GO~~ Inlet)	EA	1		
33	Minor Structure (Type **G3** ~~GO~~ Inlet)	EA	1		
34	18” Reinforced Concrete Pipe	LF	36		
35	24” Reinforced Concrete Pipe	LF	164		
36	Retaining Wall Type 1 (Cast In Place)	LF	**161** ~~11~~		
37	Retaining Wall Formliner	SQFT	715		
38	Detectable Warning Surface	SQFT	201		
39	Roadside Sign (One Post – Metal)	EA	12		
40	Thermoplastic Traffic Stripe	LF	7,694		
41	Thermoplastic Pavement Marking	SQFT	1,289		
42	Rectangular Rapid Flashing Beacon (RRFB) Assembly	LS	1		
43	**Reconstruct Fire Hydrant Valve**	**EA**	**1**		
				BASE-BID	**$**
				5% CONTINGENCY	**$**
				GRAND TOTAL (BASE-BID PLUS CONTINGENCY)	**$**

Grand Total in words:_____

The contingency is reserved for unforeseen project tasks. No payment will be made to the Contractor for any portion of the contingency unless a contract change order is approved by the City.

SECTION 1

DEFINITIONS AND TERMS

1.01 Acceptance - The formal written acceptance by the City Council of the Contract which has been completed in all respects in accordance with the Drawings and Specifications and any modifications thereof previously approved.

1.02 Addendum - A change in the Specifications or Drawings issued prior to the opening of Proposals.

1.03 Approved, Directed, Ordered, or Required - Whenever these words or their derivatives are used, it is the intent, unless otherwise clearly stated, that approval or direction by the Engineer is indicated

1.04 Article - A numbered portion of a title Section of the Specifications

1.05 Bidder - Any individual, firm, partnership, corporation or combination thereof, submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

1.06 City - The City of Capitola**.**

1.07 Contract/Contract Documents - The written agreement covering the performance of the work and the furnishing of labor; materials, tools, and equipment in the construction of the work. The Contract shall include the Notice to Contractors, Proposal, Drawings, City Special Project Specifications, Addenda, and Contract Bonds; also, any and all supplemental agreements amending or extending the work in a substantial and acceptable manner. Supplemental agreements are written agreements signed by both parties covering alterations, amendments, or extensions to the Contract and include Contract change orders.

1.08 Contractor - The person or persons, firm, partnership, corporation, or combination thereof, private or municipal, who is the successful bidder and has entered into a contract with the City.

1.09 Council, City Council - The City Council of the City of Capitola.

1.10 Days - Working days, unless otherwise designated.

1.11 Director - The Director of the Public Works Department, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

1.12 Drawings - The official drawings, working drawings, detail drawings, and supplemental drawings, or reproductions thereof, which show the location, character, dimensions, and details of the work to be done, and which are to be considered as part of the Contract.

1.13 Engineer - The City Engineer acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

1.14 Liquidated Damages - The amount prescribed in the specifications, pursuant to the authority of Government Code Section 53069.85, **and the Standard Specifications of the State of California, Department of Transportation dated 2018, with most recent revisions**, to be paid to the City or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portions of the work beyond the time allowed in the Specifications.

8.07 TERMINATION OF UNSATISFACTORY SUBCONTRACTS – When any portion of the work which has been subcontracted by the Contractor is not being prosecuted in a satisfactory manner, the subcontract for such work shall be terminated immediately by the Contractor upon written notice from the Director, and the subcontractor shall not again be employed on the type of work in which his/her performance was unsatisfactory.

8.08 CHARACTER OF WORKERS – If any subcontractor or person employed by the Contractor or subcontractor shall fail or refuse to carry out the directions of the Director or shall appear to the Director to be incompetent or to act in a disorderly or improper manner, (s)he shall be removed from the work immediately on the request of the Director, and such persons shall not again be employed on the work.

8.09 TIME OF COMPLETION AND LIQUIDATED DAMAGES – The Contractor shall complete all the work under the Contract within the number of days set forth in the Special Provisions or the Proposal form. When a delay occurs due to unforeseen causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of nature, acts of the public enemy, governmental acts, fires, floods, epidemics, strikes (except as caused by improper acts or omissions of the Contractor), the time of completion shall be extended for a period justified by the effect of such delay on the completion of the work. A delay of a subcontractor or supplier due to the above circumstances will be taken into consideration for extensions of time of completion.

Acts of nature means an earthquake, flood, cloudburst, cyclone, or other cataclysmic phenomena of nature beyond the power of the Contractor to foresee or to make preparation in defense against, but does not include ordinary precipitation. The number of days provided for the work as set forth in the Special Provisions includes a normal amount of days for downtime due to weather according to the time of year in which the Contract will be operational.

Should any of the unforeseen circumstances as described in the preceding portion of this Article occur, the Contractor shall file written notice with the Director within the 10 days of the beginning of such delay. The notification shall be accompanied by documentary evidence to the fact and effect of the circumstances. Circumstances of which no notification has been given within 10 days of their occurrence shall not afterward be claimed as grounds for extension of time of completion. The Director will determine the facts in the matter and his/her findings shall be final and conclusive.

If the Contract is revised by a Contract Change Order and the Director determines that such revision will cause delay in completion of the work, the Change Order will provide for extension of the time of completion.

It is agreed by the parties to the Contract that in case all the work called for under the Contract in all parts and requirements is not finished or completed within the number of days as set forth in the Special Provisions, damage will be sustained by the City, and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the City will sustain in the event of a reason of such delay; and it is therefore agreed that the Contractor will pay to the City the sum set forth in the Special Provisions per day for each and every day's delay in finishing the work in excess of the number of days prescribed; and the Contractor agrees to pay said liquidated damages **in the amount of $3,500.00 per day herein provided for in the State Specifications,** and further agrees that the City may deduct the amount thereof from any monies due or that may become due to the Contractor under the Contract.

8.10 TERMINATION OF CONTRACT – If the Contractor should fail to supply sufficient workers, material, supplies, and equipment, the City shall give written notice to the Contractor, which notice shall require that the Contractor supply sufficient workers, supplies, materials, and equipment to diligently prosecute the project. If the Contractor fails to resume diligent prosecution of the work within 48 hours.

10-2.11 RELOCATE WATER VALVE, RELOCATE WATER METER BOX, ADJUST WATER VALVE / WATER METER BOX COVER TO GRADE, AND RECONSTRUCT FIRE HYDRANT VALVE

The work performed in connection with "Relocate Water Valve", "Relocate Water Meter Box", **"Adjust Water Valve / Water Meter Box Cover to Grade", and "Reconstruct Fire Hydrant Valve"** shall conform to the provisions in Section 17-5.03B, "Frames, Covers, Grates, and Manholes," Section 5-1.30, "Noncompliant and Unauthorized Work," of the Standard Specifications, and shall consist of adjusting or relocating existing water valves and covers to finish grade, and in conformance with designs and details shown on the plans and these special provisions.

The Contractor shall contact Soquel Creek Water District for coordination and requirements of water valve, meter box, and in-line water main adjustments at the following phone number:

Soquel Creek Water District Telephone: (831) 475-8500

The Contractor shall be solely responsible for coordinating with Soquel Creek Water District before water utilities are adjusted and shall attend a pre-construction meeting with Soquel Creek Water District to review water system work requirements. If water utilities are needed to be shut down due to construction activities, the Contractor shall submit a shutdown notice least 5 working days prior to beginning construction operations.

The following work shall be performed in accordance with the Soquel Creek Water District (SqCWD) Standard Specifications and Standard Plans dated August 1994, and as instruction herein. SqCWD Standard Specifications and Standard Plans are available at:

http://www.soquelcreekwater.org/content/engineering.

Inspection of the work shall be performed by the SqCWD Inspector or Engineer. Contractor shall notify the SqCWD Inspector at least 24-hours in advance of any work to commence on SqCWD facilities.

A. ADJUST SOQUEL CREEK WATER DISTRICT WATER VALVES.

In lieu of Section 17-5.03B, "Frames, Covers, Grates, and Manholes," of the Standard Specifications, the following shall apply.

Adjustment of water valve boxes and covers shall be performed after paving. Adjustment of water valves shall be limited to the area to be paved or resurfaced during the working day in which such adjustment is performed. The top of the water valve cover shall be adequately protected from the asphalt concrete during paving operations by means of a plywood cover, or by another method approved by the Engineer, and its location shall be carefully noted and referenced. All excess paving material shall be removed prior to rolling. Valve Boxes shall be cleaned out at end of construction.

Existing water valve boxes shall be adjusted to grade by removing the existing valve box and concrete collar and pouring a new 6" wide X 6" minimum deep Class 2 concrete collar around the valve box as per SqCWD Standard Detail S-6. The top of the concrete collar shall be flush with the top of the existing base rock/bottom of existing asphalt, with a minimum asphalt pavement depth of 3". The valve box and concrete collar hole shall be cleaned of concrete pieces and other debris prior to pouring concrete. Concrete shall be fully set prior to placing asphalt. Contractor shall apply an asphaltic tack coat to the concrete, valve box side walls and asphalt side walls prior to placing asphalt.

The Contractor shall also be responsible for proper debris handling, transportation, disposal, and documentation in accordance with Federal, State, and local requirements.

The Contractor is notified that demolition may be conducted in stages as some materials may be left in place during tie-in to the existing system. Adequate provision shall be made for this condition.

Abandoned pipe left in place shall be abandoned per SqCWD Standard Specifications.

The contract price for cutting into and/or removing AC pipe will be included in the costs for other work items and shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work involved in installing the new section of water main and abandoning the section left in the ground as identified, including removal or abandoning in place of any AC pipe, dewatering of the existing water main in the field and reconnecting the new section of water main to the existing distribution water main. The contract unit price shall also include all costs for traffic control, insurance, bonding and any administration for completing the work. No additional compensation will be allowed therefor.

Measurement and Payment-The quantity for “Adjust Water Valve / Water Meter Box Cover to Grade” shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract unit price paid for “Adjust Water Valve Cover to Grade,” shall include full compensation for furnishing all labor, materials, equipment, tools and incidentals, and for doing all work involved in adjusting existing water valve covers to finish grade, complete in place, as shown on the plans and these special provisions.

The quantity for “Reconstruct Fire Hydrant Valve” shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract unit price paid for “Relocate Water Valve,” shall include full compensation for furnishing all labor, materials, equipment, tools and incidentals, and for doing all work involved in adjusting existing water valve covers to finish grade, complete in place, as shown on the plans and these special provisions.

The quantity for “Relocate Water Valve” shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract unit price paid for “Relocate Water Valve,” shall include full compensation for furnishing all labor, materials, equipment, tools and incidentals, and for doing all work involved in adjusting existing water valve covers to finish grade, complete in place, as shown on the plans and these special provisions.

The quantity for “Relocate Water Meter Box” shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract unit price paid for “Relocate Water Meter” shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work involved in relocating water meter boxes according to SqCWD Standard Detail S-3 & S-8, and as specified herein.

10-2.17 MINOR STRUCTURE (TYPE GO INLET), MINOR STRUCTURE (TYPE OS INLET), MINOR STRUCTURE (TYPE G3 INLET) AND MODIFY DRAINAGE INLET

The work performed in connection with "Minor Structure (Type GO Inlet)", **"Minor Structure (Type OS Inlet)" , "Minor Structure (Type G3 Inlet)"** and "Modify Drainage Inlet" shall conform to the provisions in Sections 51, "Concrete Structures," 52, "Reinforcement," and 90, "Concrete" of the Standard Specifications and in conformance with designs and details shown on the plans and these special provisions.

The Contractor shall contact Santa Cruz County Flood Control and Stormwater for coordination and requirements of storm drain improvements at the following phone number:

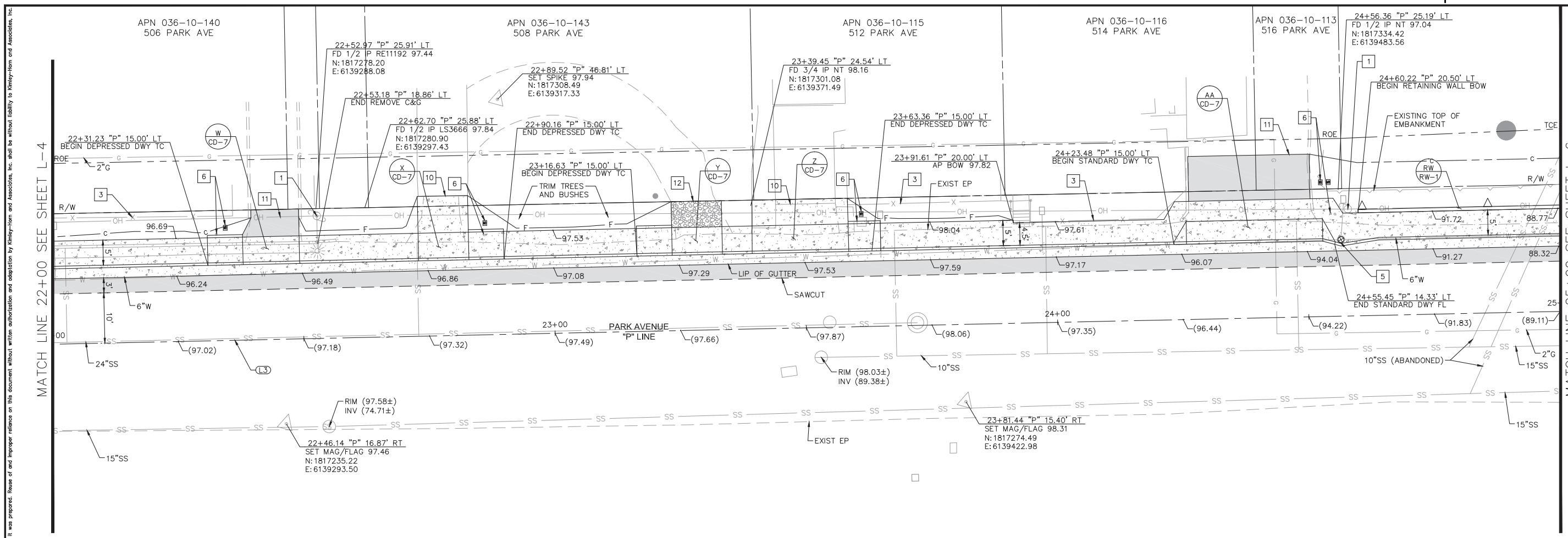
Santa Cruz County Flood Control and Telephone: (831) 454-2160

Measurement and Payment- The quantity for "Minor Structure (Type GO Inlet)" shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work as shown on the plans including connecting existing pipe to the inlet structure, as specified in the Standard Specifications, and these special provisions and no additional allowance will be made therefore.

The quantity for "Minor Structure (Type OS Inlet)" shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work as shown on the plans including connecting existing pipe to the inlet structure, as specified in the Standard Specifications, and these special provisions and no additional allowance will be made therefore.

The quantity for "Minor Structure (Type G3 Inlet)" shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work as shown on the plans including connecting existing pipe to the inlet structure, as specified in the Standard Specifications, and these special provisions and no additional allowance will be made therefore.

The quantity for "Modify Drainage Inlet" shall be measured by each (EA) unit as set forth in the Bid Proposal. The contract price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work as shown on the plans, as specified in the Standard Specifications, and these special provisions and no additional allowance will be made therefore.



LEGEND

- HMA (SEE TYPICAL SECTIONS)
- PCC (SIDEWALK/CURB RAMP/DRIVEWAY)
- DETECTABLE WARNING SURFACE
- GRAVEL
- — — SAWCUT
- RETAINING WALL
- RIGHT-OF-WAY (R/W)
- TCE / ROE — TEMPORARY CONSTRUCTION EASEMENT (TCE) / RIGHT OF ENTRY (ROE)
- —G— EXIST GAS LINE
- —OH— EXIST OVERHEAD UTILITY LINE(S)
- —SS— EXIST SANITARY SEWER LINE
- —SD— EXIST STORM DRAIN LINE
- —W— EXIST WATER LINE
- —C— DAYLIGHT CUT
- —F— DAYLIGHT FILL
- XX GRADE ELEV (EXIST ELEV)
- XX / XX DETAIL NO. / SHEET REFERENCE

CONSTRUCTION NOTES

1. EXISTING UTILITY POLE TO REMAIN
2. EXISTING FIRE HYDRANT TO REMAIN
3. EXISTING FENCE TO REMAIN
4. EXISTING WALL TO REMAIN
5. ADJUST EXISTING WATER VALVE / METER BOX TO GRADE
6. RELOCATE EXISTING MAILBOX
7. RELOCATE AND ADJUST EXISTING WATER VALVE / METER BOX
8. RELOCATE EXISTING BUS STOP BENCH
9. POTENTIAL TREE IMPACT/REMOVAL
10. DRIVEWAY CONFORM (PCC)
11. DRIVEWAY CONFORM (HMA)
12. DRIVEWAY CONFORM (GRAVEL)
13. RECONSTRUCT FIRE HYDRANT VALVE. REMOVE EXISTING GATE VALVE AND INSTALL 18" SPOOL ON TEE. INSTALL NEW GATE VALVE INTO SIDEWALK CURB RAMP AND RECONNECT TO EXISTING FIRE HYDRANT LATERAL.

GENERAL CONSTRUCTION NOTES

1. SAWCUT SHALL BE PER CITY DETAIL CAP-002 ON A NEAT LINE WITHOUT DAMAGING EXISTING AC OR CONCRETE THAT IS TO REMAIN IN PLACE. ANY DAMAGE TO THE ADJACENT SURFACE MATERIAL TO REMAIN SHALL BE REPAIRED OR REPLACED TO A CONDITION SATISFACTORY TO THE ENGINEER AT THE CONTRACTOR'S EXPENSE.
2. ALL STATION CALLOUTS REFERENCE "P" LINE STATIONS, UNLESS OTHERWISE NOTED. SEE CALLOUTS ON LAYOUT SHEETS FOR EXISTING SURVEY MONUMENTS AND ALIGNMENT CONTROL POINTS.
3. CONTRACTOR SHALL VERIFY ALL RIGHT-OF-WAY PRIOR TO CONSTRUCTION.
4. SEE TYPICAL SECTIONS FOR STANDARD SIDEWALK, CURB AND GUTTER, DRIVEWAY, AND CURB RAMP SECTIONS.
5. SEE CONSTRUCTION DETAIL SHEETS FOR CURB RAMP, DRIVEWAY, AND SIDEWALK DETAILS.
6. SEE DRAINAGE PLAN FOR STORM DRAIN INLET AND PIPE DETAILS.
7. SEE RETAINING WALL PLAN FOR RETAINING WALL LAYOUT AND PROFILE.
8. SEE SIGNING AND STRIPING PLAN FOR PAVEMENT DELINEATION AND SIGNING DETAILS.
9. EXISTING UTILITIES ARE PRESENT CLOSE TO THE PROPOSED WORK. CONTRACTOR SHALL POTHOLE AND FIELD LOCATE EXISTING UTILITIES AND NOTIFY THE ENGINEER OF ANY CONFLICTS WITH THE PROPOSED WORK PRIOR TO THE START OF CONSTRUCTION. ALL UTILITIES SHOWN ARE EXISTING.
10. ALL TREES NOT SPECIFICALLY INDICATED FOR REMOVAL SHALL BE PROTECTED IN PLACE. ANY TREES THAT ARE DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED IN KIND AT NO ADDITIONAL EXPENSE TO THE CITY.
11. IF TREE ROOTS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE PROTECTED AND A QUALIFIED CITY ARBORIST SHALL BE ENGAGED TO PROVIDE DIRECTION TO PROTECT TREE AND ROOTS FROM DAMAGE.

CA: 1-800-227-2600
CALL BEFORE YOU DIG
UNDERGROUND SERVICE ALERT
CA: 1-800-227-2600
CALL TWO WORKING DAYS BEFORE YOU DIG

NORTH

GRAPHIC SCALE IN FEET
0 5 10 20

No.	REVISIONS	DATE	BY

Kimley»Horn
© 2015 KIMLEY-HORN AND ASSOCIATES, INC.
100 WEST SAN FERNANDO STREET, SUITE 250, SAN JOSE, CA 95113
PHONE: 669-800-4130
WWW.KIMLEY-HORN.COM

KHA PROJECT	097763124
DATE	4/22/2019
SCALE	AS SHOWN
DESIGNED BY	DW
DRAWN BY	DW
CHECKED BY	DC

PARK AVENUE SIDEWALK IMPROVEMENTS

PREPARED FOR

CITY OF CAPITOLA

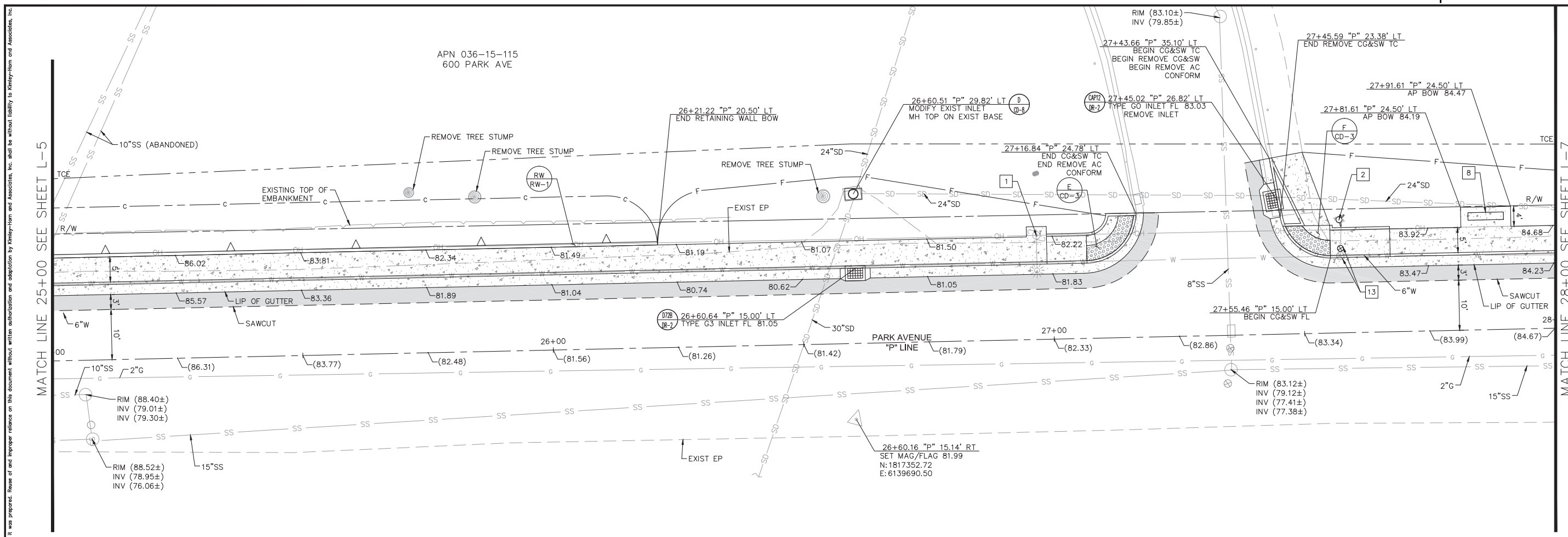
SANTA CRUZ COUNTY CA

REGISTERED PROFESSIONAL ENGINEER
DEREK W. WU
No. C81401
Exp. 9/30/19
CIVIL
STATE OF CALIFORNIA

LAYOUT PLAN

SHEET NO. 7
OF 31 SHEETS

L-5



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11. IF TREE ROOTS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE PROTECTED AND A QUALIFIED CITY ARBORIST SHALL BE ENGAGED TO PROVIDE DIRECTION TO PROTECT TREE AND ROOTS FROM DAMAGE.

CA: 1-800-227-2600 CALL BEFORE YOU DIG U.S.A. UNDERGROUND SERVICE ALERT
CA: 1-800-227-2600
CALL TWO WORKING DAYS BEFORE YOU DIG

NORTH

GRAPHIC SCALE IN FEET
0 5 10 20

No.	REVISIONS	DATE	BY

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100 WEST SAN FERNANDO STREET, SUITE 250, SAN JOSE, CA 95113
PHONE: 669-800-4130
WWW.KIMLEY-HORN.COM

KHA PROJECT	097763124
DATE	4/22/2019
SCALE	AS SHOWN
DESIGNED BY	DW
DRAWN BY	DW
CHECKED BY	DC

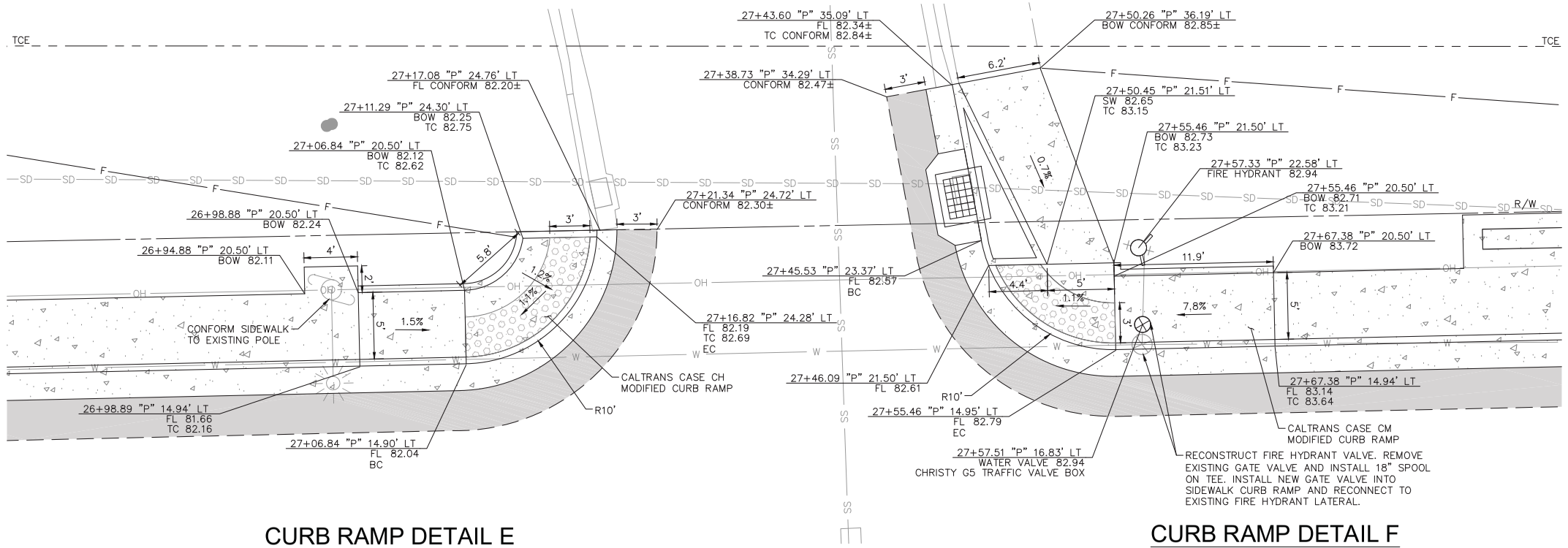
PARK AVENUE SIDEWALK IMPROVEMENTS
PREPARED FOR
CITY OF CAPITOLA
SANTA CRUZ COUNTY CA

REGISTERED PROFESSIONAL ENGINEER — JEFFREY W. WOOD — No. C81401 Exp. 9/30/19 — CIVIL — STATE OF CALIFORNIA

LAYOUT PLAN

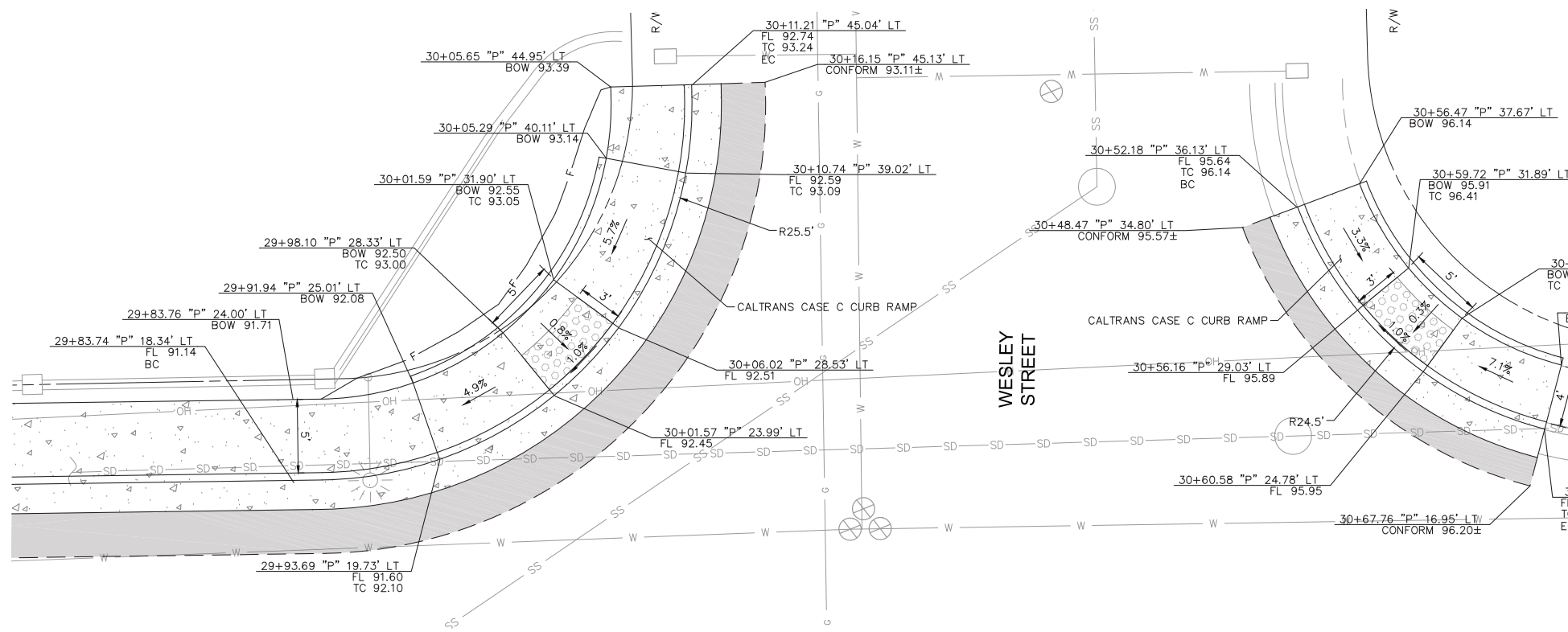
SHEET NO. 8
OF 31 SHEETS

L-6



CURB RAMP DETAIL E

CURB RAMP DETAIL F



CURB RAMP DETAIL G

CURB RAMP DETAIL H

NOTES

1. SEE SHEET CD-1 FOR NOTES AND LEGEND

CA: 1-800-227-2600
CALL BEFORE YOU DIG
UNDERGROUND SERVICE ALERT
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NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

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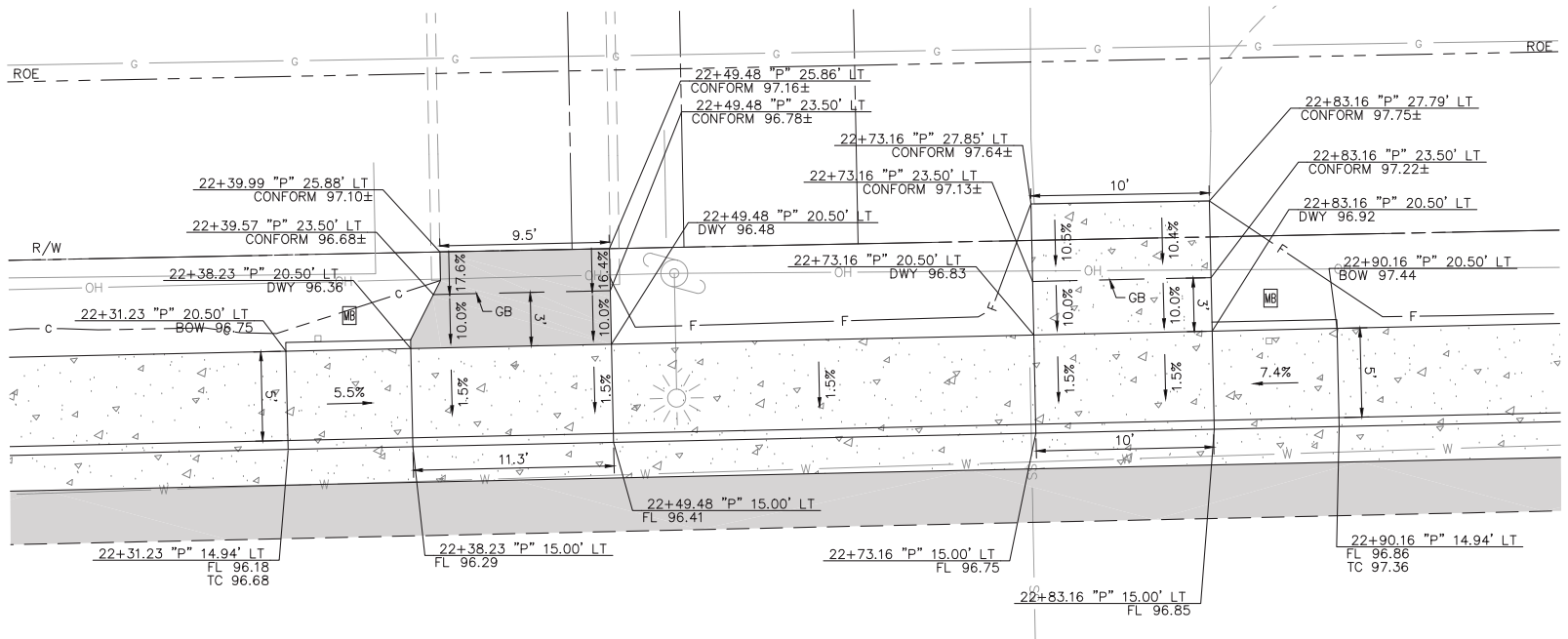
SANTA CRUZ COUNTY CA

REGISTERED PROFESSIONAL ENGINEER
DEREK W. WU
No. C81401
Exp. 9/30/19
CIVIL
STATE OF CALIFORNIA

CONSTRUCTION DETAILS

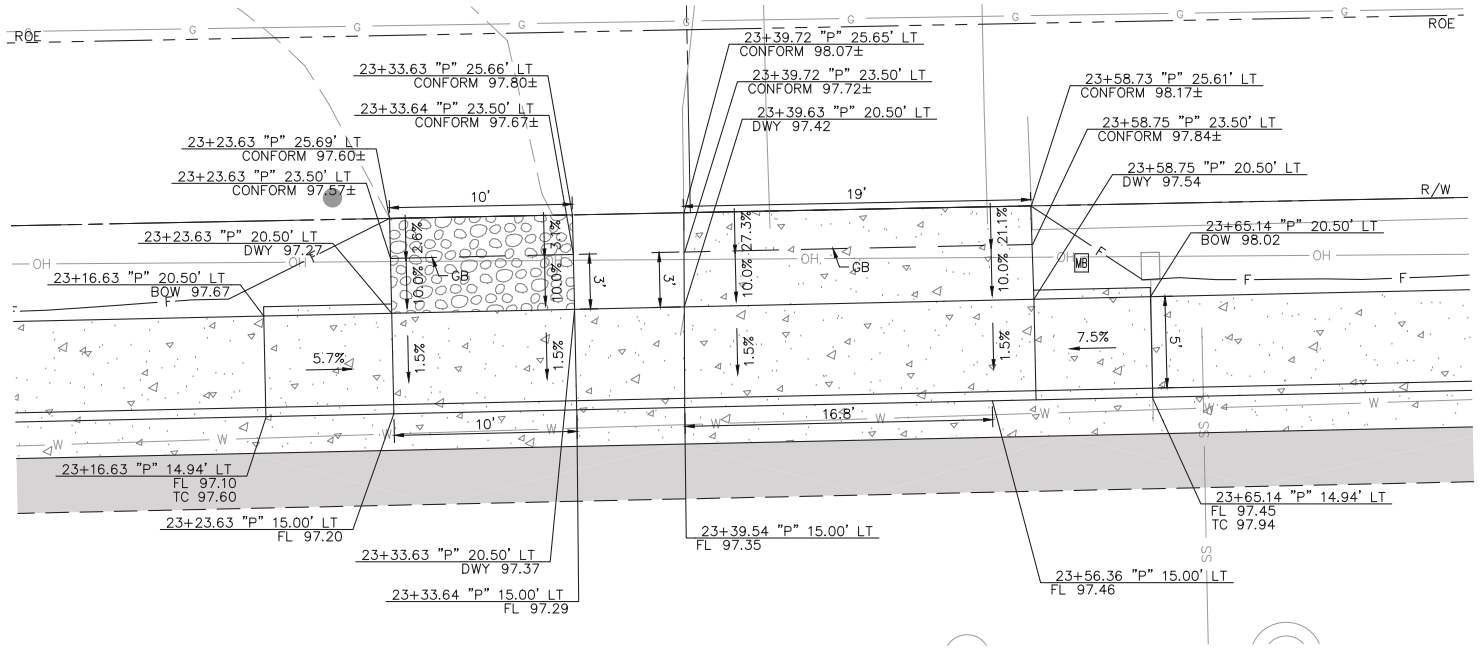
SHEET NO. 13
OF 31 SHEETS

CD-3



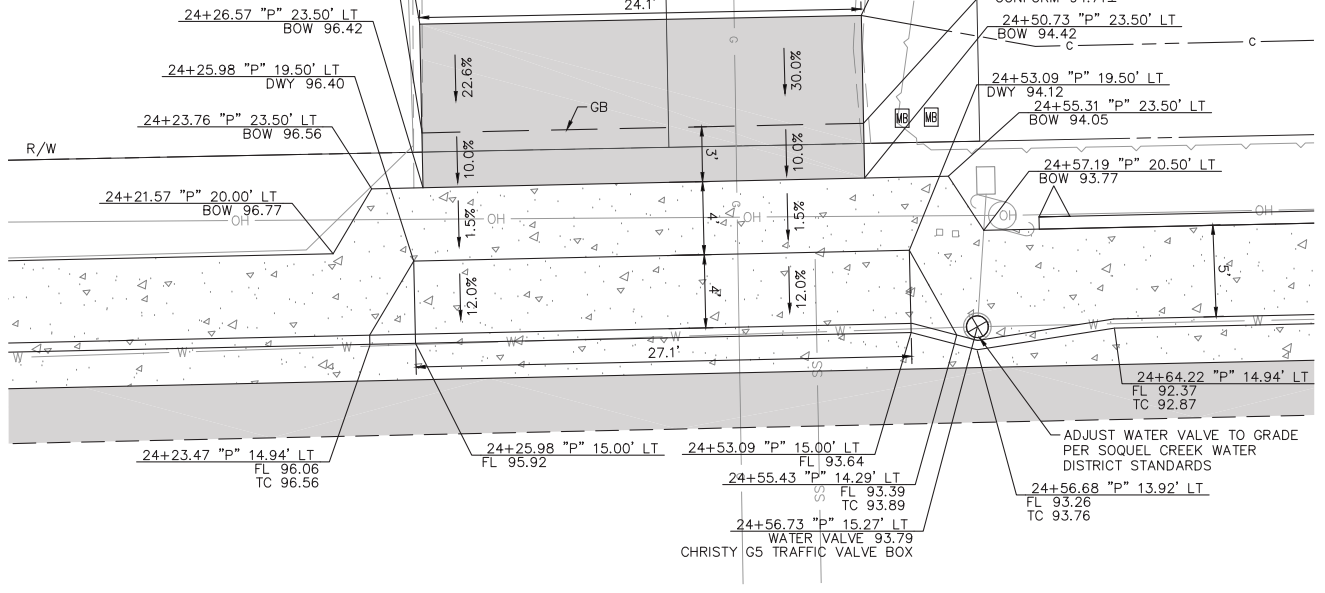
DRIVEWAY DETAIL W

DRIVEWAY DETAIL X



DRIVEWAY DETAIL Y

DRIVEWAY DETAIL Z



DRIVEWAY DETAIL AA

CA: 1-800-227-2600
CALL BEFORE YOU DIG
UNDERGROUND SERVICE ALERT
CA: 1-800-227-2600
CALL TWO WORKING DAYS BEFORE YOU DIG

NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

NOTES

1. SEE SHEET CD-1 FOR NOTES AND LEGEND

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No. C81401
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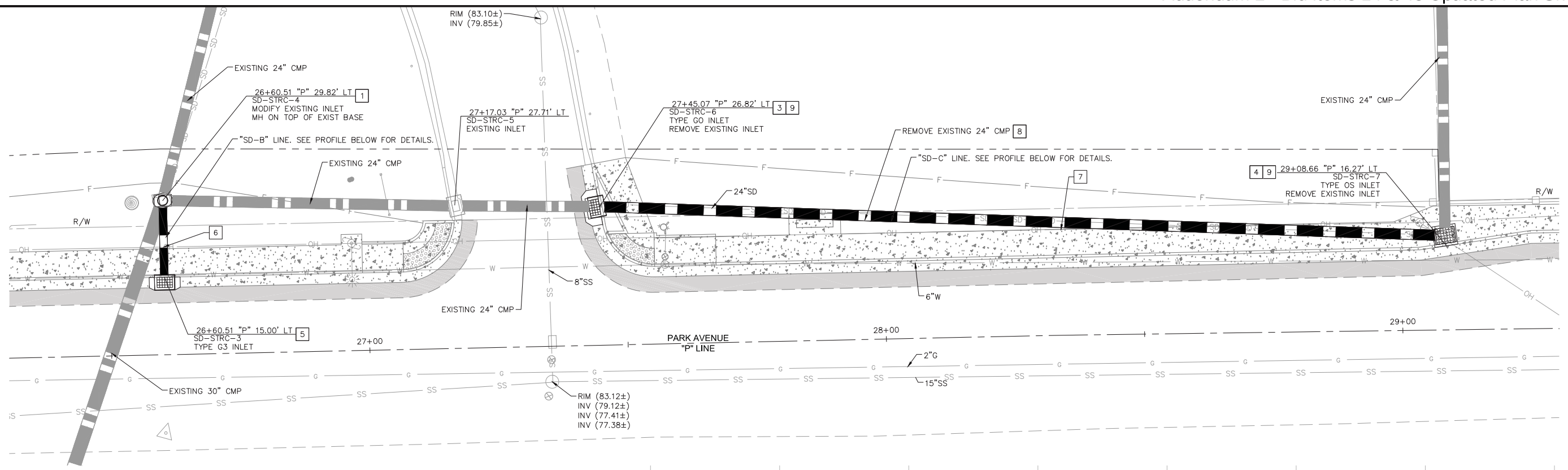
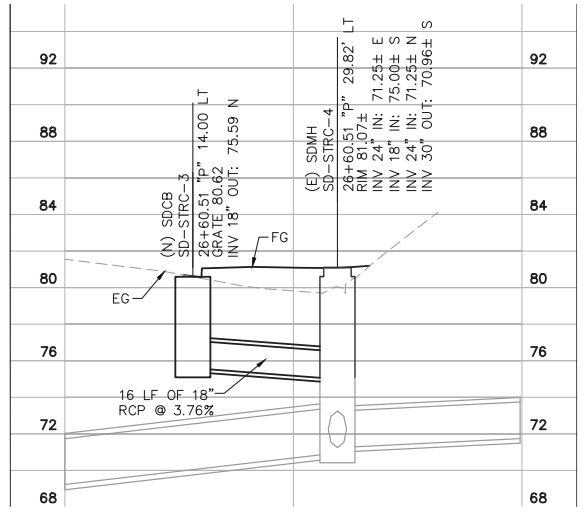
STATE OF CALIFORNIA

CONSTRUCTION DETAILS

SHEET NO. 17
OF 31 SHEETS

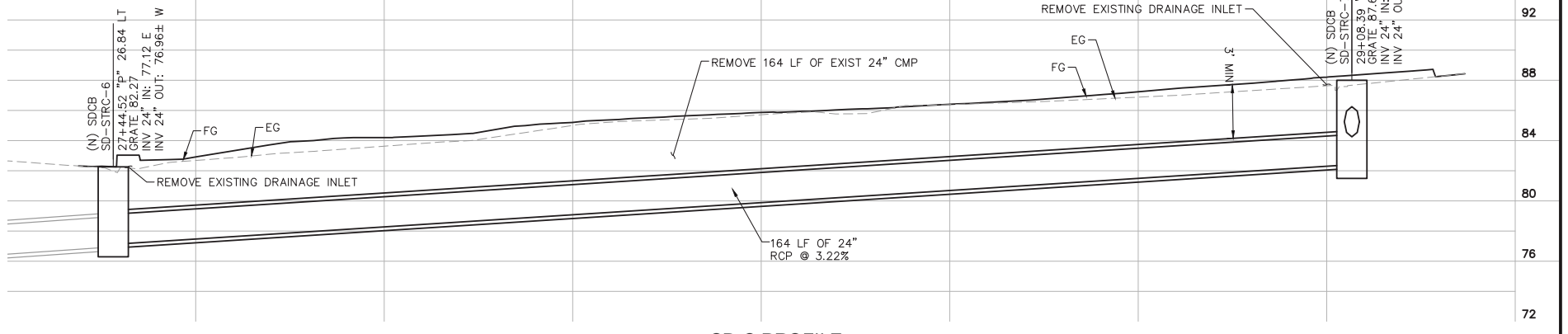
CD-7





SD-B PROFILE:

"SB-B" LINE
SCALE:
1"=5' V
1"=10' H



SD-C PROFILE:

"SB-C" LINE
SCALE:
1"=5' V
1"=10' H

DRAINAGE NOTES

1. LOCATIONS AND DEPTHS OF EXISTING UNDERGROUND UTILITY FACILITIES ARE APPROXIMATE. CONTRACTOR SHALL FIELD LOCATE EXISTING UTILITIES AND NOTIFY ENGINEER OF ANY CONFLICTS WITH THE PROPOSED WORK PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING UTILITIES ARE TO REMAIN UNLESS OTHERWISE NOTED.
3. ALL DRAINAGE FACILITIES SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE LATEST EDITION OF THE CITY OF CAPITOLA AND SANTA CRUZ COUNTY STANDARD PLANS AND SPECIFICATIONS.

STORM DRAIN NOTES

1. CONVERT EXISTING DRAINAGE INLET TO STORM DRAIN MANHOLE. SEE SHEET CD-8.
2. CONSTRUCT STORM DRAIN MANHOLE PER SANTA CRUZ COUNTY DETAILS. SEE SHEET CD-8.
3. CONSTRUCT TYPE GO DRAINAGE INLET PER CITY OF CAPITOLA STANDARD PLAN CAP-012.
4. CONSTRUCT TYPE OS DRAINAGE INLET PER CALTRANS STANDARD PLAN D72A.
5. CONSTRUCT TYPE G3 DRAINAGE INLET PER CALTRANS STANDARD PLAN D72B.
6. FURNISH AND INSTALL 18" RCP
7. FURNISH AND INSTALL 24" RCP
8. REMOVE EXISTING CMP
9. REMOVE EXISTING DRAINAGE INLET

LEGEND

- PROPOSED STORM DRAIN PIPE (SIZE AND MATERIAL PER PLAN)
- EXISTING STORM DRAIN PIPE
- DRAINAGE INLET (SIZE AND TYPE PER PLAN)
- (D) STORM DRAIN MANHOLE

CA: 1-800-227-2600
CALL BEFORE YOU DIG
811
UNDERGROUND SERVICE ALERT
CA: 1-800-227-2600
CALL TWO WORKING DAYS BEFORE YOU DIG

NORTH

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PARK AVENUE SIDEWALK IMPROVEMENTS

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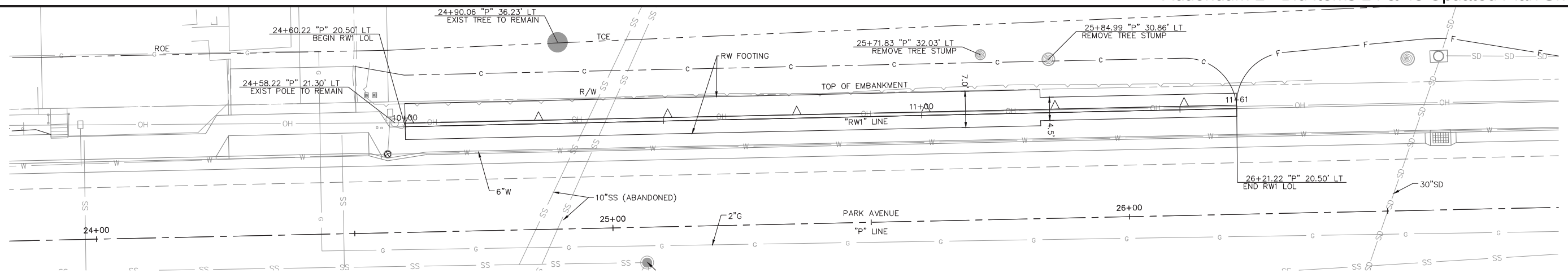
CIVIL
STATE OF CALIFORNIA

DRAINAGE PLANS

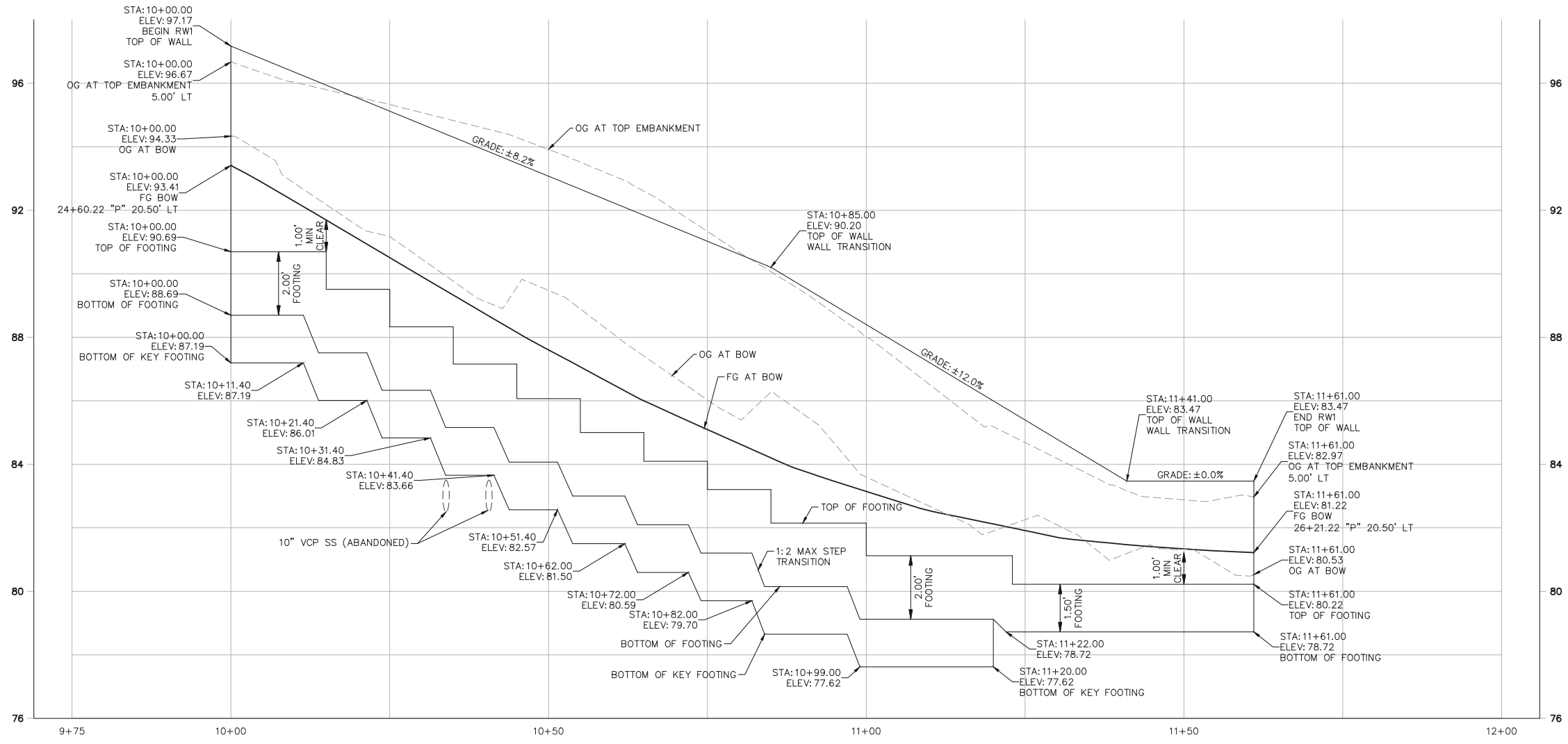
SHEET NO. 20
OF 31 SHEETS

DR-2



RW 1 PLAN:

SCALE: 1"=10'



RW 1 PROFILE:

"RW1" LINE
SCALE:
1"=2' V
1"=10' H

LEGEND

- — — SAWCUT
- RETAINING WALL
- ---- RIGHT-OF-WAY (R/W)
- TCE TEMPORARY CONSTRUCTION EASEMENT (TCE)
- ROE RIGHT OF ENTRY (ROE)
- — G — EXIST GAS LINE
- —OH— EXIST OVERHEAD UTILITY LINE(S)
- —SS— EXIST SANITARY SEWER LINE
- —SD— EXIST STORM DRAIN LINE
- — W — EXIST WATER LINE
- — C — DAYLIGHT CUT
- — F — DAYLIGHT FILL

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811
UNDERGROUND SERVICE ALERT
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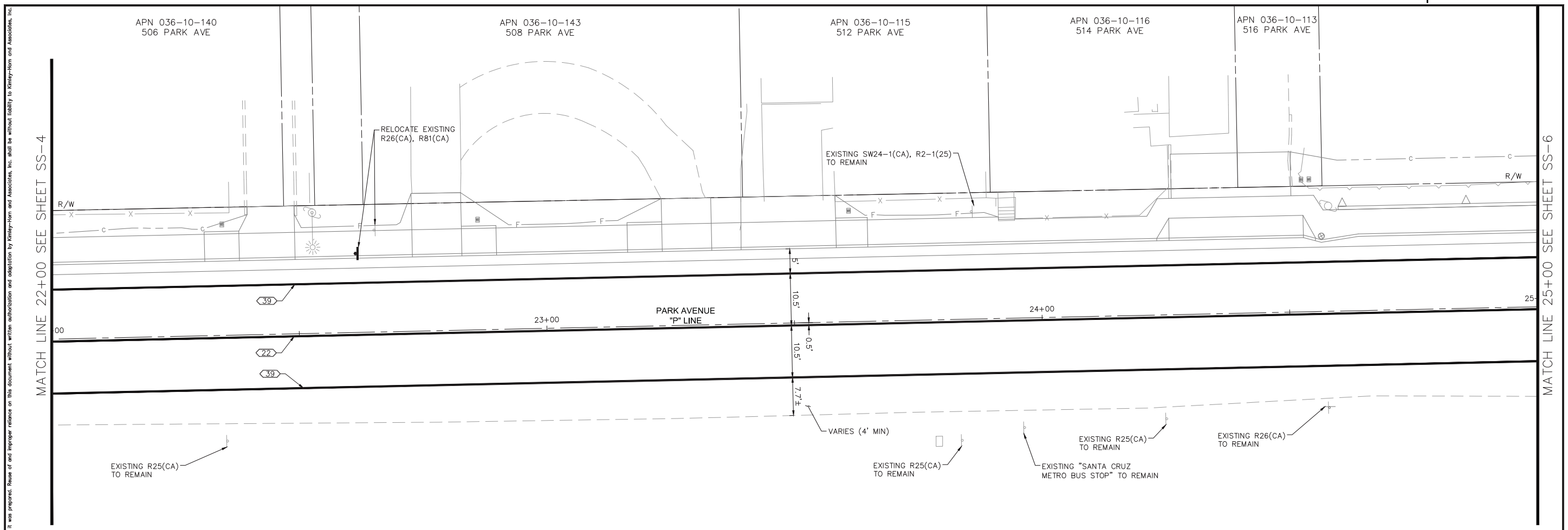
STATE OF CALIFORNIA

RETAINING WALL PLANS

SHEET NO. 21
OF 31 SHEETS

RW-1



LEGEND

- EXISTING SIGN
- PROPOSED SIGN
- XX EXISTING STRIPING DETAIL
- XX PROPOSED STRIPING DETAIL
- STRIPING CHANGE
- STRIPING LIMIT
- ANGLE POINT
- PM PAVEMENT MARKING

GENERAL SIGNING AND STRIPING NOTES

1. ALL STATION CALLOUTS REFERENCE "P" LINE STATIONS, UNLESS OTHERWISE NOTED.
2. ALL EXISTING SIGNS SHALL BE PROTECTED IN PLACE UNLESS SPECIFIED FOR REMOVAL OR RELOCATION.
3. EXISTING SIGNS SPECIFIED FOR REMOVAL SHALL NOT BE REMOVED UNTIL NO LONGER PERTINENT TO TRAFFIC CONTROL.
4. ALL STRIPING CONFLICTING WITH PROPOSED STRIPING SHALL BE REMOVED PRIOR TO NEW STRIPING INSTALLATION.
5. ALL PAVEMENT DELINEATION MUST BE IN ACCORDANCE WITH CURRENT VERSION OF THE CALIFORNIA MUTCD AND 2018 CALTRANS STANDARD PLANS.
6. ALL STRIPING DIMENSIONS SHOWN ARE MEASURED FROM STRIPE TO STRIPE, STRIPE TO TOP OF CURB, OR STRIPE TO FACE OF CURB WHICHEVER SCENARIO IS CLOSER.
7. STREET SIGN POSTS SHALL BE INSTALLED PER CITY OF CAPITOLA DETAIL CAP-014 AND CAP-015.

CA: 1-800-227-2600 CALL BEFORE YOU DIG UNDERGROUND SERVICE ALERT CA: 1-800-227-2600 CALL TWO WORKING DAYS BEFORE YOU DIG

NORTH

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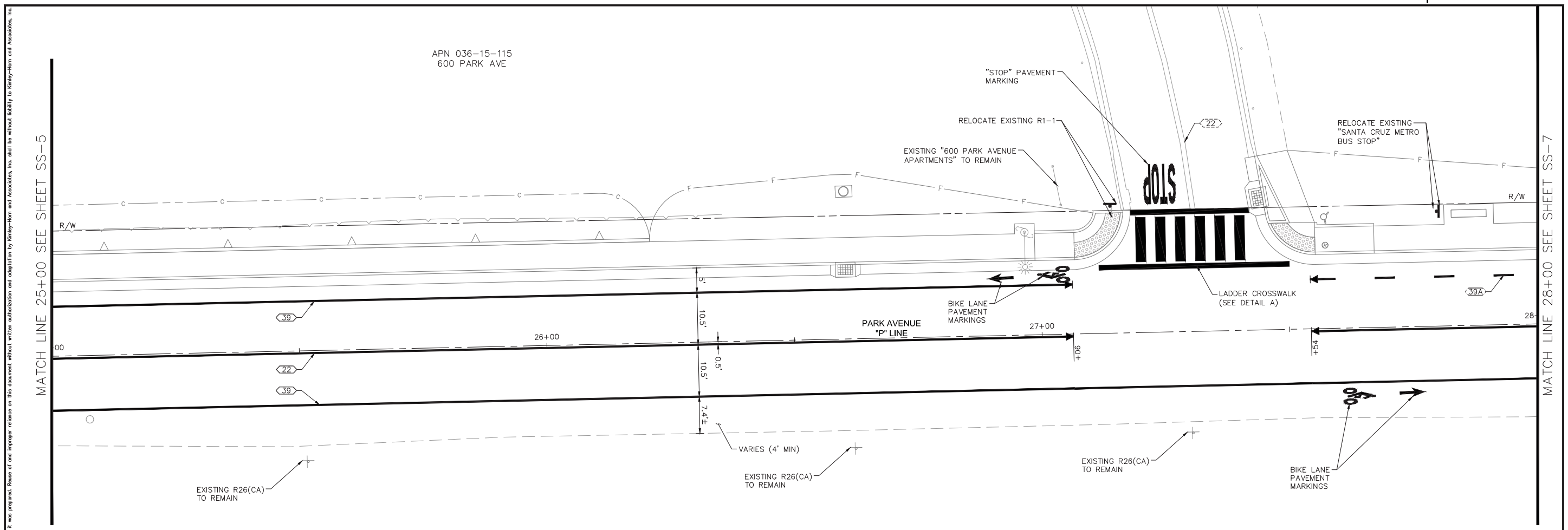
SANTA CRUZ COUNTY CA

REGISTERED PROFESSIONAL ENGINEER DEREK W. WAY No. C81401 Exp. 9/30/19 CIVIL STATE OF CALIFORNIA

SIGNING AND STRIPING

SHEET NO. 28 OF 31 SHEETS

SS-5



LEGEND

- EXISTING SIGN
- PROPOSED SIGN
- XX EXISTING STRIPING DETAIL
- XX PROPOSED STRIPING DETAIL
- STRIPING CHANGE
- STRIPING LIMIT
- ANGLE POINT
- PM PAVEMENT MARKING

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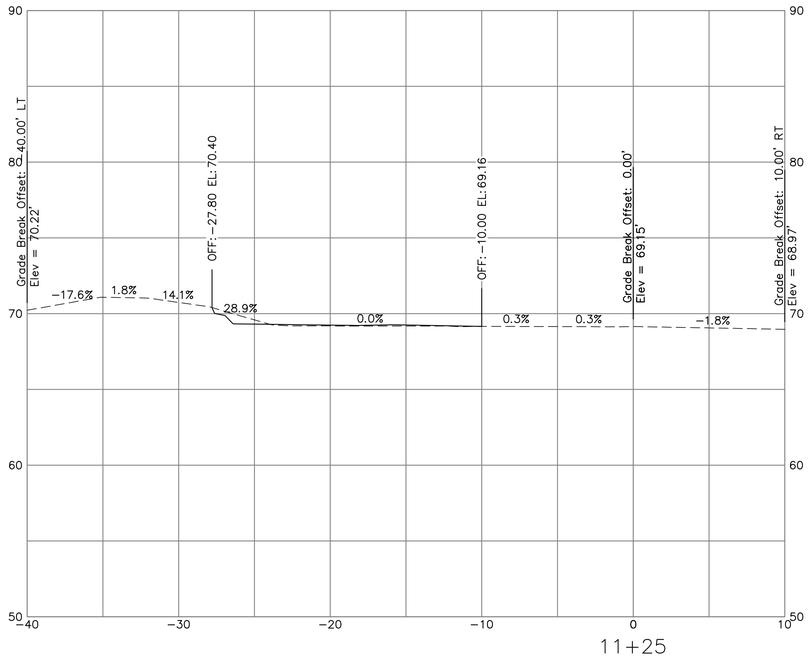
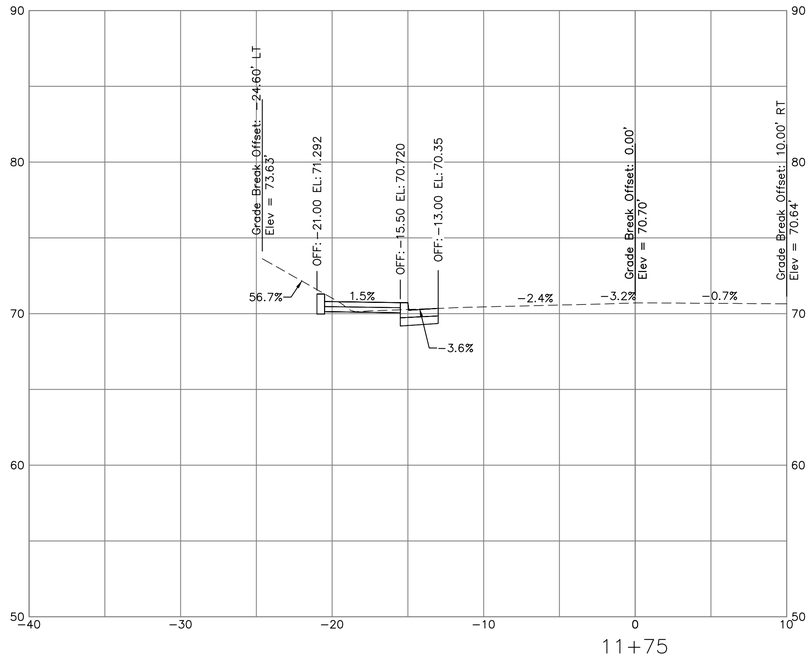
Exp. 9/30/19
CIVIL
STATE OF CALIFORNIA

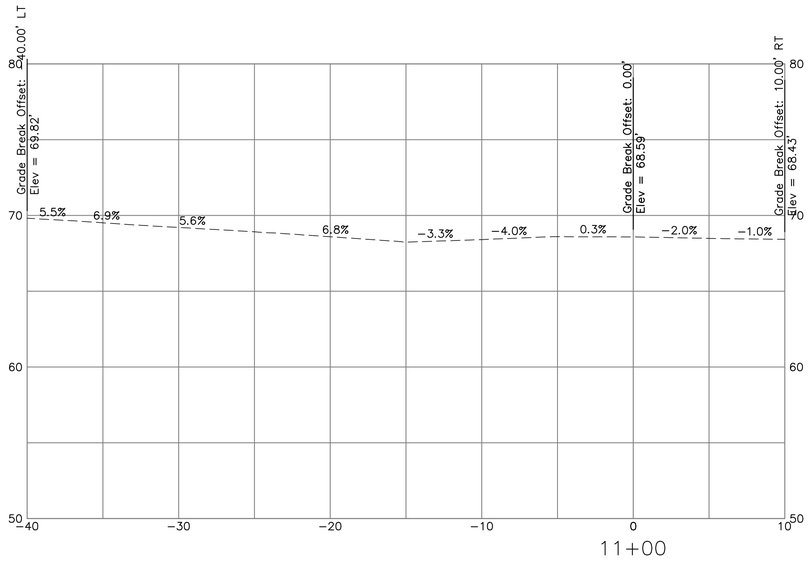
SIGNING AND STRIPING

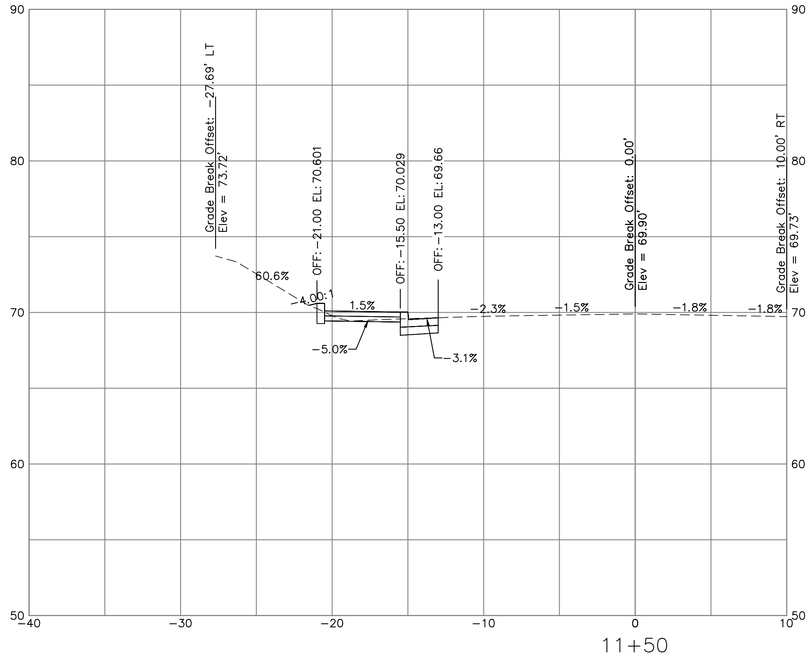
SHEET NO. 29 OF 31 SHEETS

SS-6









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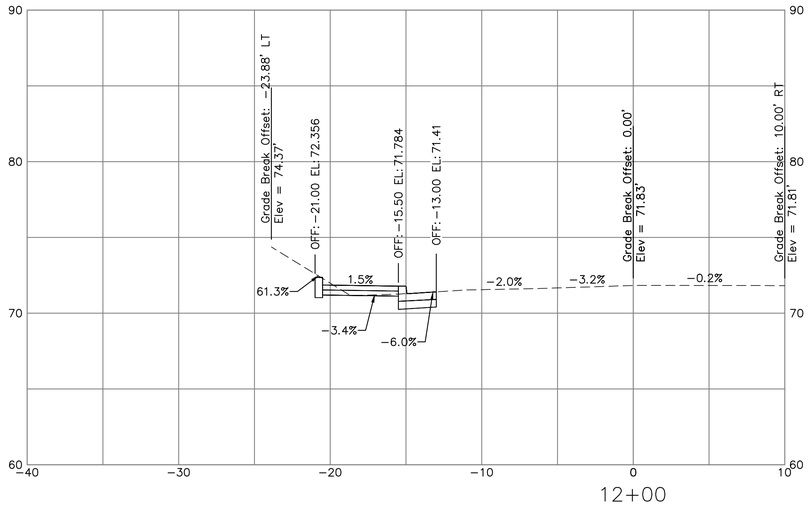
CITY OF CAPITOLA

SANTA CRUZ COUNTY CA

CROSS-SECTIONS

FOR REFERENCE ONLY

NOT FOR CONSTRUCTION



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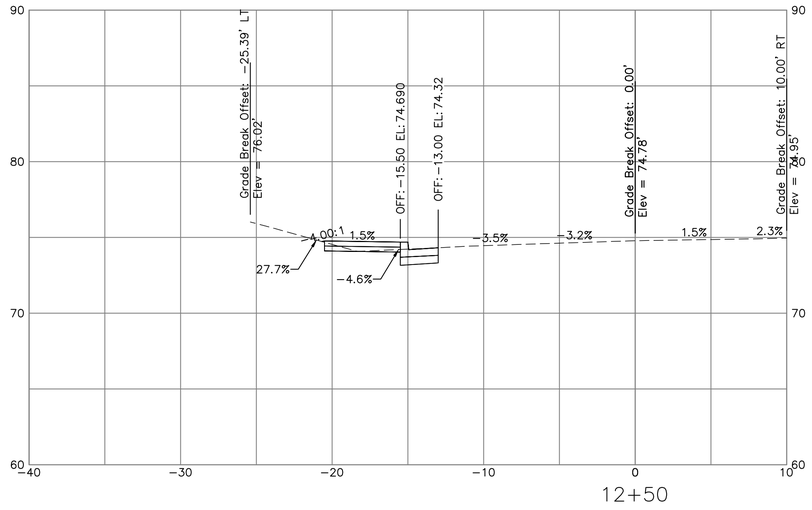

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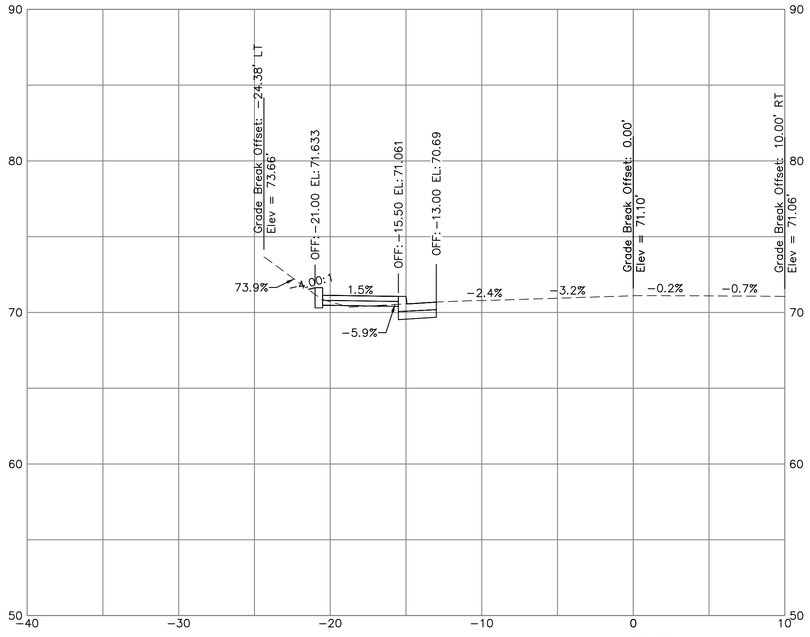

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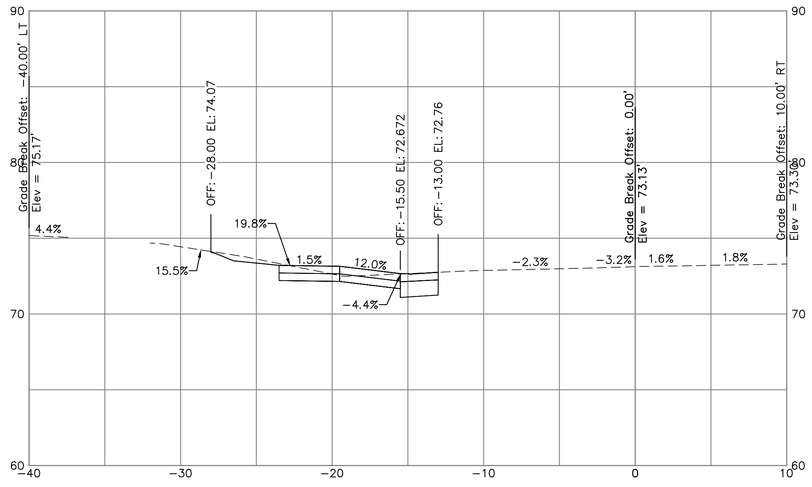

12+25

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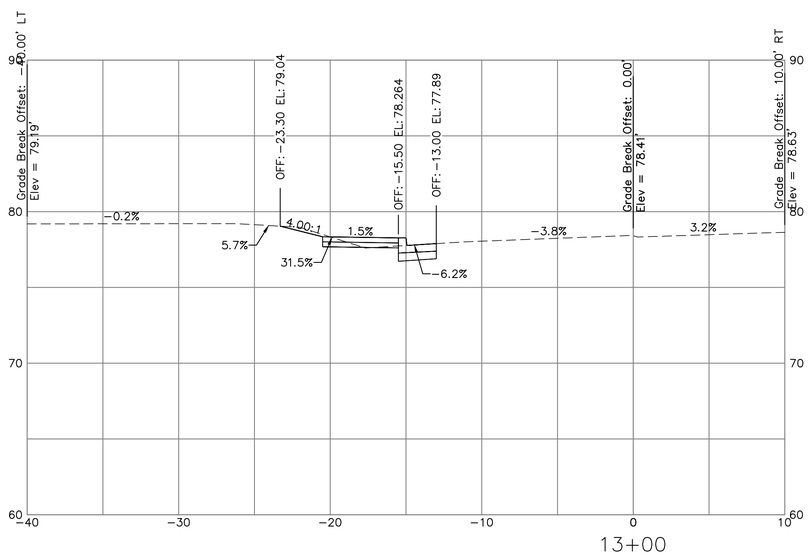

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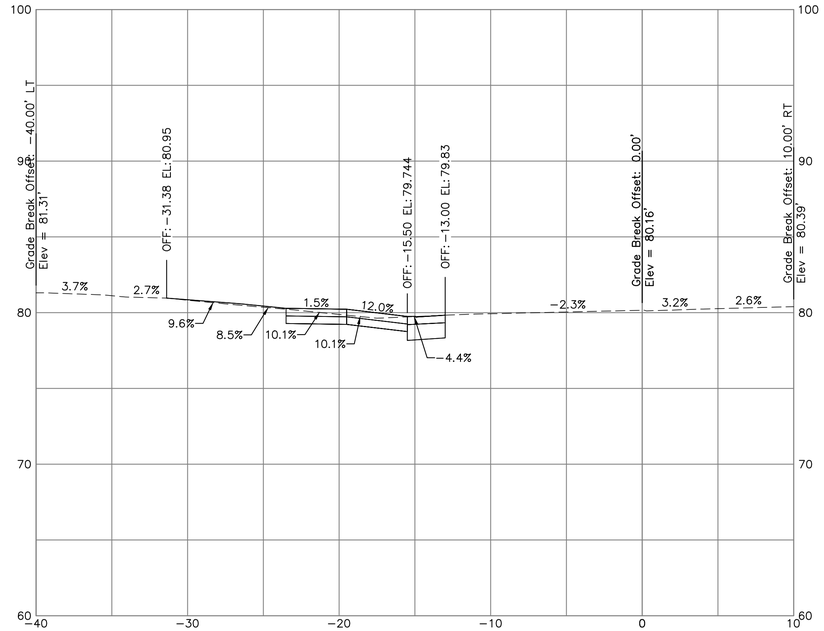

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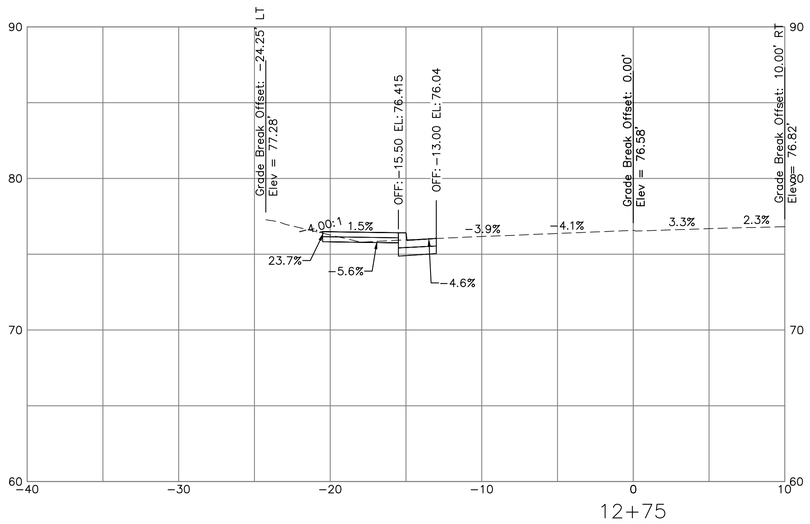

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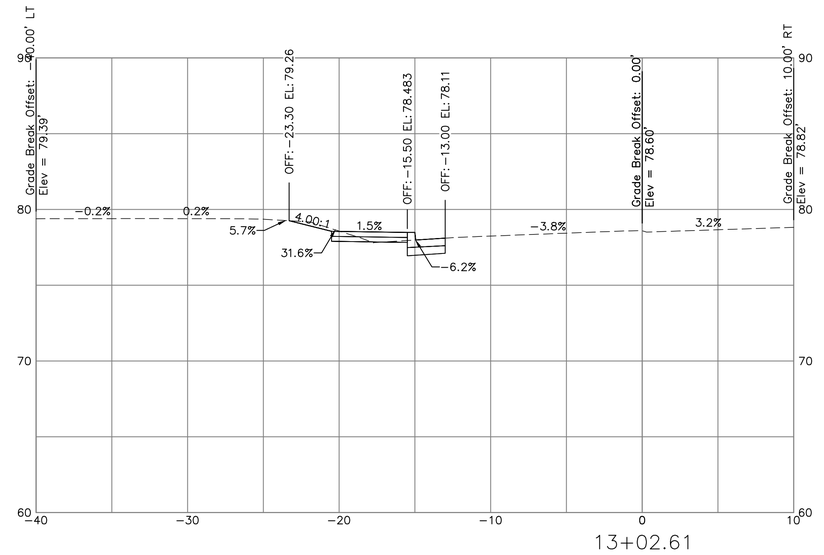

13+02.61

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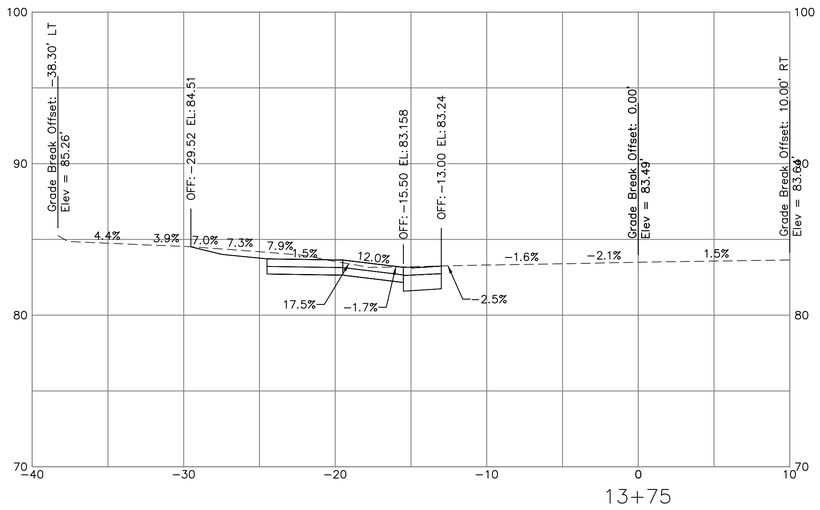

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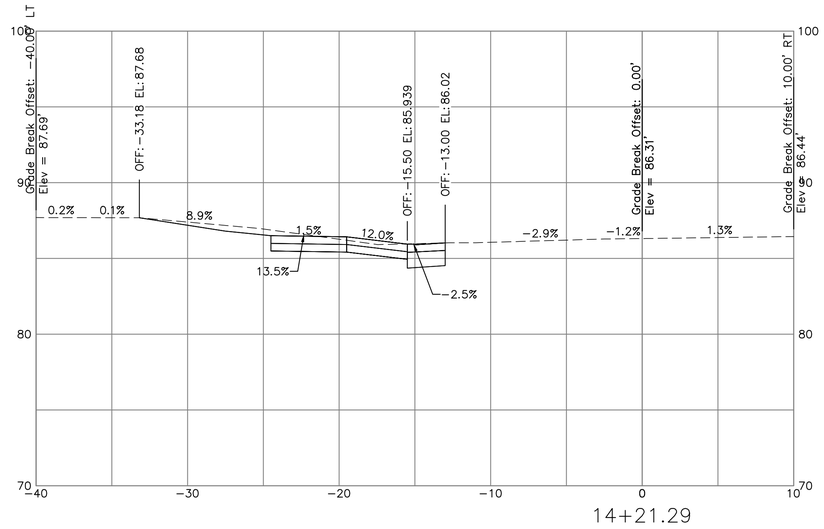

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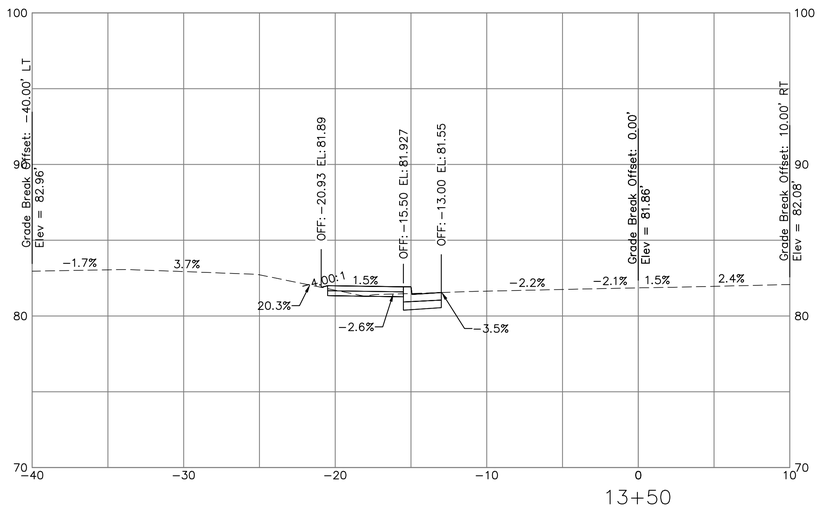

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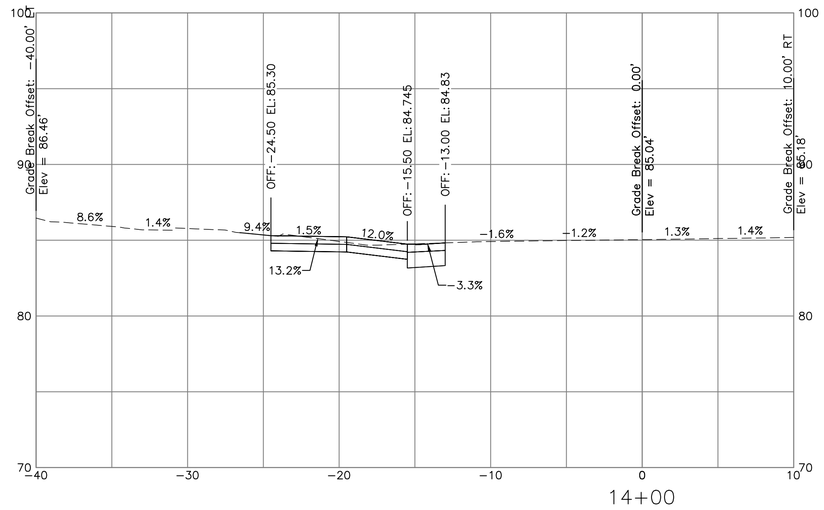

14+00

No.	REVISIONS	DATE	BY

Kimley»Horn
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KHA PROJECT	097763124
DATE	4/22/2019
SCALE	AS SHOWN
DESIGNED BY	DW
DRAWN BY	DW
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PARK AVENUE SIDEWALK IMPROVEMENTS

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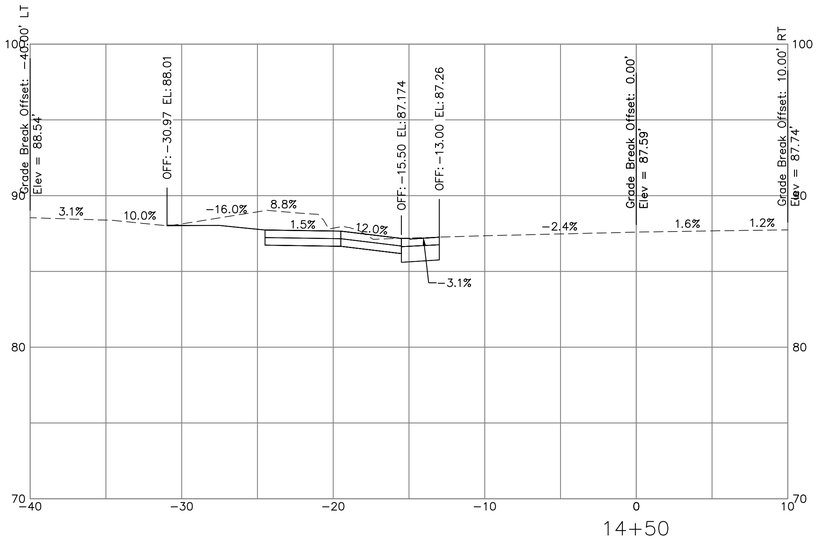

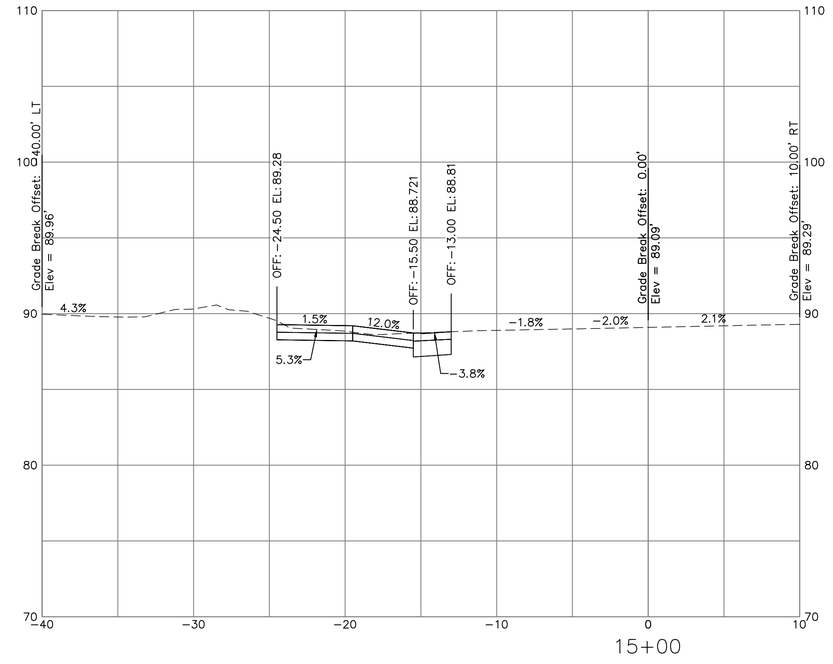

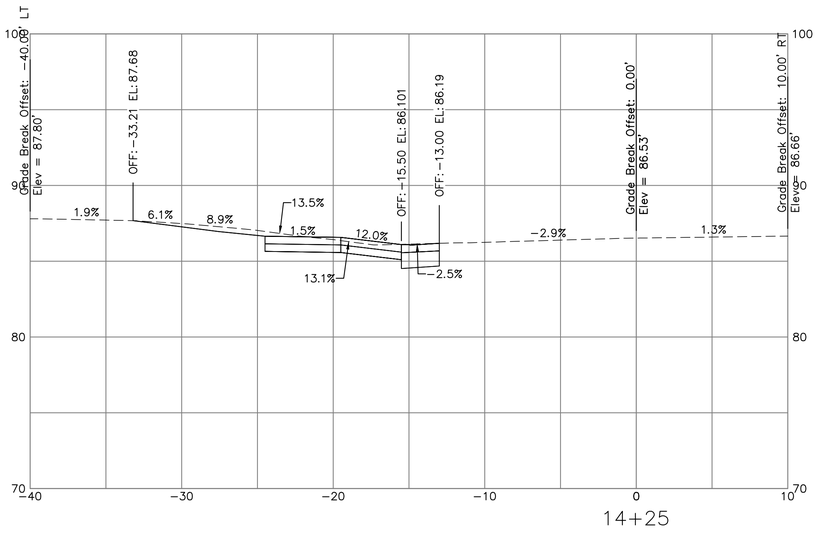

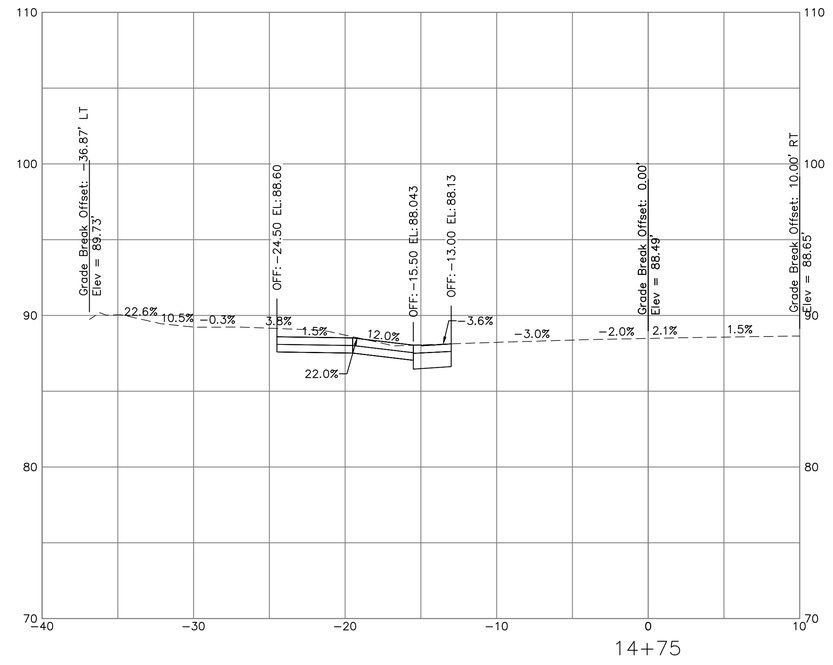

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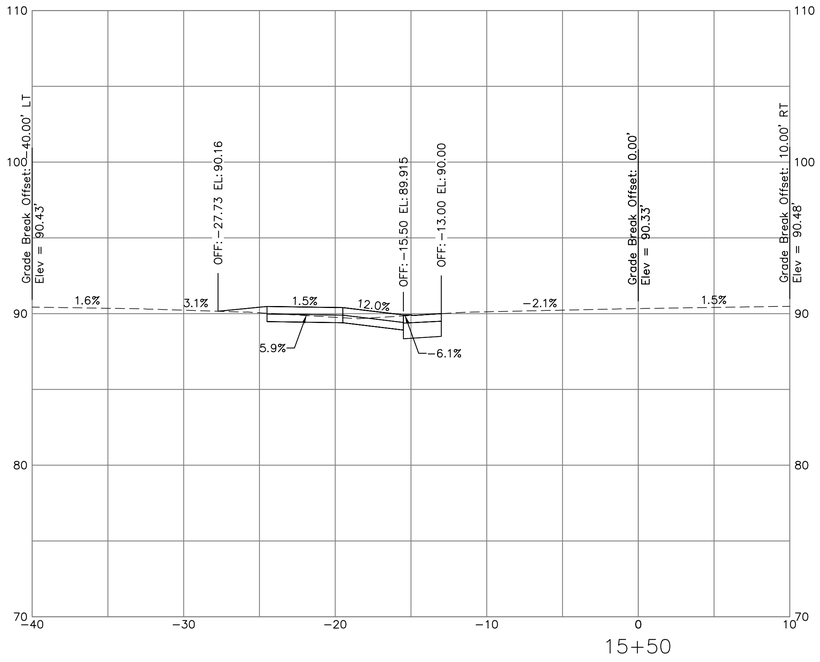

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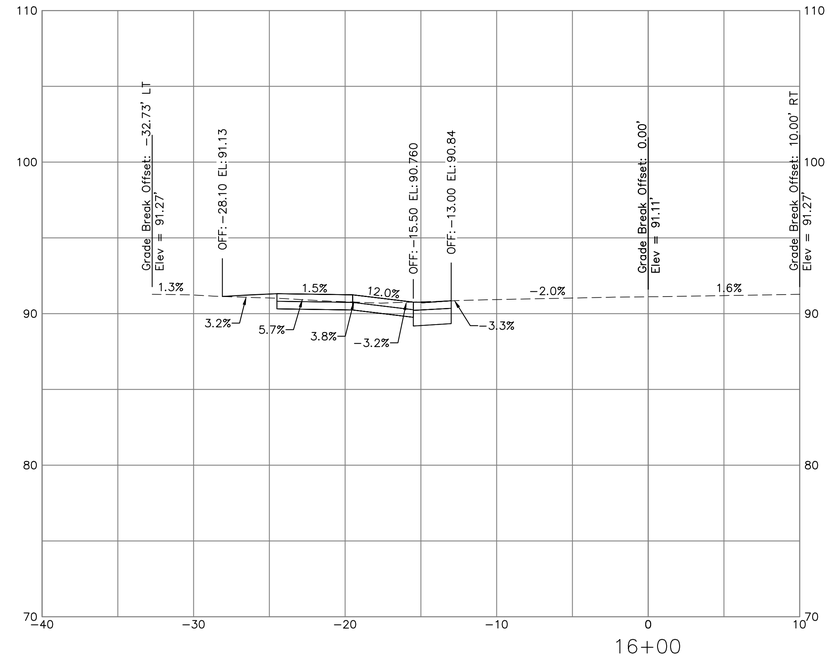

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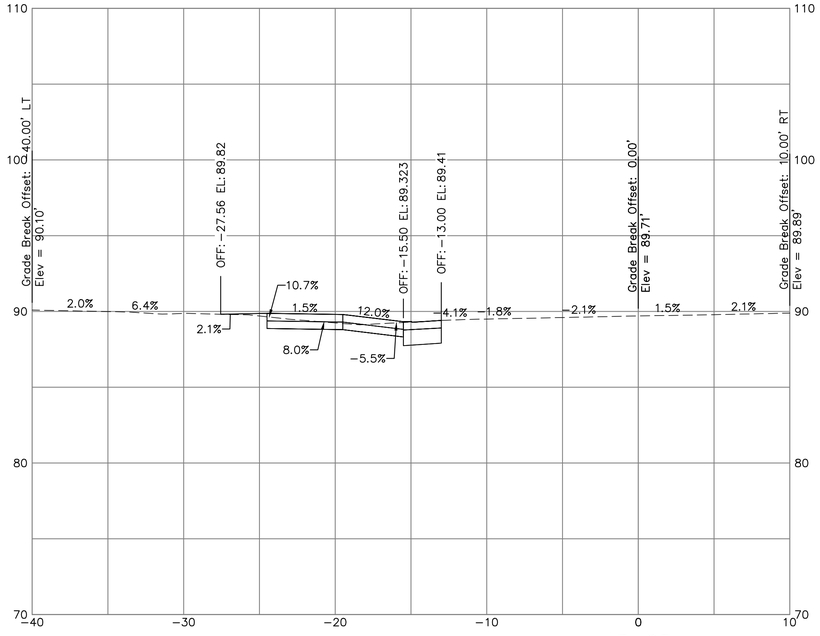

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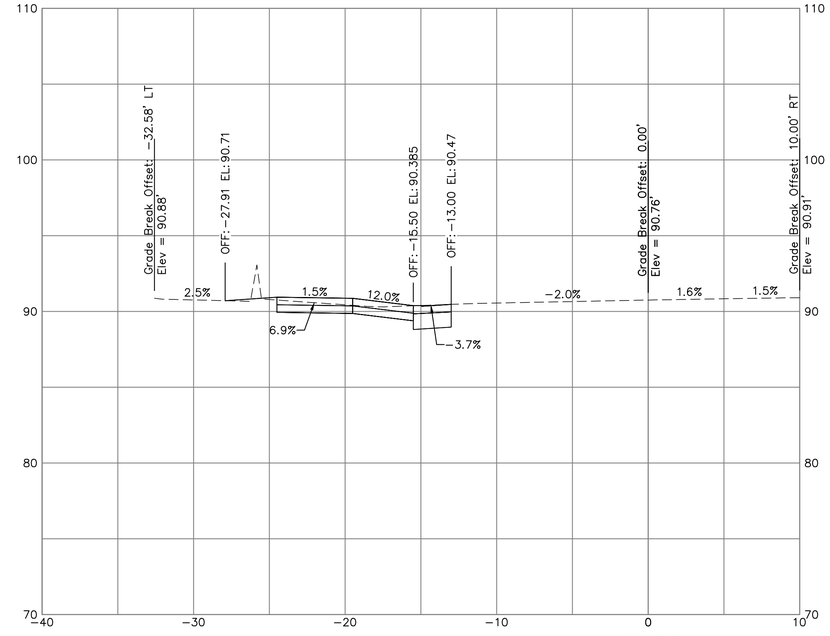

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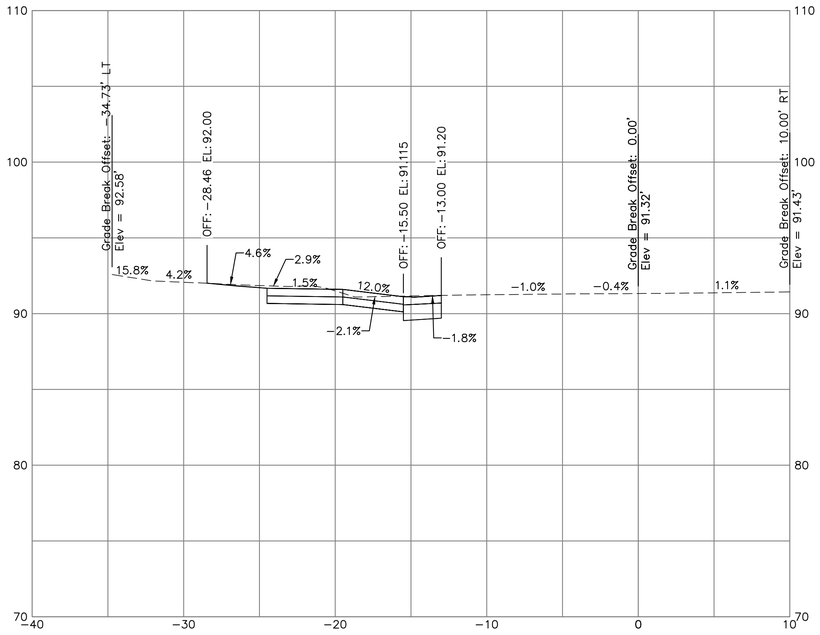

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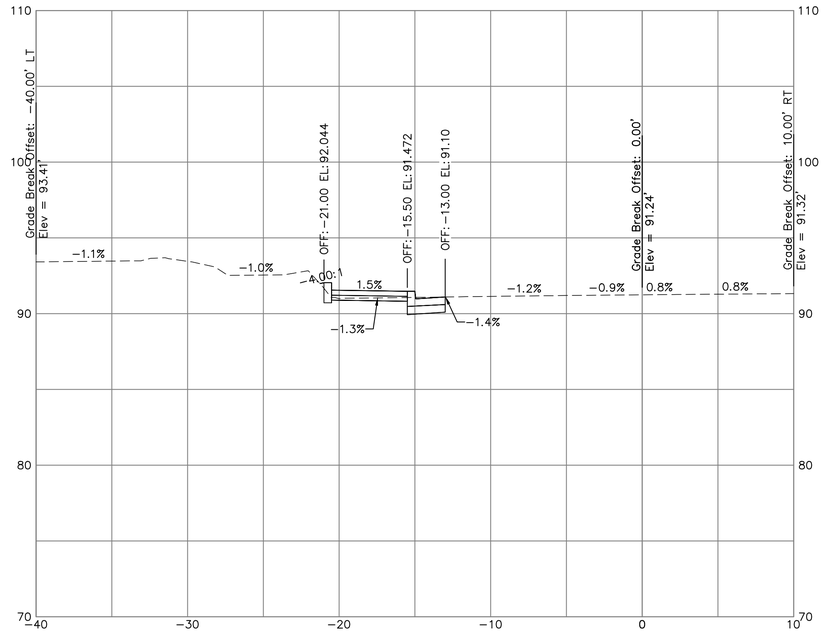

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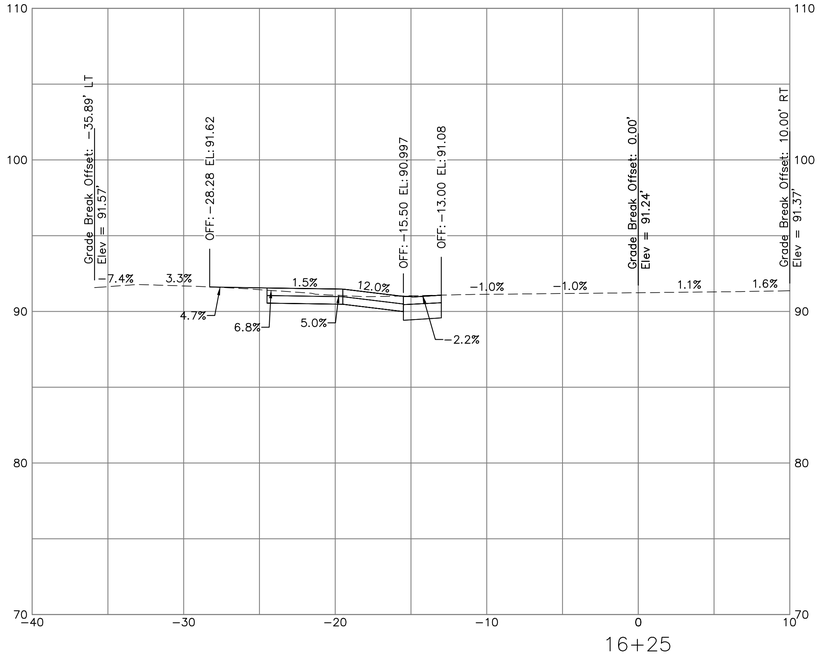

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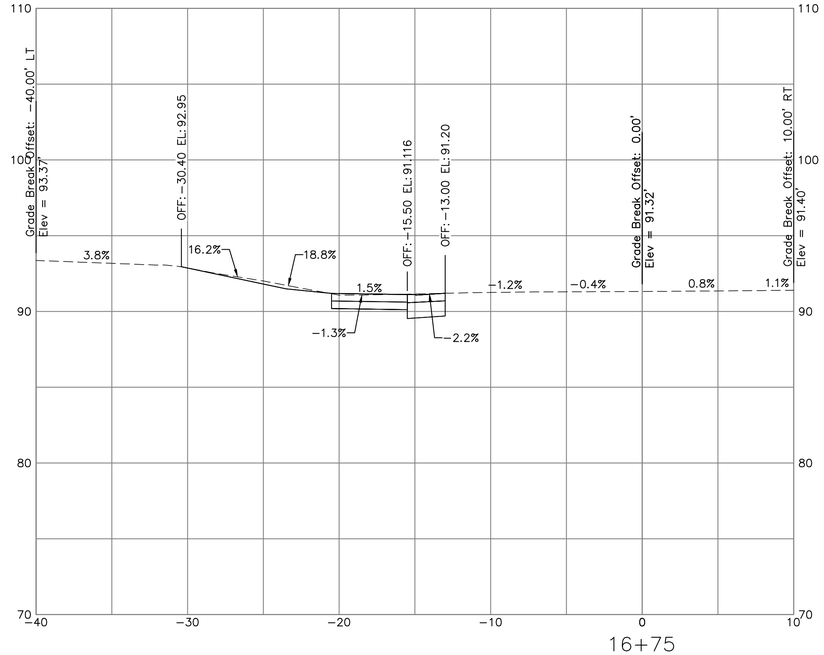

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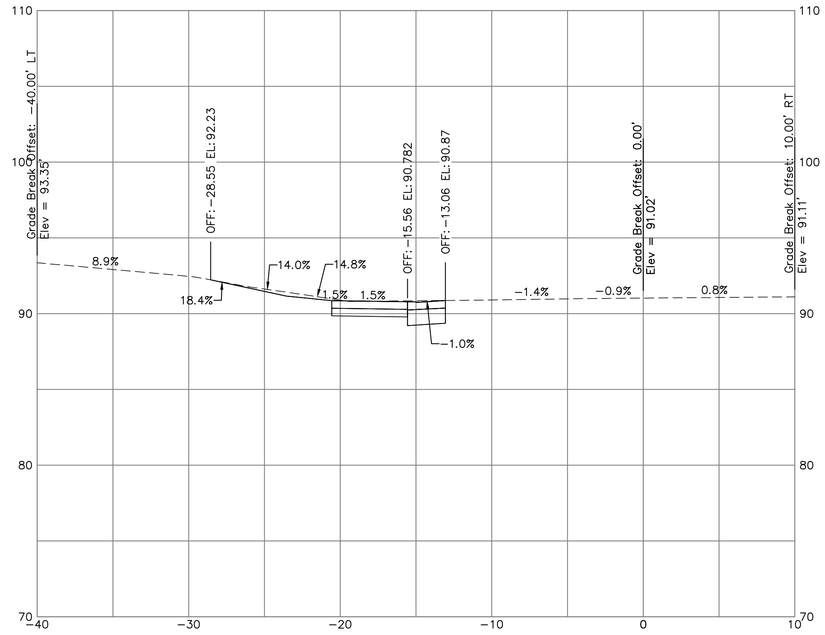

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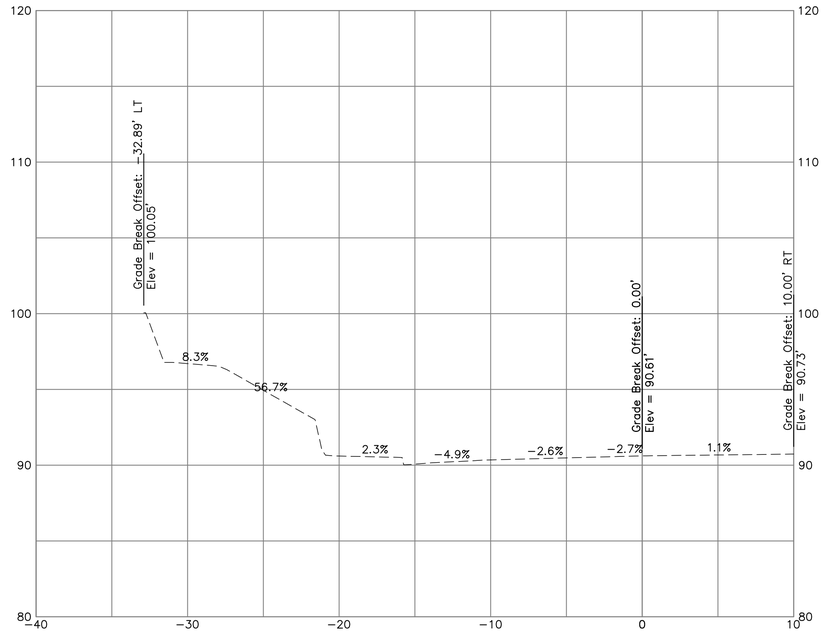

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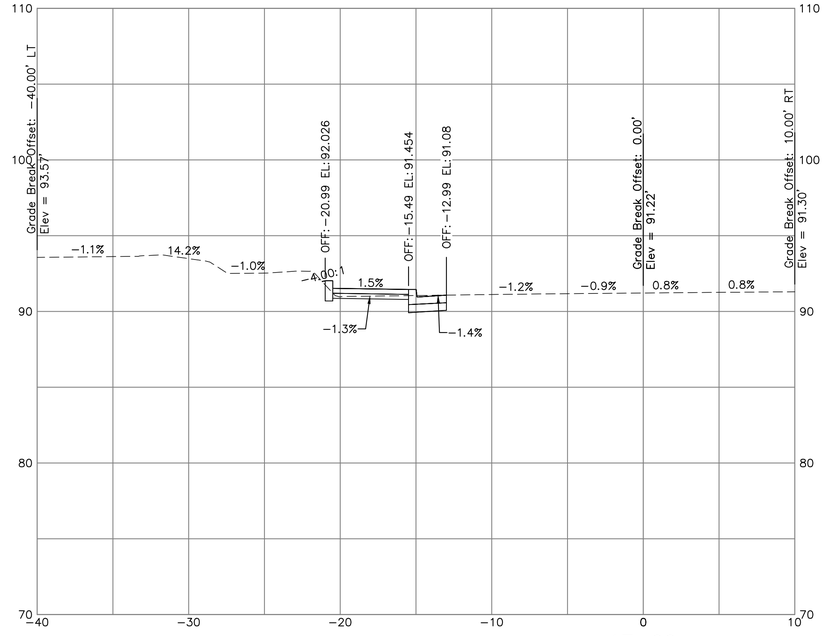

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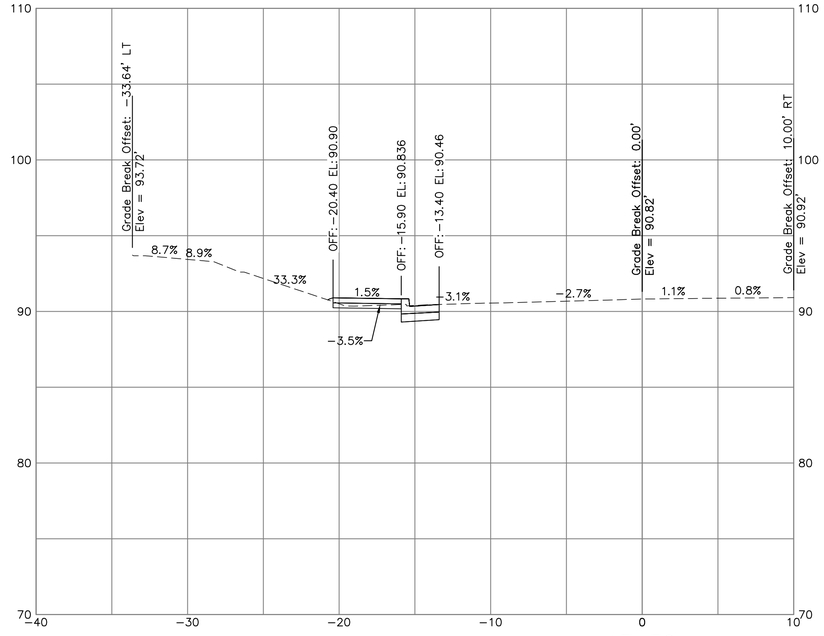

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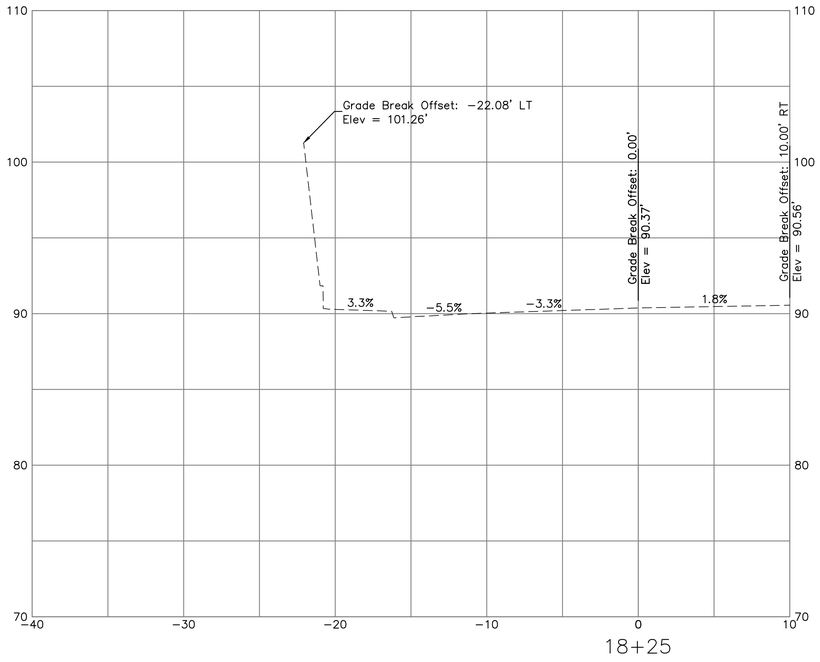

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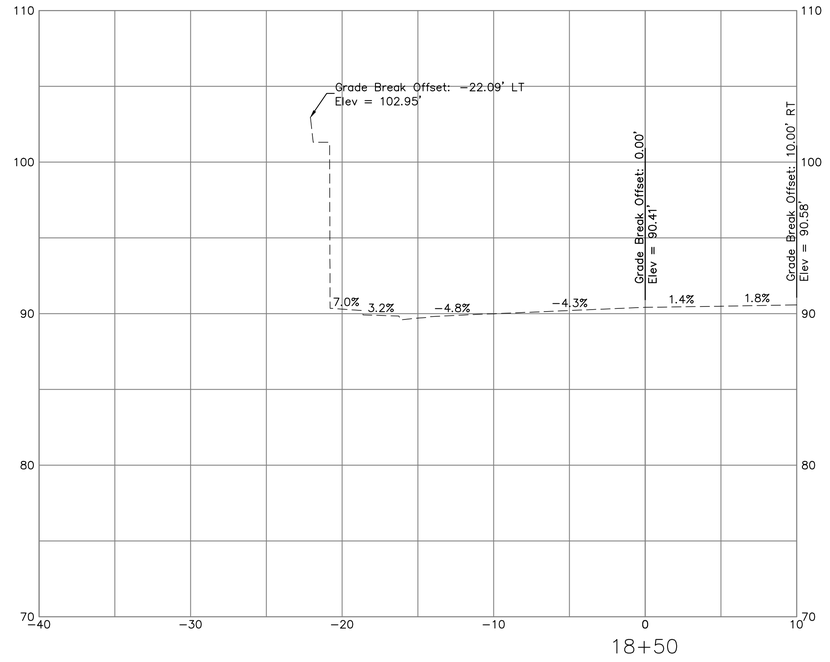

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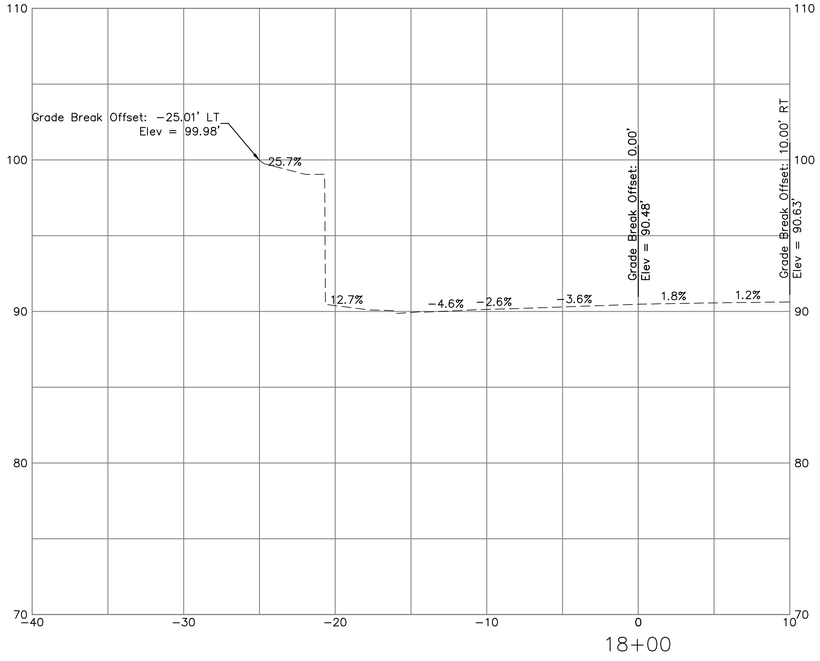

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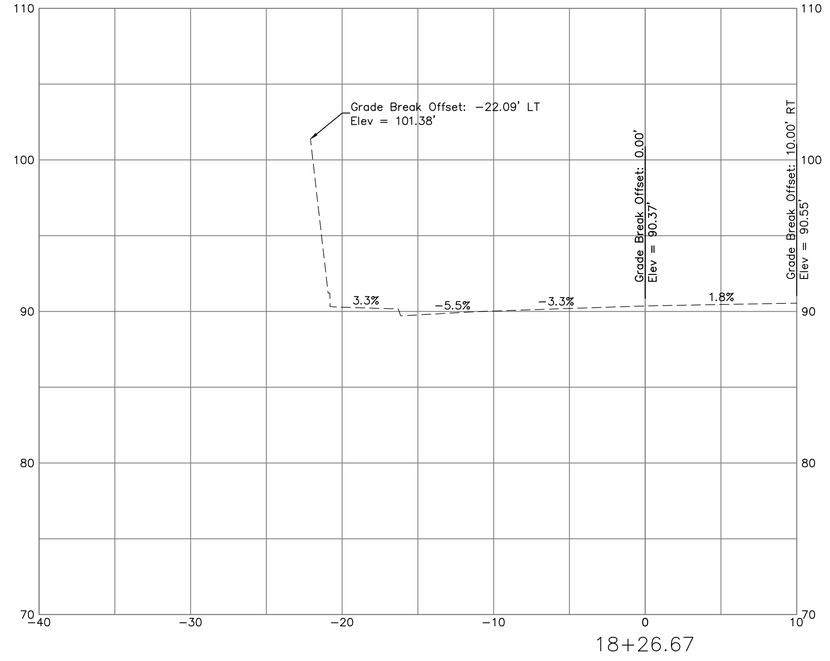

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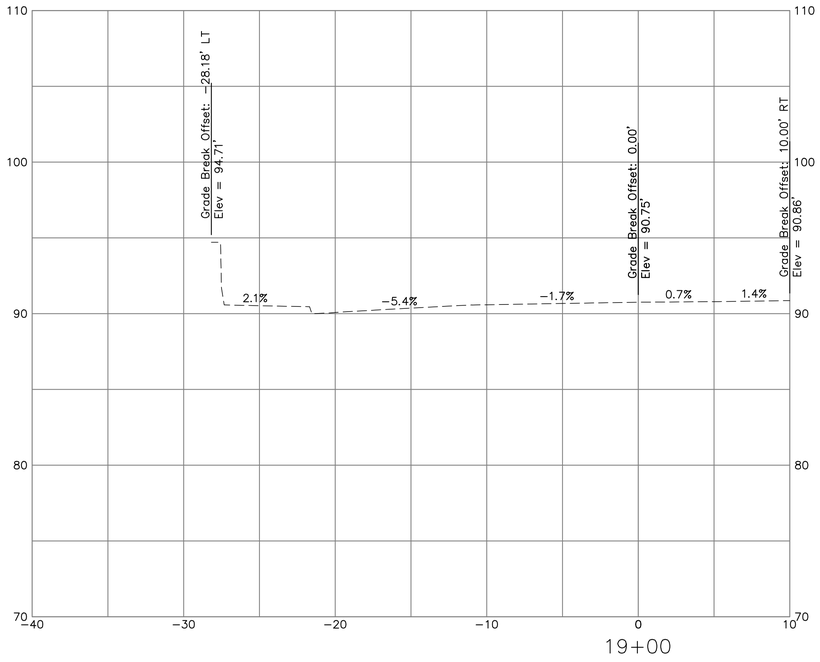

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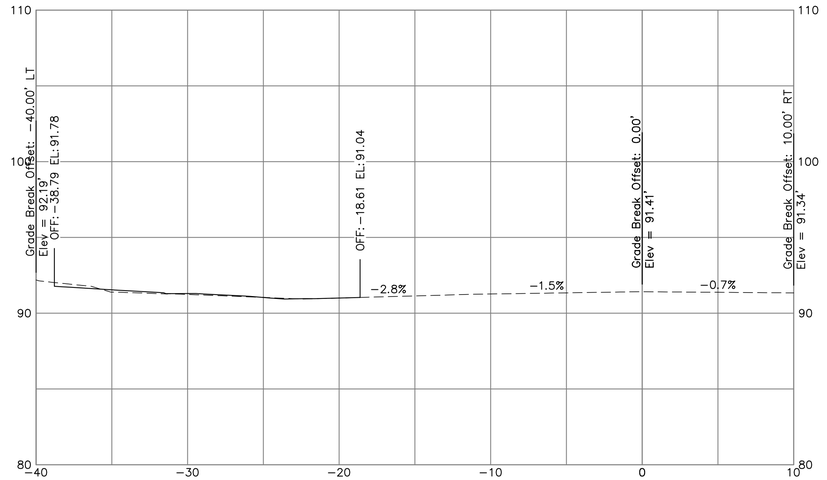

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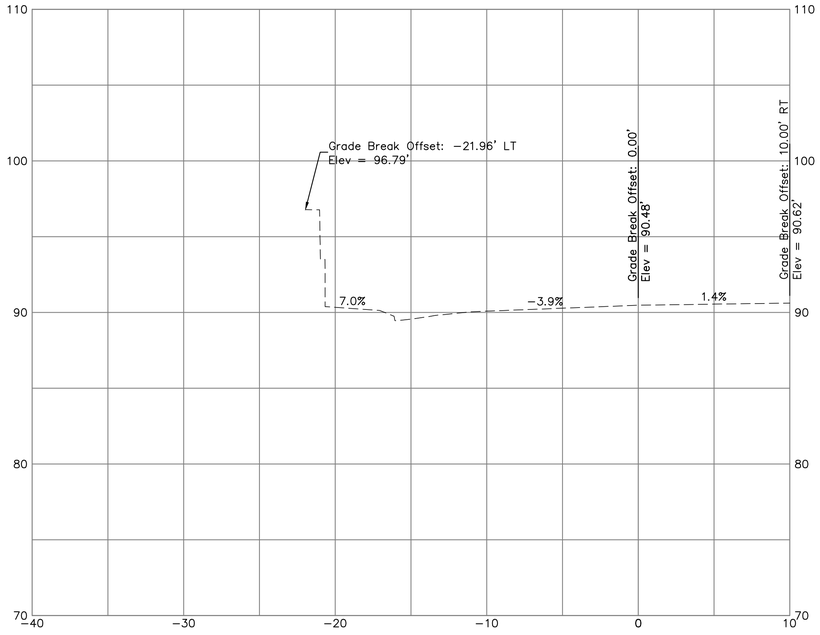

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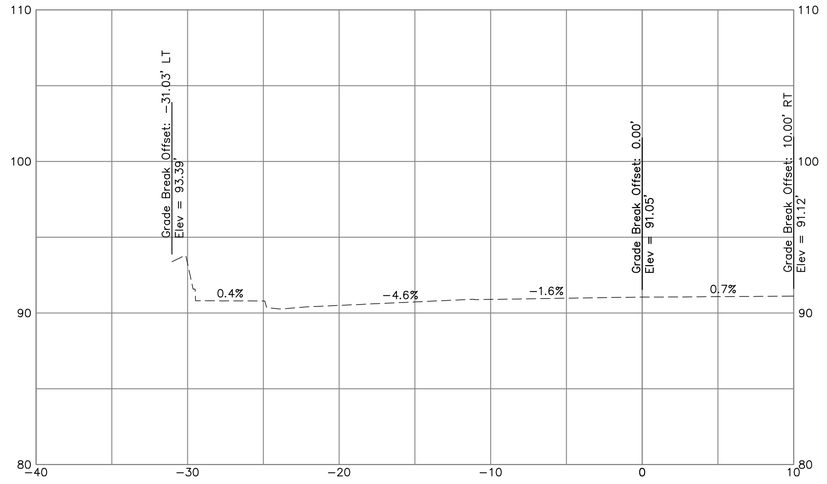

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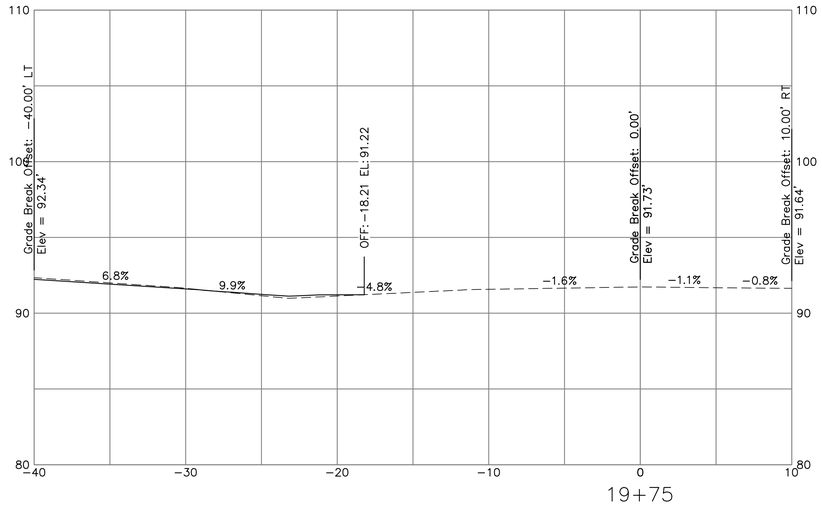

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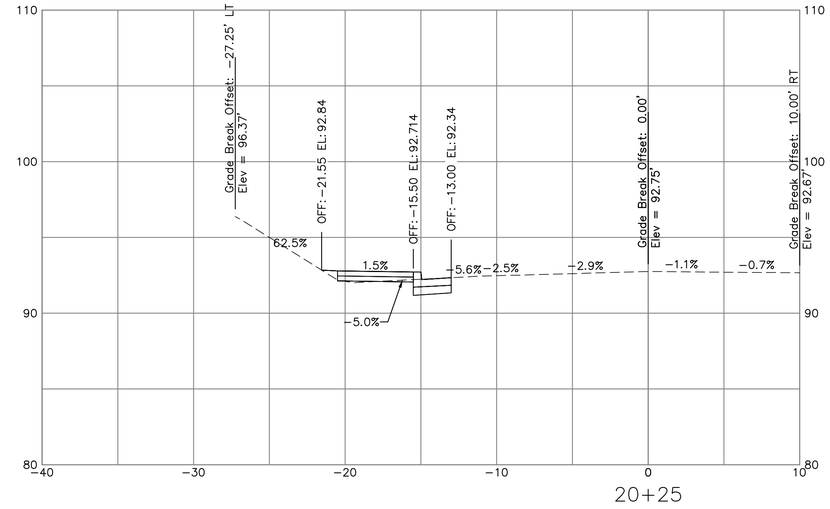

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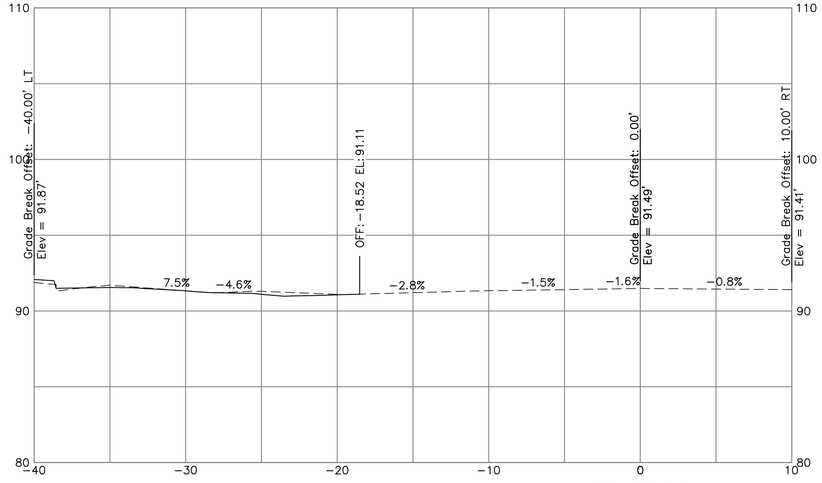

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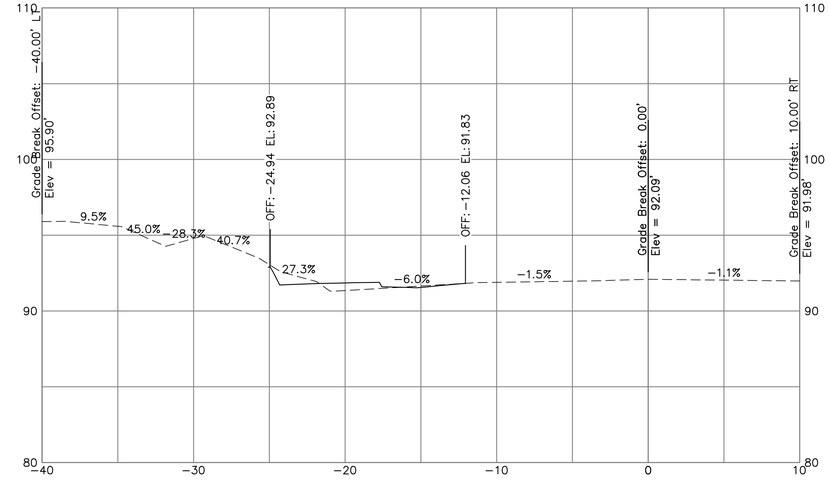

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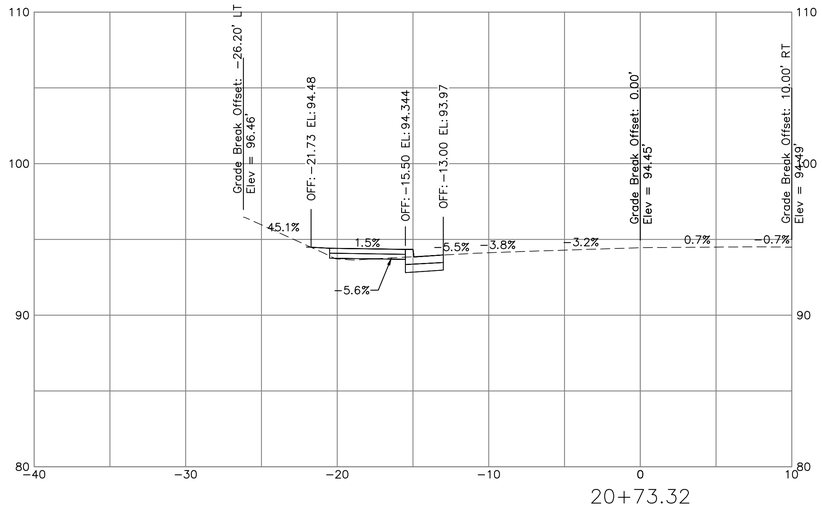

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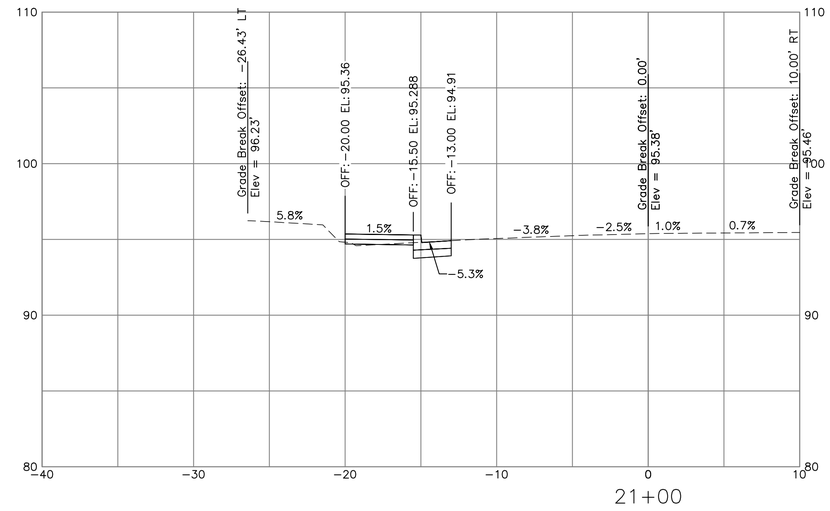

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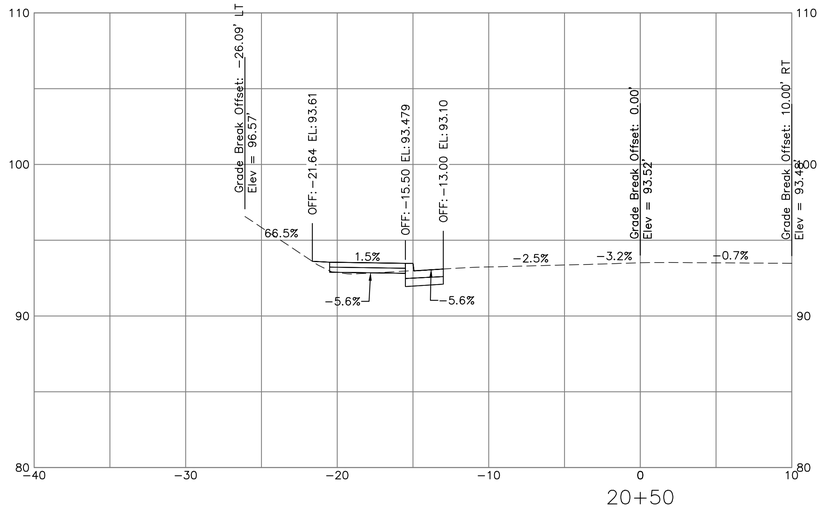

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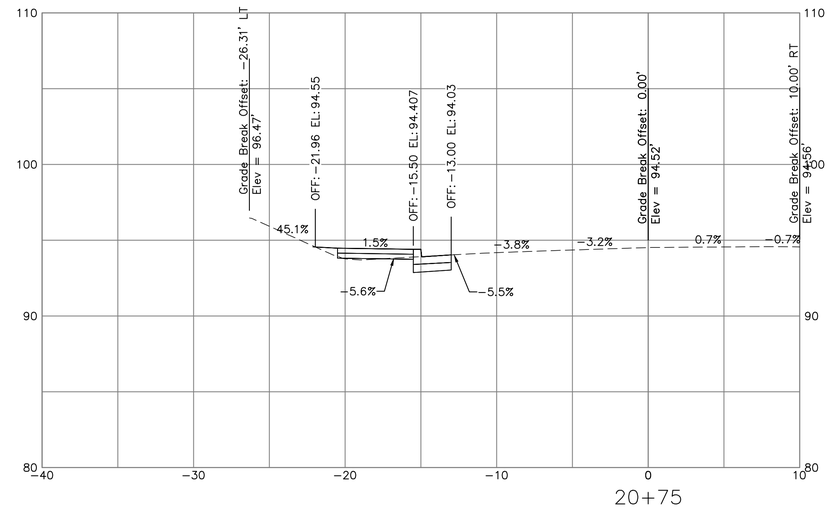

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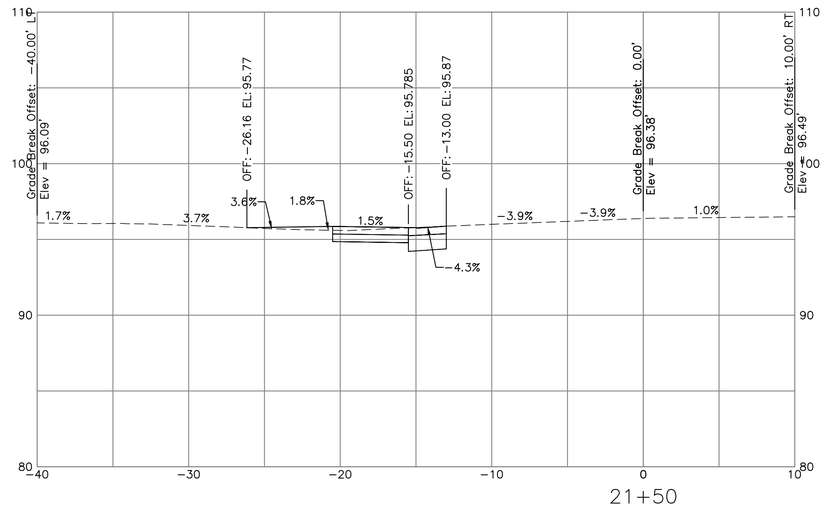

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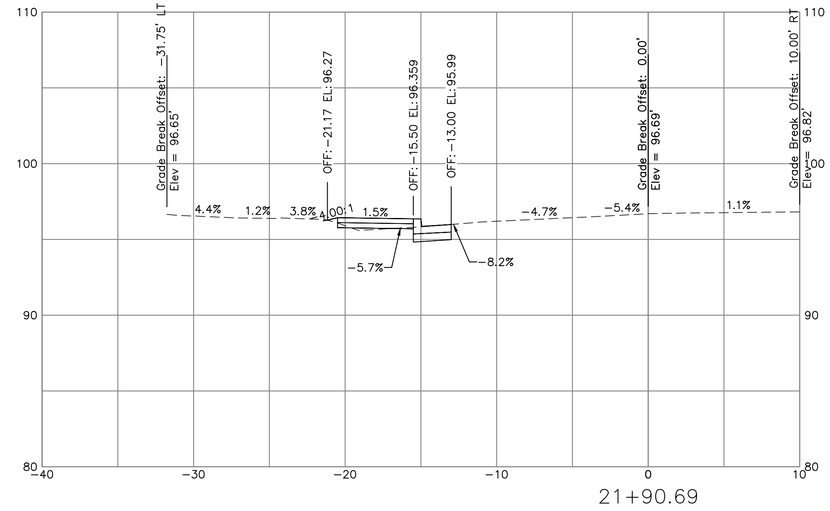

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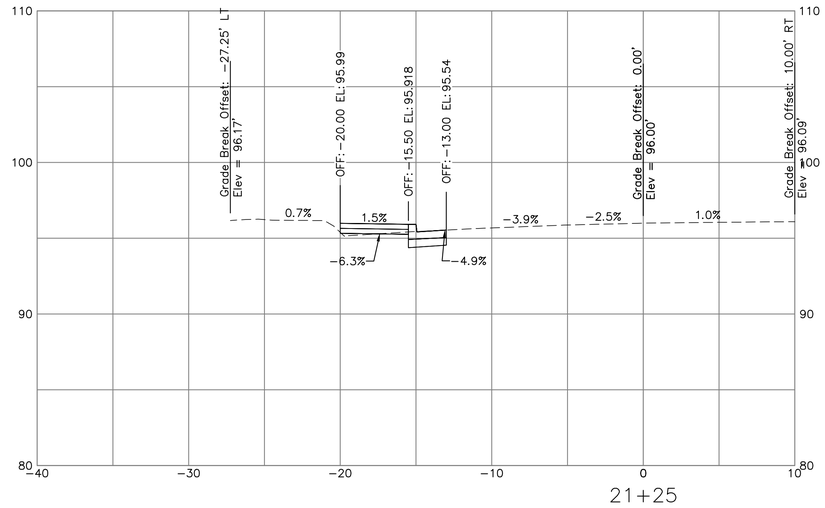

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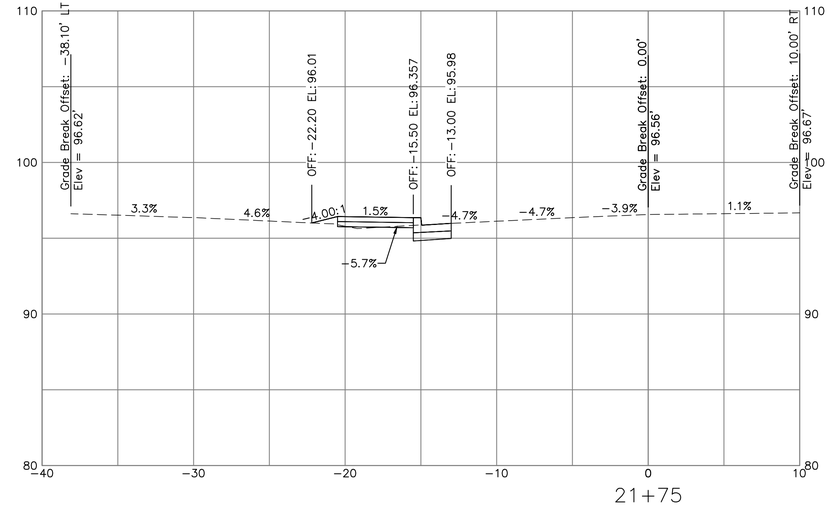

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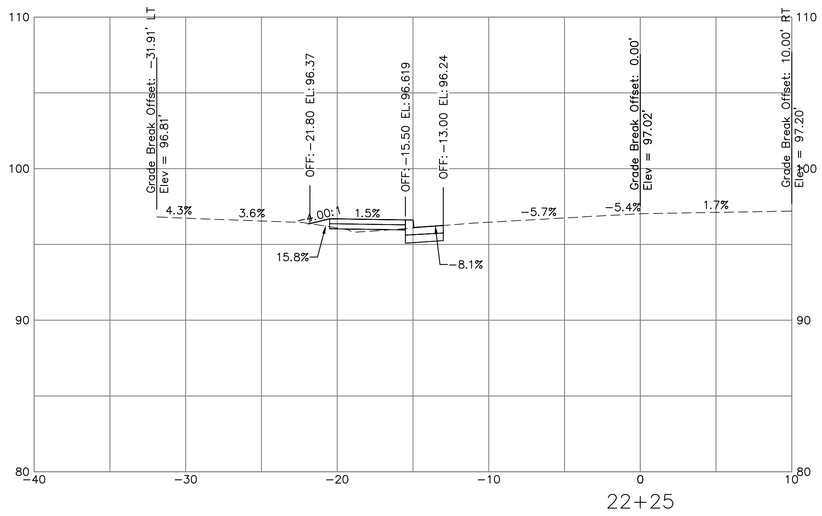

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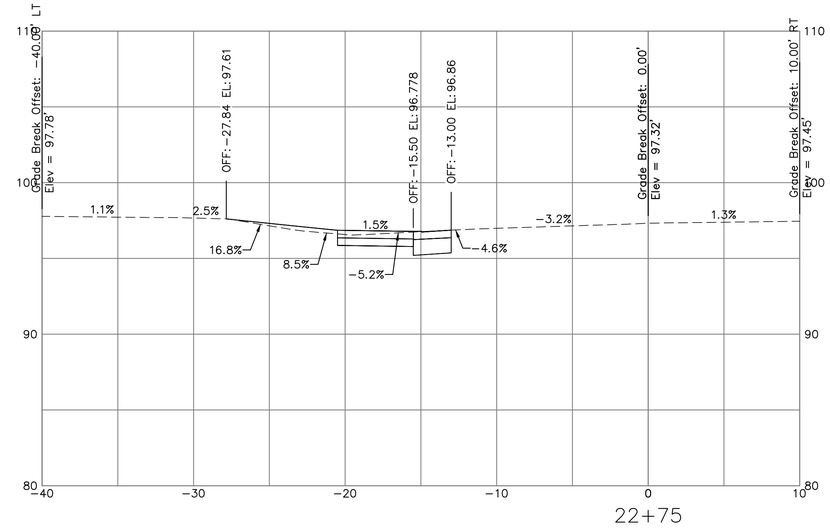

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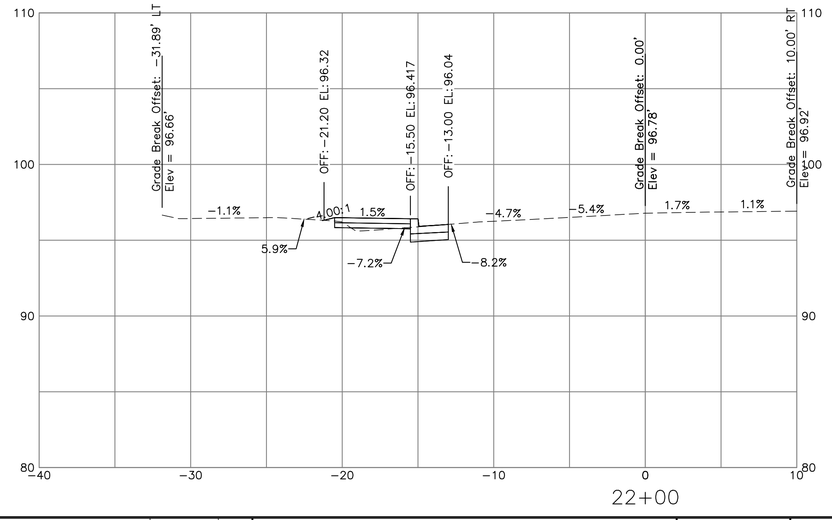

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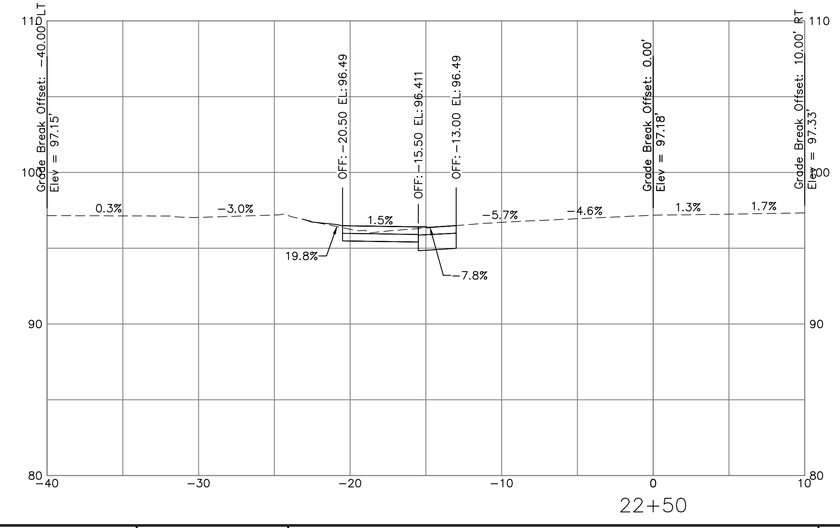

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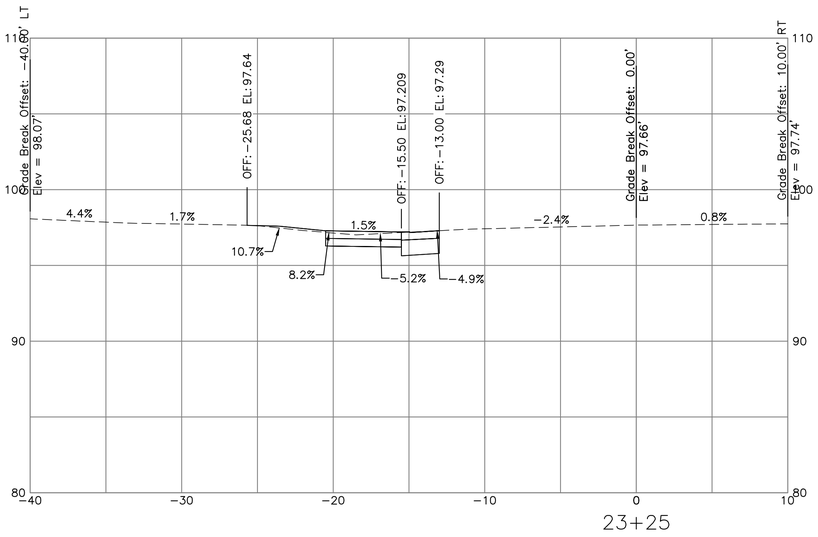

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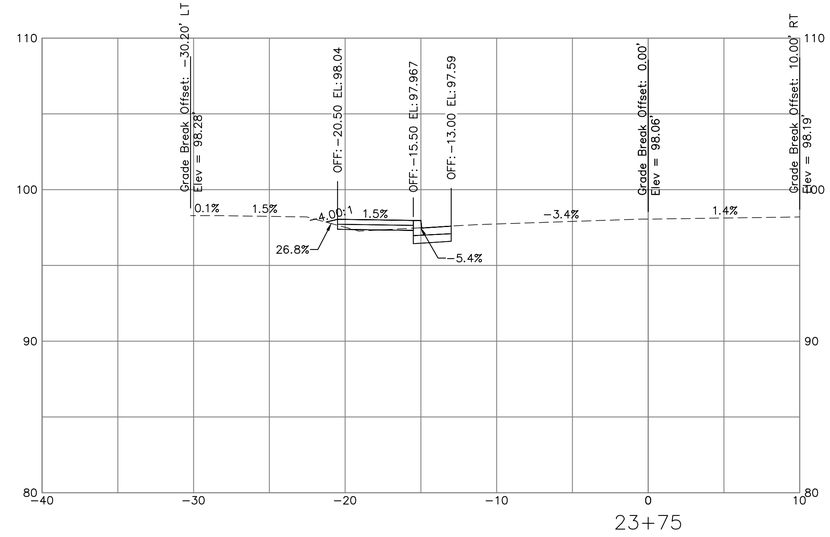

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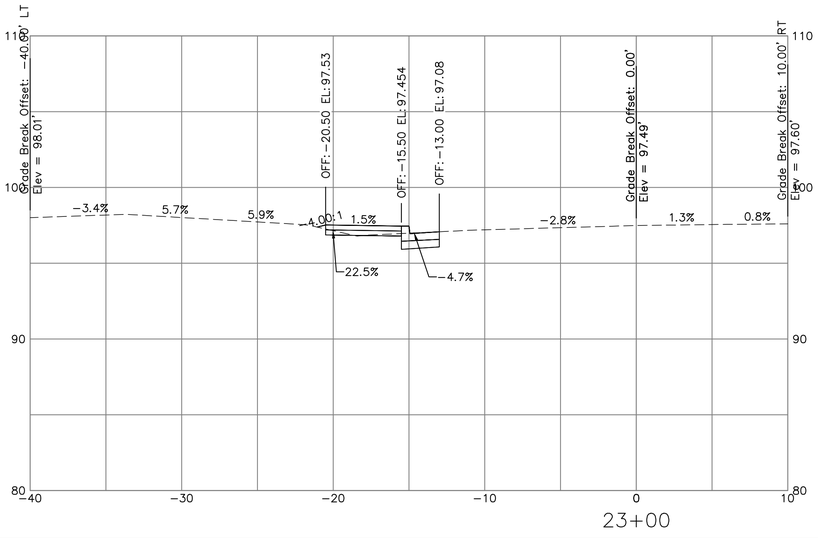

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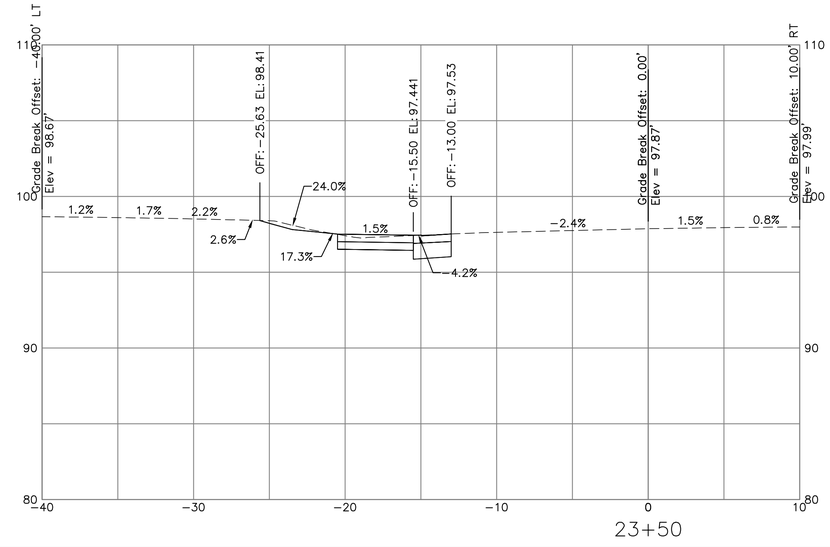

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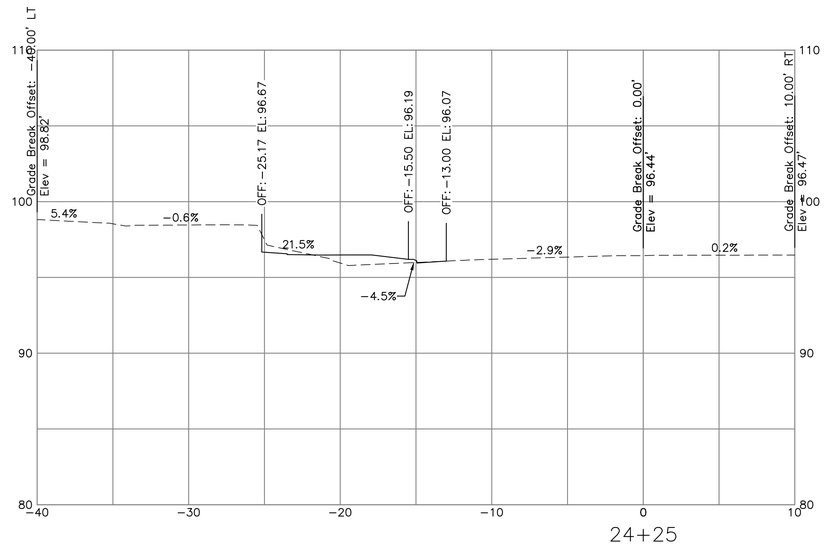

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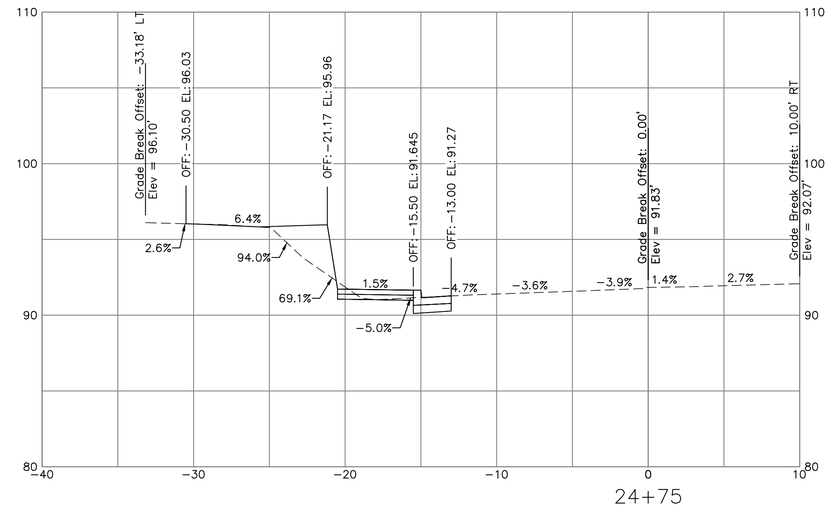

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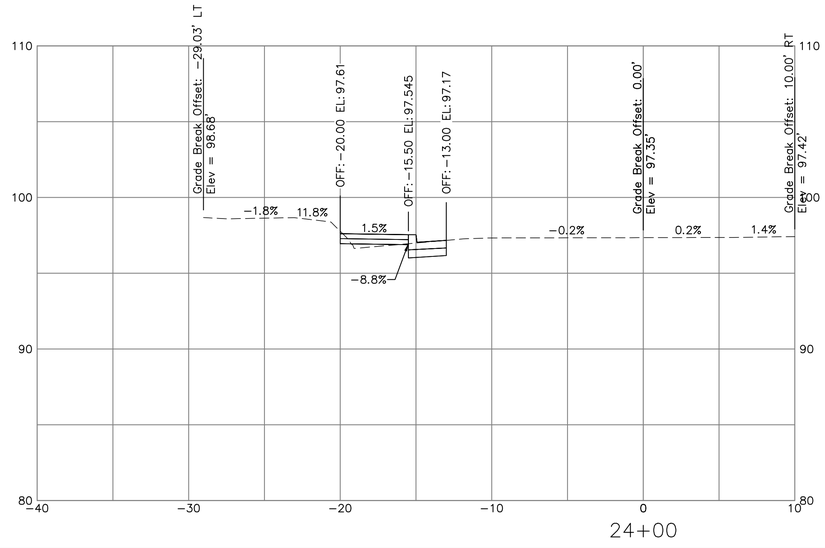

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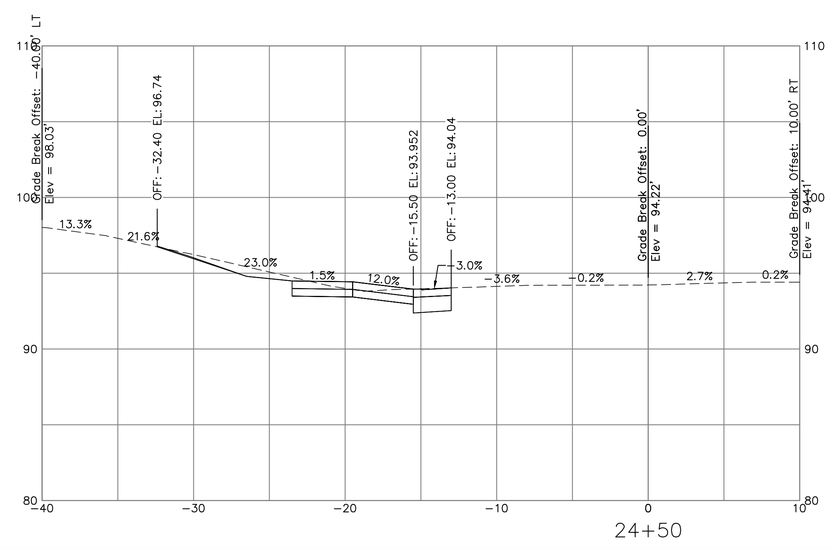

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Kimley»Horn

100 WEST SAN FERNANDO STREET, SUITE 250, SAN JOSE, CA 95113
PHONE: 669-800-4130
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KHA PROJECT	097763124
DATE	4/22/2019
SCALE	AS SHOWN
DESIGNED BY	DW
DRAWN BY	DW
CHECKED BY	DC

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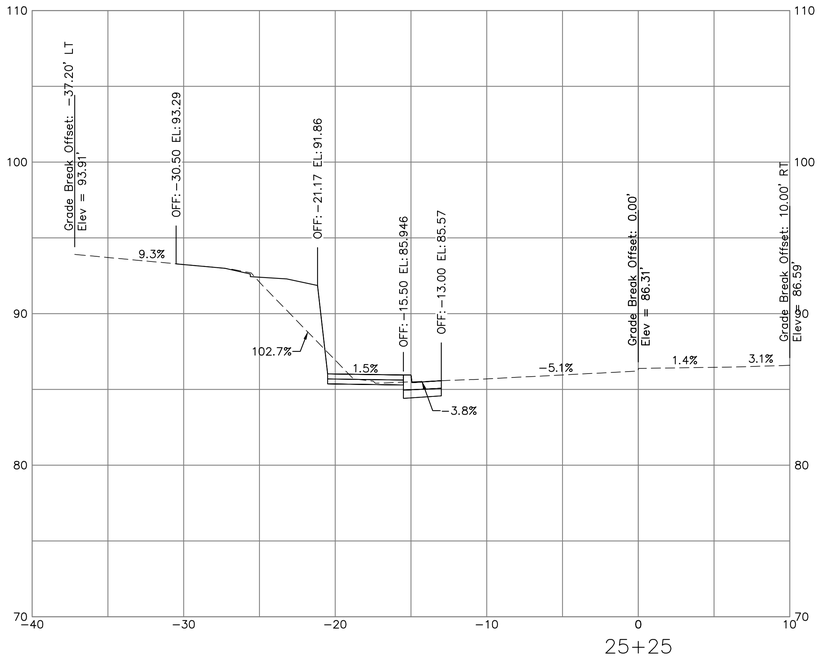

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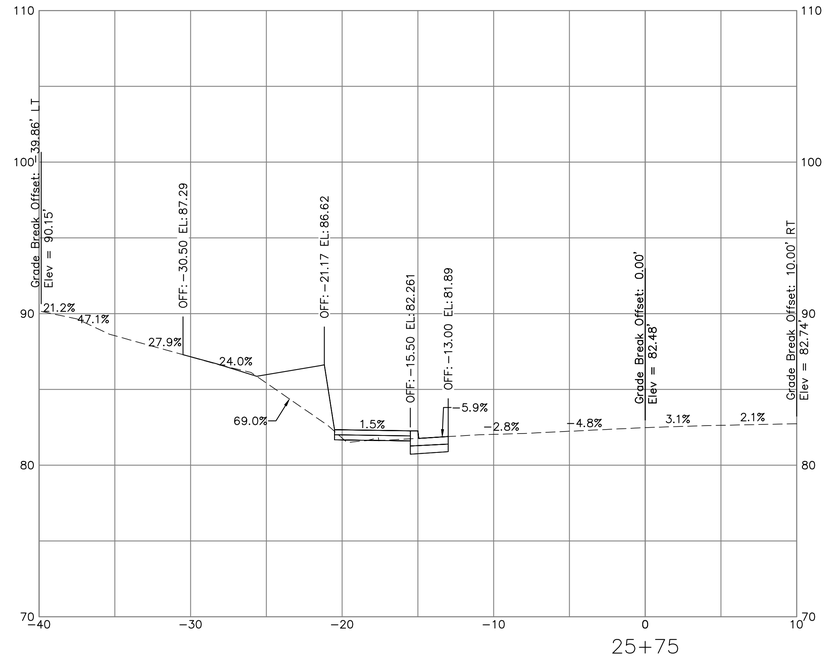

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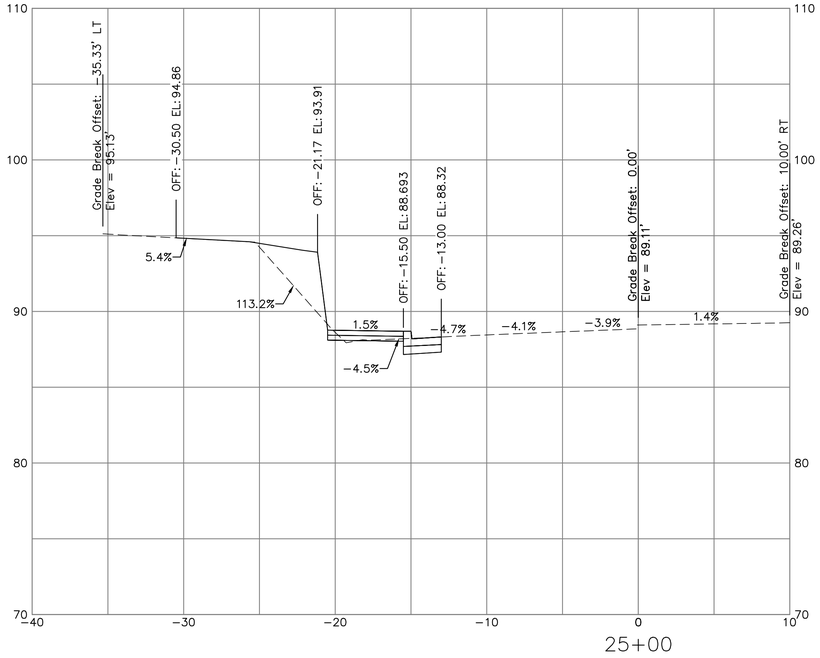

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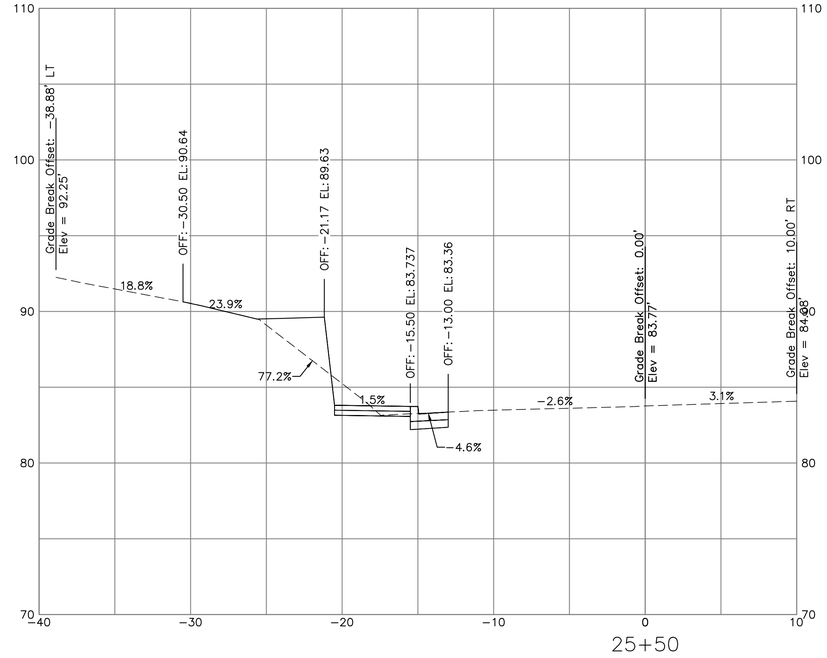

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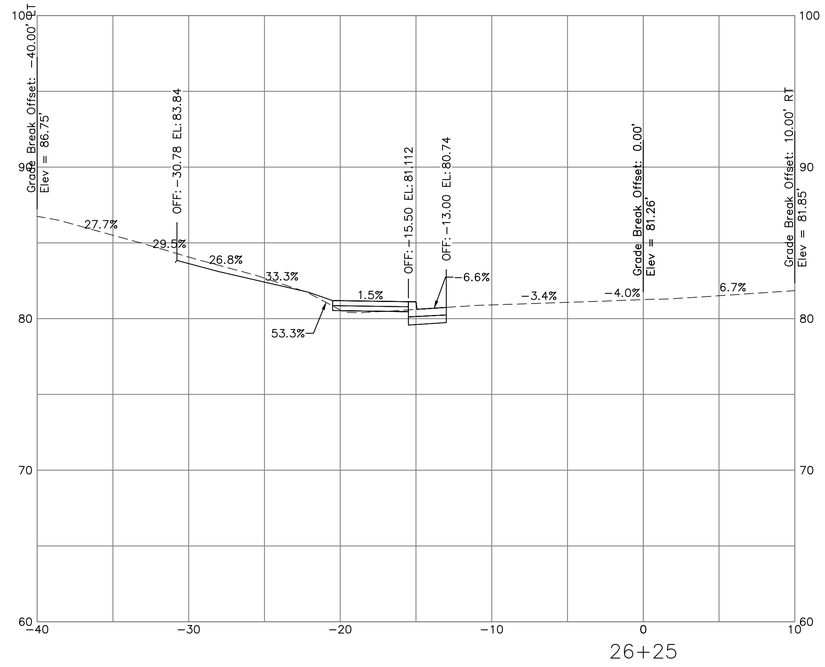

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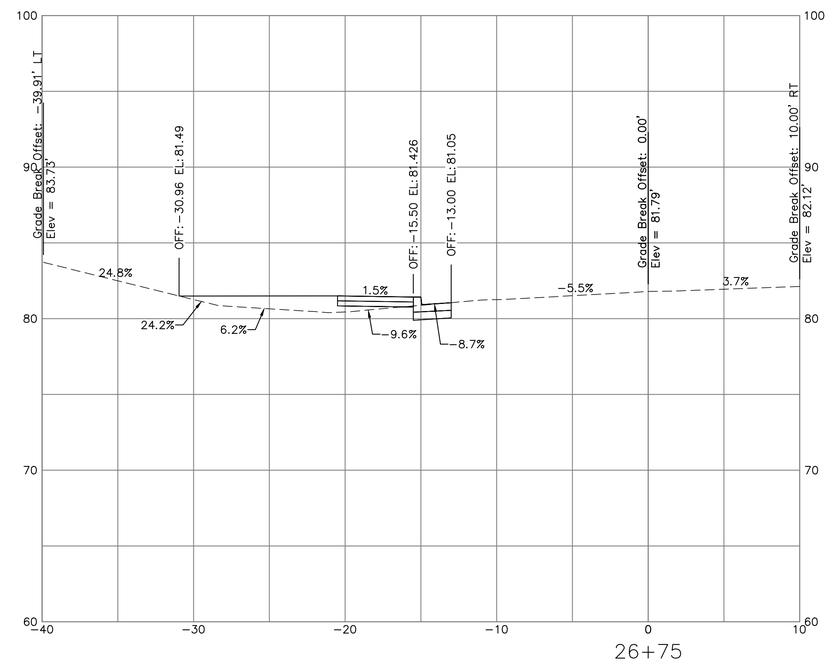

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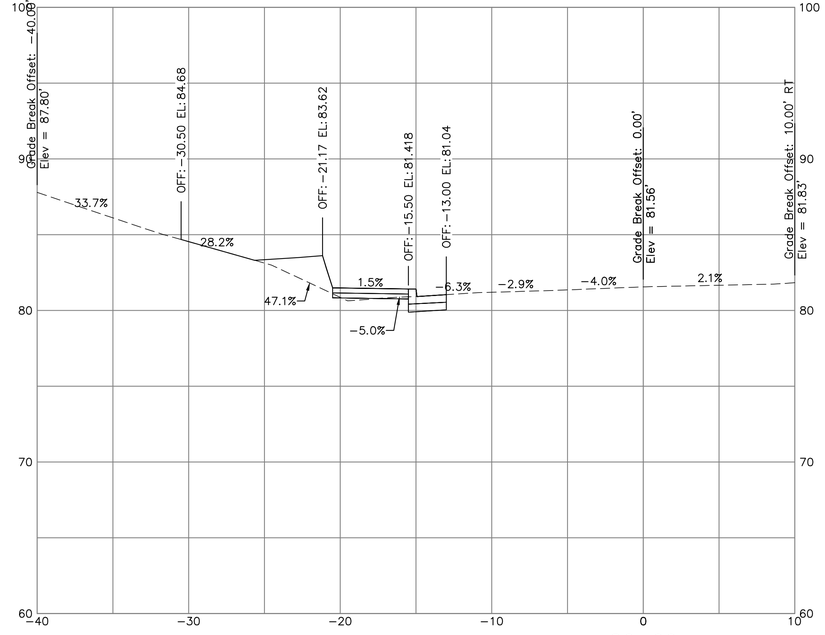

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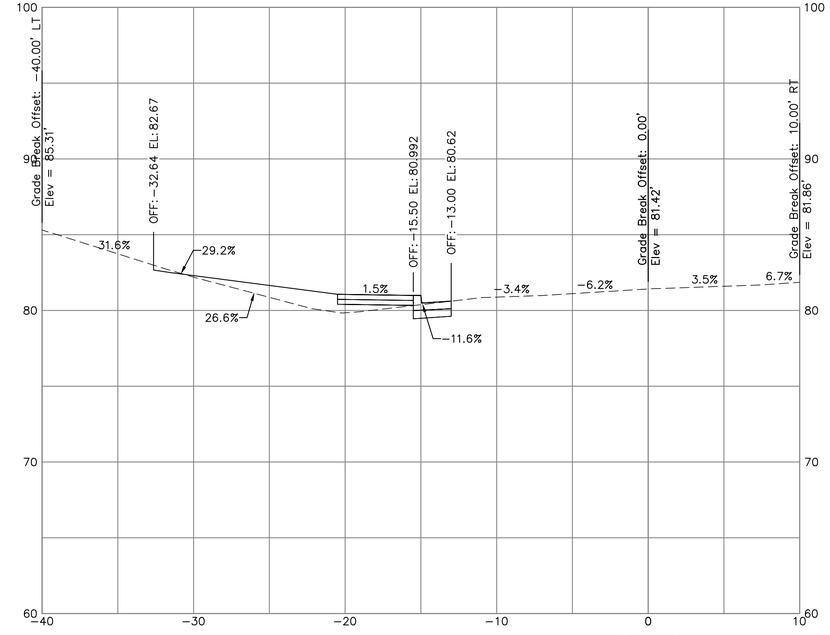

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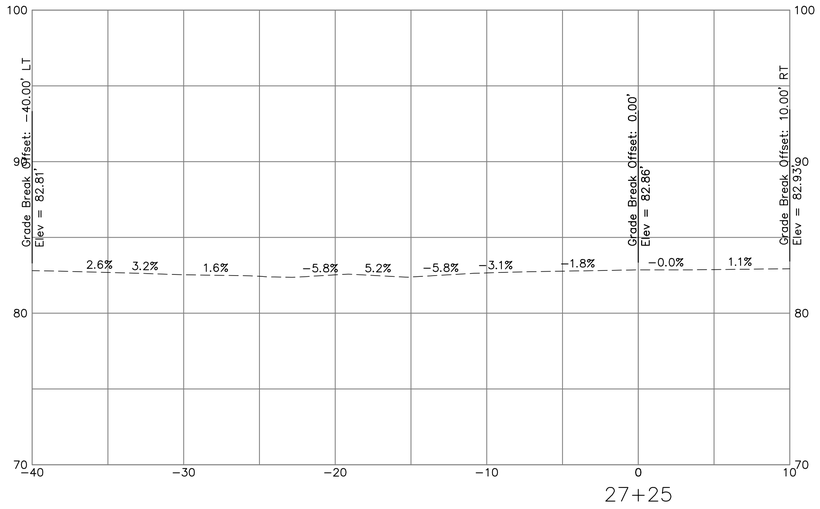

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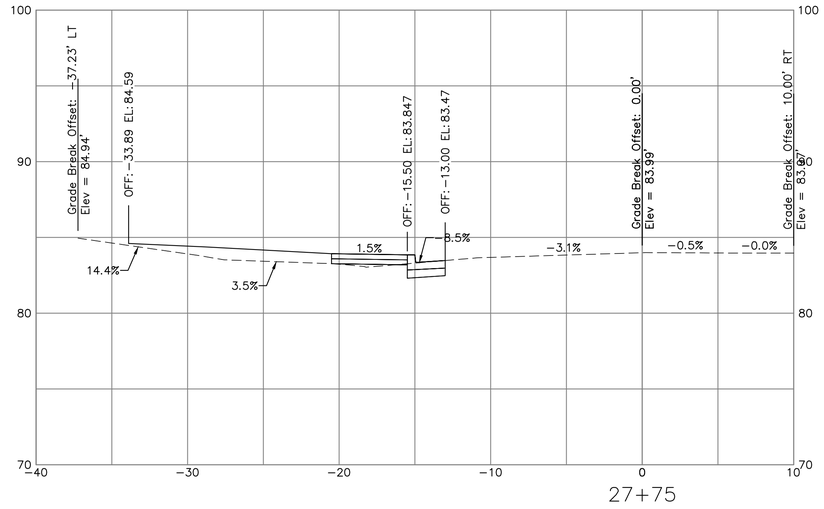

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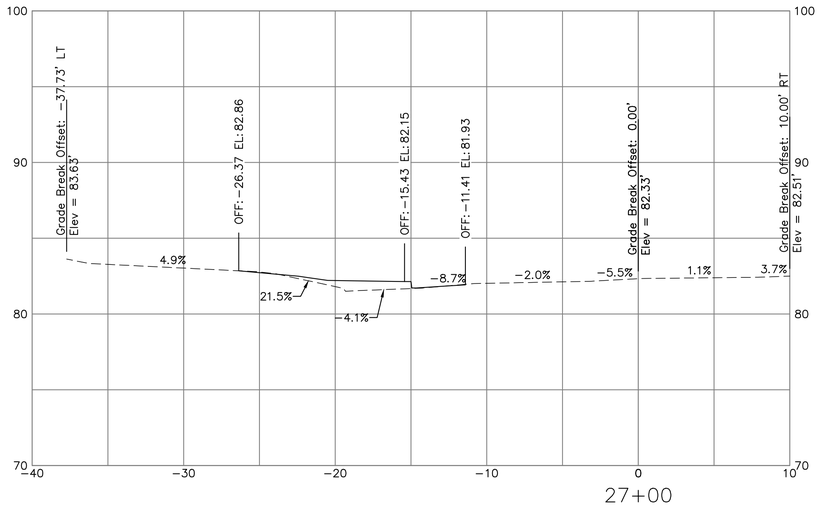

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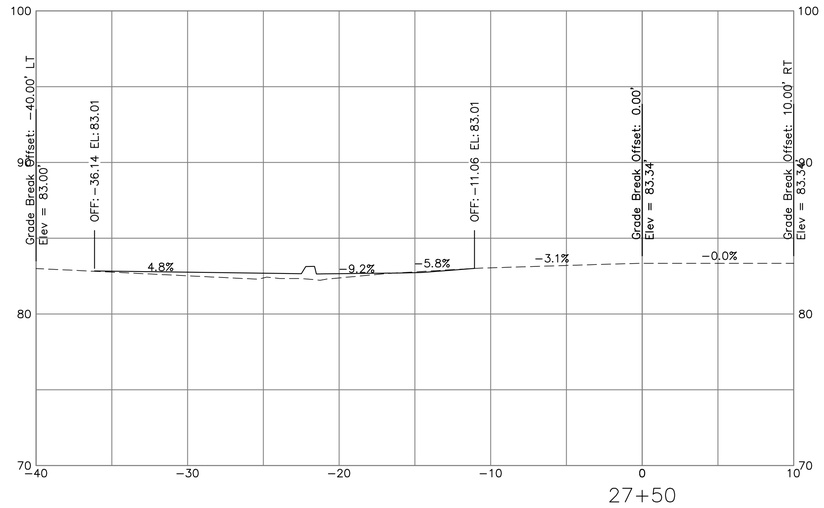

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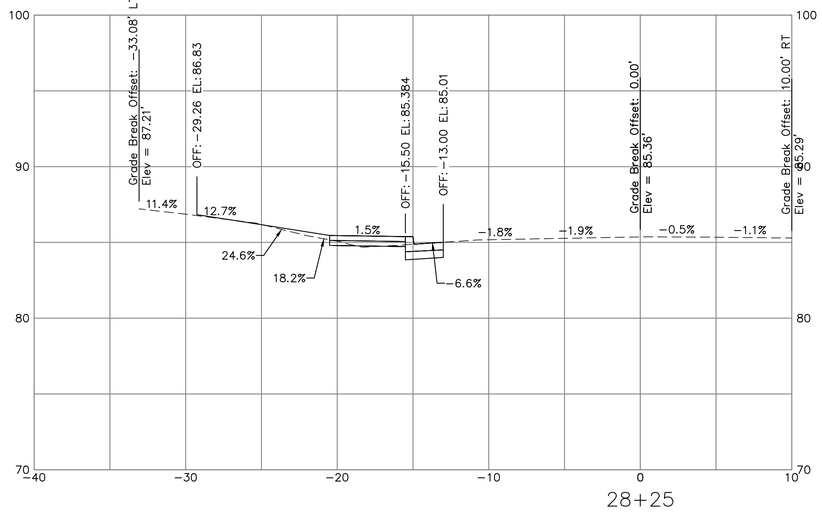

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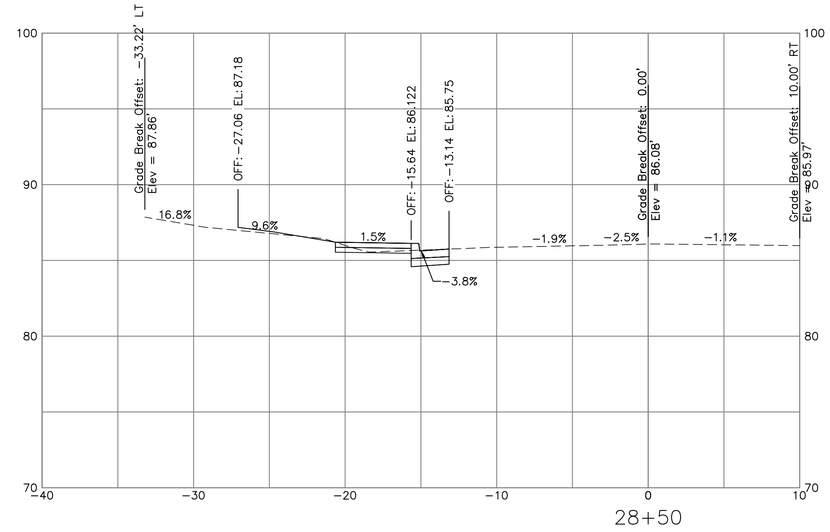

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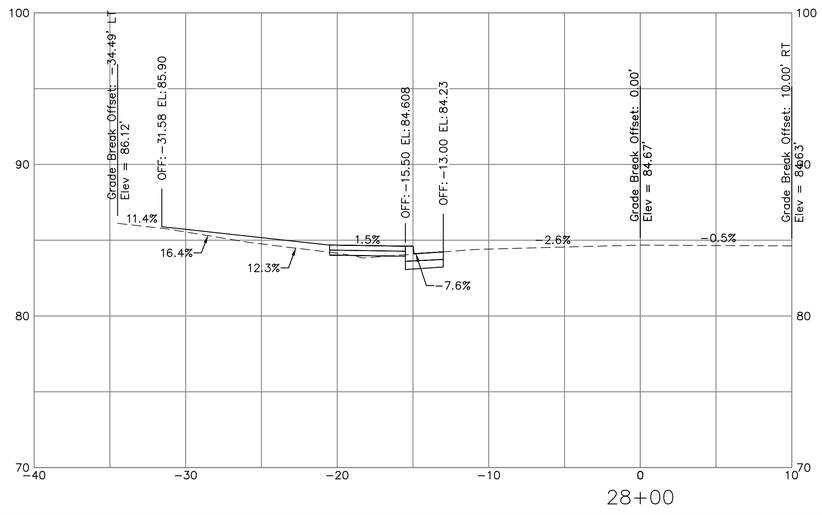

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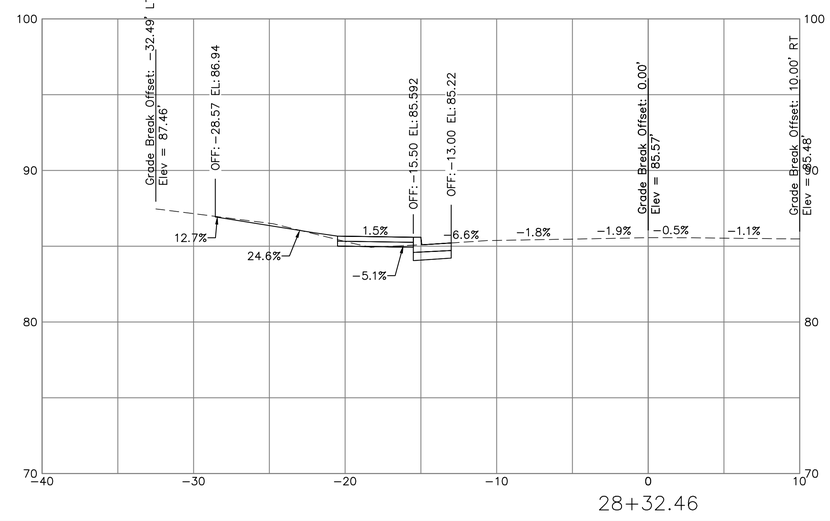

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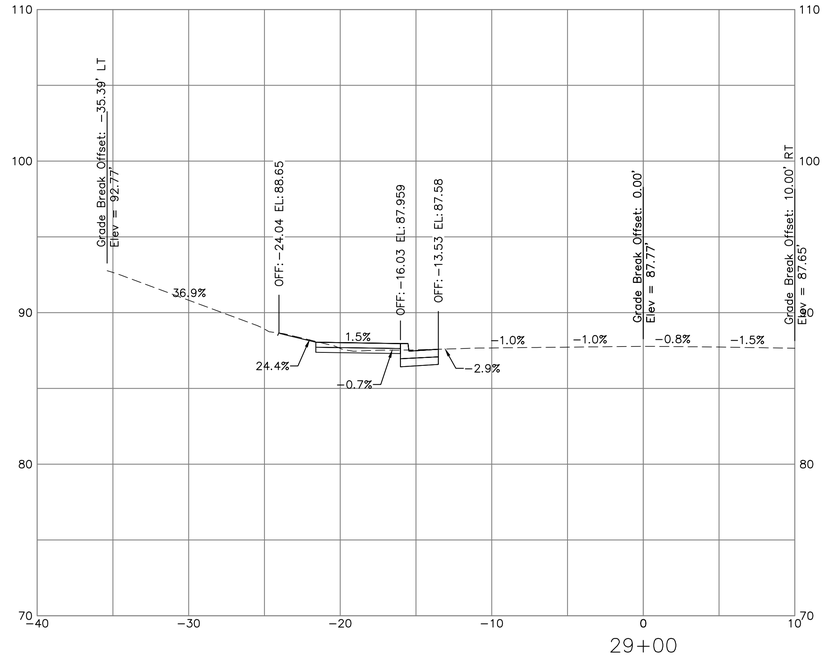

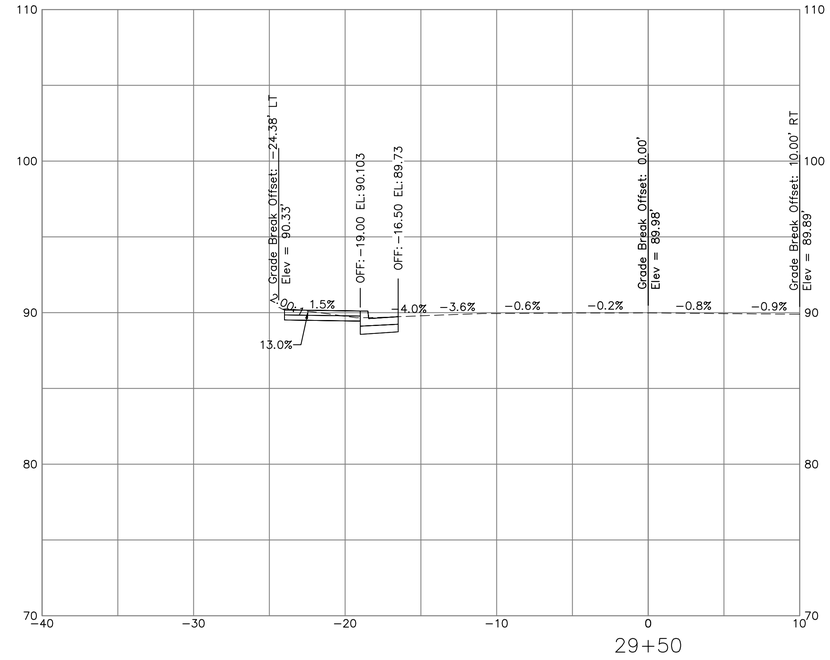

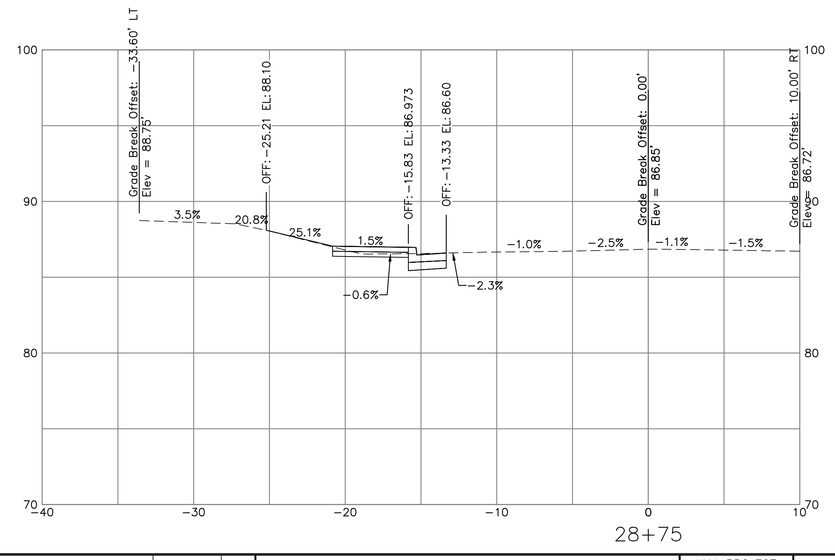

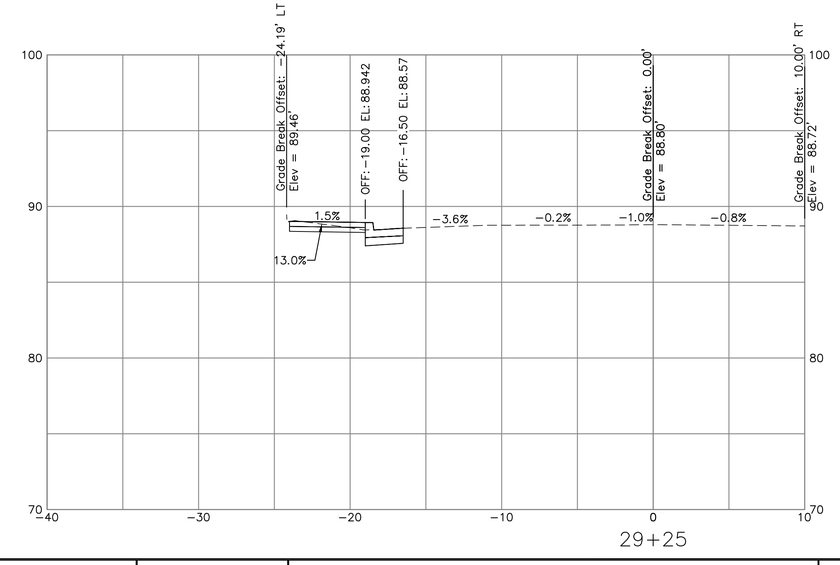

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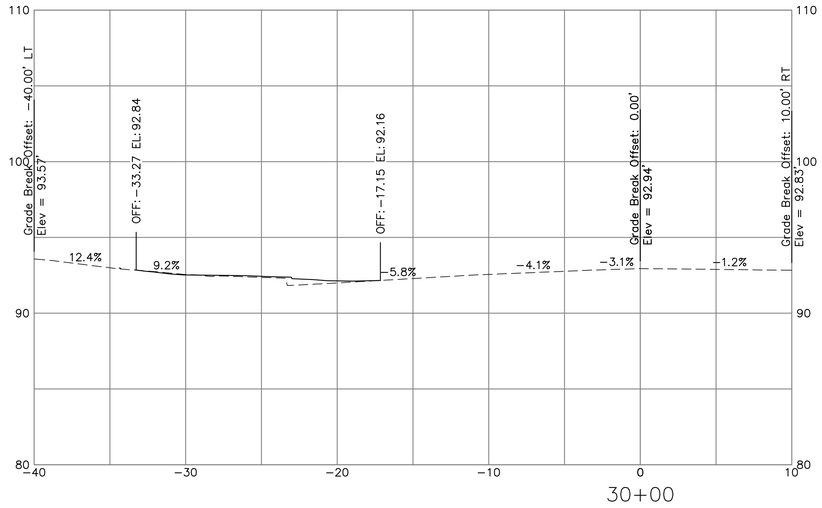

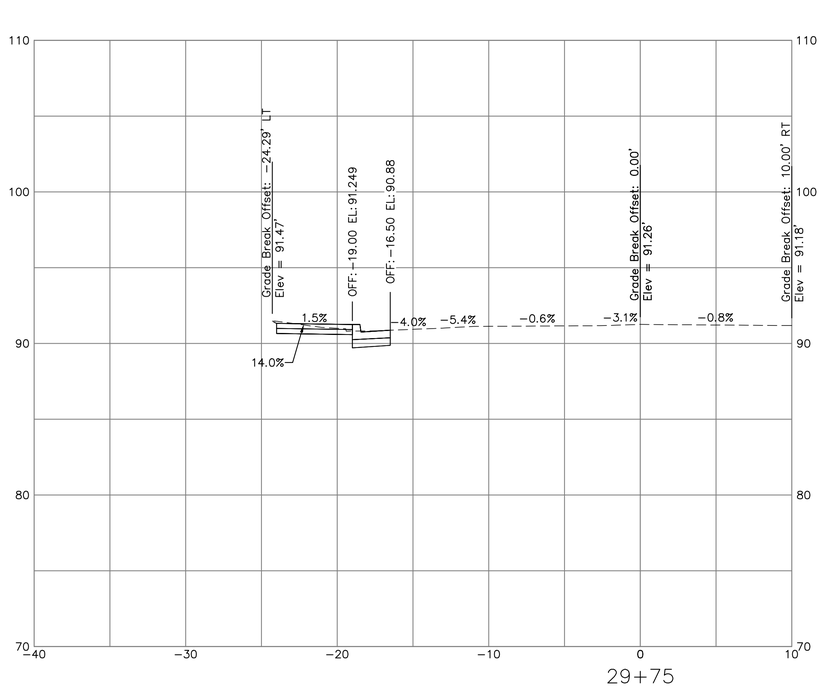

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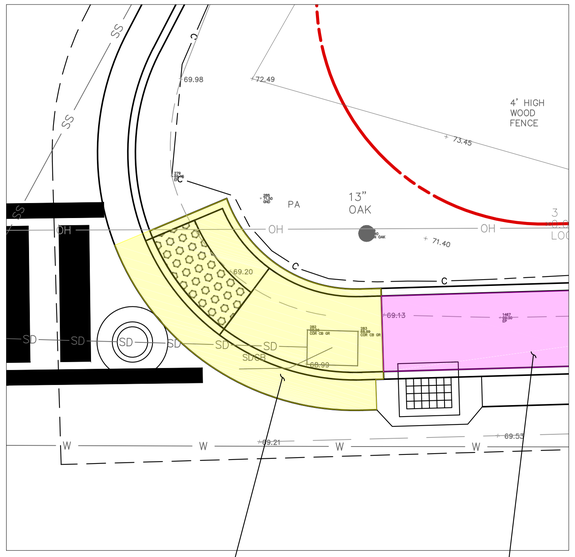
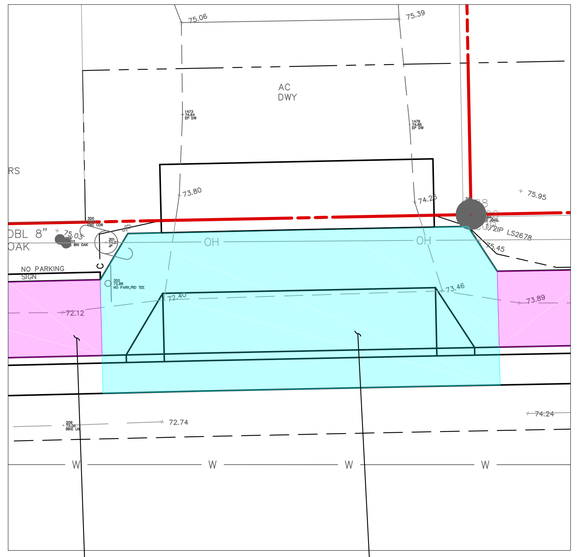
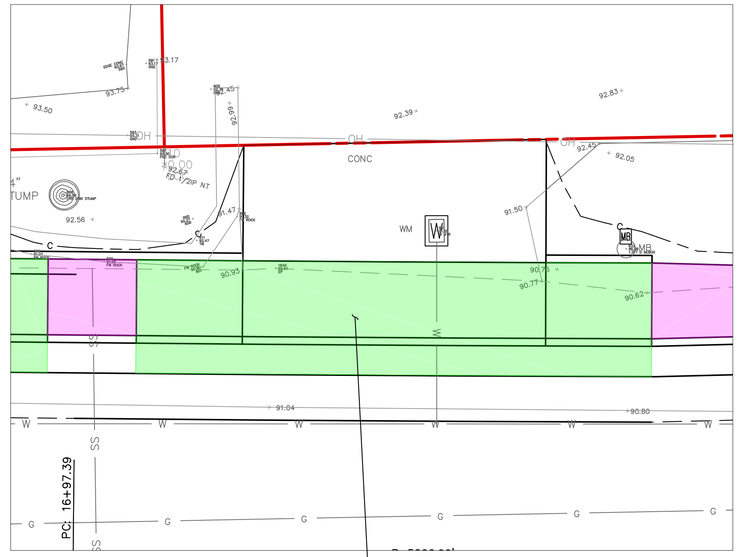


EXAMPLE LIMITS OF MINOR CONCRETE (CURB RAMP) QUANTITY



EXAMPLE LIMITS OF MINOR CONCRETE (SIDEWALK) QUANTITY



EXAMPLE LIMITS OF MINOR CONCRETE (STANDARD DRIVEWAY) QUANTITY

EXAMPLE LIMITS OF MINOR CONCRETE (DEPRESSED DRIVEWAY) QUANTITY

CA: 1-800-227-2600
CALL BEFORE YOU DIG
CA: 1-800-227-2600
CALL TWO WORKING DAYS BEFORE YOU DIG

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SHEET NO. ____
OF 31 SHEETS

GEOTECHNICAL INVESTIGATION
DESIGN PHASE

FOR
PARK AVENUE SIDEWALK
CAPITOLA, CALIFORNIA

PREPARED FOR
KIMLEY-HORN AND ASSOCIATES, INC.
PROJECT NO. 18-223-SC

PREPARED BY

BUTANO GEOTECHNICAL ENGINEERING, INC.
DECEMBER 2018

BUTANO GEOTECHNICAL ENGINEERING, INC.
231 GREEN VALLEY ROAD, SUITE E, FREEDOM, CALIFORNIA 95019
PHONE: 831.724.2612
WWW.BUTANOGEOTECH.COM

December 6, 2018
Project No. 18-223-SC

Kimley-Horn and Associates, Inc.
100 West San Fernando Street, Suite 250
San Jose, California 95113

ATTENTION: Derek Wu

SUBJECT: **GEOTECHNICAL INVESTIGATION - DESIGN PHASE**
Proposed Sidewalk Improvements
Property Impact to 600 Park Avenue
Park Avenue
Capitola, California
APN 036-15-115

Dear Mr. Wu:

In accordance with your authorization, we have completed a geotechnical investigation for the subject project. This report summarizes the findings, conclusions, and recommendations from our field exploration, laboratory testing, and engineering analysis. It is a pleasure being associated with you on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

BUTANO GEOTECHNICAL ENGINEERING, INC.

Greg Bloom, PE, GE
Principal Engineer
R.C.E. 58819

PROFESSIONAL ENGINEER
GREG BLOOM
C.E. 58819
CIVIL
STATE OF CALIFORNIA

Philip Edwards
Senior Engineer
R.C.E. 86451

REGISTERED PROFESSIONAL ENGINEER
PHILIP T. EDWARDS
C86451
EXP 3/19
CIVIL
STATE OF CALIFORNIA

Appendices:
1. Appendix A Figures and Standard Details
2. Appendix B Field Exploration Program
3. Appendix C Laboratory Testing Program

Distribution: (4) Addressee

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed sidewalk improvements on Park Avenue in the City of Capitola, California.

The purpose of our investigation is to provide preliminary geotechnical design parameters and recommendations for the construction of a new sidewalk and accompanying retaining walls. Conclusions and recommendations related to site grading, drainage, retaining walls, and foundations are presented herein.

This work included site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report. The scope of services for this investigation is outlined in our agreement dated October 4th, 2018 as attached into the joint agreement dated October 24th, 2018.

The recommendations contained in this report are subject to the limitations presented in Section 8.0 of this report. The Association of Engineering Firms Practicing the Geosciences has produced a pamphlet for your information titled *Important Information About Your Geotechnical Report*. This pamphlet has been included with the copies of your report.

2.0 PROJECT DESCRIPTION

Based on our discussions with the client it is our understanding that the project consists of building a new sidewalk and accompanying improvements along portions of Park Avenue. The portion of the project along 600 Park Avenue is adjacent to an embankment which will require a retaining wall. Our geotechnical exploration was focused on the impacted area at 600 Park Avenue were retaining walls will be incorporated into the design.

We were provided with a digital copy of the following documents for use in design by Kimley-Horn and Associates:

> Bowman & Williams Consulting Civil Engineers, *Topographic Map of a Portion of Park Avenue,* Dated: 9/19,18, Job No.: 25704
>
> Kimley-Horn and Associates, *Park Avenue Sidewalk Improvements,* Layout Plan and Property Impacts Exhibit APN 036-15-115 600 Park Avenue, Dated: 10/1/18, Job No.: 097763124

3.0 FIELD EXPLORATION AND LABORATORY TESTING PROGRAMS

Our field exploration program included drilling, logging, and interval sampling of two borings on November 6th, 2018. The borings were advanced using a 6-inch diameter solid stem auger on a tractor mounted drill rig. The boring depths ranged from 17 ½ feet to 21 ½ feet below existing grade. Details of the field exploration program, including the Boring Logs and the Key to the Logs, are presented in Appendix B, Figures B-3 through B-5.

Representative samples obtained during the field investigation were taken to the laboratory for testing. Laboratory tests were used to determine physical and engineering properties of the in-situ soils. Details of the laboratory testing program are presented in Appendix C. Test results are presented on the Boring Logs and in Appendix C.

4.0 SITE DESCRIPTION

4.1 Location

The project site is located south of Highway 1 in the City of Capitola, California. The improvements will take place on the north side of Park Avenue with the impacted portion of the alignment adjacent to 600 Park Avenue (APN 036-15-115). The site location is shown on the Site Location Plan, Appendix B, Figure B-1.

4.2 Surface Conditions

Park Avenue travels east/west and roughly parallels the coastal bluff. The two lane arterial is surrounded by residential neighborhoods. A railroad line parallels the project south of the road. There is an existing bike path and segmented sidewalk on Park Avenue.

The length of the alignment where retaining walls are proposed is approximately 261 feet long and corresponds to project station numbers: 24+55 to 27+16. There is currently no sidewalk in this area.

This portion of the alignment has a grassy embankment adjacent to the north side of the road. The embankment slopes are at approximate gradients of 4:1 (H:V) on the east side and increase to over 1:1 (H:V) moving west. The embankment is approximately 5 feet tall. There are sparse large and small trees on the top of the embankment.

4.3 Subsurface Conditions

Two borings were advanced for the project in the area of the proposed construction. The site is geologically mapped as being underlain by the lowest emergent coastal terrace deposits (Qcl). The terrace deposits typically overlie shallow Purisima Formation (Tp). Our field exploration generally concurred with the geologic mapping.

Boring B1 was drilled on the east side of the project. Boring B1 encountered 3 ½ feet of medium dense non-engineered fill consisting of clayey sand. From a depth of 3 ½ to 10 feet soft to medium dense silty sand, clayey sand, and sandy lean clay was encountered (terrace deposits). Dense to very dense Purisima Formation sandstone bedrock was encountered below a depth of 10 feet.

Boring B2 was drilled on top of the embankment on the west side of the project. Boring B2 encountered 21 feet of medium dense to dense silty sand (terrace deposits), overlying very dense Purisima Formation sandstone bedrock.

Groundwater was encountered at 14 feet in boring B1 and not encountered in B2. The depth to groundwater may vary seasonally.

Complete soil profiles are presented on the Boring Logs, Appendix B, Figures B-4 and B-5. The boring locations are shown on the Boring Location Plan, Figure B-2.

5.0 GEOTECHNICAL HAZARDS

5.1 General

In our opinion the geotechnical hazards that could potentially affect the proposed project are:

- Intense seismic shaking
- Collateral seismic hazards

5.1.1 Intense Seismic Shaking

The hazard of intense seismic shaking is present throughout central California. Intense seismic shaking may occur at the site during the design lifetime of the proposed structure from an earthquake along one of the regions many faults. Generally, the intensity of shaking will increase the closer the site is to the epicenter of an earthquake, however, seismic shaking is a complex phenomenon and may be modified by local topography and soil conditions. The transmission of earthquake vibrations from the ground into the structure may cause structural damage.

The City of Capitola has adopted the seismic provisions set forth in the 2016 California Building Code to address seismic shaking. The seismic provisions in the 2016 CBC are minimum load requirements for the seismic design for the proposed structure. The provisions set forth in the 2016 CBC will not prevent structural and nonstructural damage from direct fault ground surface rupture, coseismic ground cracking, liquefaction and lateral spreading, seismically induced differential compaction, seismically induced landsliding, or seismically induced inundation.

Table 1 has been constructed based on the 2016 CBC requirements for the seismic design of the proposed structure. The Site Class has been determined based on our field investigation and laboratory testing.

Table 1. Seismic Design Parameters

S_S	S_1	Site Class	F_a	F_v	S_{DS}	S_{D1}	F_{PGA}	PGA_M	Risk Category	Seismic Design Category
1.500	0.600	C	1.0	1.3	1.000	0.520	1.0	0.514	II	D

Latitude: 36.976925º, Longitude: -121.945547º

5.1.2 Collateral Seismic Hazards

In addition to intense seismic shaking, other seismic hazards that may have an adverse affect to the site and/or the structure are: fault ground surface rupture, coseismic ground cracking, seismically induced liquefaction and lateral spreading, seismically induced differential compaction, seismically induced landsliding, and seismically induced inundation (tsunami and seiche). It is our opinion that the potential for collateral seismic hazards to affect the site and to damage the proposed structure is low.

6.0 DISCUSSIONS AND CONCLUSIONS

Non-engineered fill was encountered in boring B1. The approximate extents of the non-engineered fill is are outlined on the boring site plan, Figure B-2. Even though the project is on the uphill side of the road, non-engineered fill was encountered. This may have emanated from infilling a small drainage or depression. Regardless, the actual extents will need to be determined during construction by the geotechnical engineer. It is advised that the City get a bid for unit pricing of over-excavating this material and replacing it as an engineered fill.

7.0 RECOMMENDATIONS

7.1 General

Based on the results of our field investigation, laboratory testing, and engineering analysis it is our opinion that from the geotechnical standpoint, the subject site will be suitable for the proposed improvements.

7.2 Site Grading

7.2.1 Site Clearing

The site should be cleared of non-engineered fill, loose soil, organics, and debris within the project limits.

7.2.2 Preparation of On-Site Soils

Areas to receive fill should be over excavated through any non-engineered fill, scarified, cleared of organics, moisture conditioned and compacted to a minimum of 90 percent relative compaction. Engineered fill should extend a minimum of 2 feet laterally of any proposed improvements.

The approximate depth of non-engineered fill encountered was 3 ½ feet deep. This depth may vary and the exact depth and extents of fill to be removed should be verified in the field by a representative of Butano Geotechnical Engineering, Inc.

Site Grading-General

The on-site soil may be re-used as engineered fill after any deleterious material is removed and it is moisture conditioned.

Imported fill material should be approved by a representative of Butano Geotechnical Engineering, Inc. prior to importing.

Imported fill should be primarily granular with **no material greater than 2½ inches in diameter** and no more than 20 percent of the material passing the #200 sieve. The fines fraction of fill should not consist of expansive material. The Geotechnical Engineer should be notified not less than 5 working days in advance of placing any fill or base course material proposed for import. Each proposed source of import material should be sampled, tested, and approved by the Geotechnical Engineer prior to delivery of any soils imported for use on the site.

Any surface or subsurface obstruction, or questionable material encountered during grading, should be brought immediately to the attention of the Geotechnical Engineer for proper processing as required.

All fill should be compacted with heavy vibratory equipment to a minimum of 90 percent relative compaction. Fill should be compacted by mechanical means in relatively thin and uniform horizontal loose lifts not exceeding 8 inches in thickness. The relative compaction and required moisture content shall be based on the maximum dry density and optimum moisture content obtained in accordance with ASTM D1557.

Paved Areas

The upper 6 inches of subgrade and all aggregate baserock in paved areas should be prepared as above and compacted to a minimum of **95 percent** relative compaction in the upper six inches. This should extend a minimum of 2 feet laterally of all paved areas.

7.2.3 Cut and Fill Slopes

Temporary cuts within the existing medium dense terrace deposit may be made at near vertical up to heights of 4 feet. Temporary cuts from 4 to 20 feet should be laid back at gradients no steeper than 1:1 (H:V).

Permanent cut and fill slopes should be laid back at surface gradients of 2:1 (H:V).

Fill placed on slopes greater than 5:1 (H:V) should be keyed and benched. This includes retaining wall backfill. For a keying and benching typical see Appendix A, Figure A-2.

All disturbed soil should be re-seeded, and erosion controlled according the City of Capitola standard plans and specifications.

7.2.4 Excavating Conditions

The on-site soil may be excavated with standard earthwork equipment.

7.2.5 Surface Drainage

Positive drainage should be maintained away from the structures at a minimum gradient of 2 percent for 5 feet. If this is not feasible swales may be constructed to control drainage. Collected drainage should be released at approved locations as indicated by the project civil engineer or designer.

7.2.6 Utility Trenches

Utility trenches should be backfilled based on the City of Capitola standard details. At a minimum this should consist of 4 inches of compacted bedding sand below the utility and 8 inches of compacted bedding sand above the utility. Extra care should be taken to compact utility sand along the spring lines and haunches of the utilities.

Backfill of all exterior and interior trenches should be placed in thin lifts not to exceed 8 inches and mechanically compacted to achieve a relative compaction of not less than 95 percent in paved areas and 90 percent in other areas per ASTM D1557. Care should be taken not to damage utility lines.

The on-site native soils may be utilized for trench backfill above the bedding sand. If sand or granular material is used for trench backfill, a 3 foot concrete plug should be placed in each trench where it passes under the exterior footings.

Utility trenches that are parallel to the sides of a building should be placed so that they do not extend below a line sloping down and away at an inclination of 2:1 V:H from the bottom outside edge of all footings.

Trenches should be capped with 1 1/2 feet of relatively impermeable material. Import material must be approved by the Geotechnical Engineer prior to its use.

Trenches must be shored as required by the local regulatory agency, the State of California Division of Industrial Safety Construction Safety Orders, and Federal OSHA requirements.

7.3 Foundations

7.3.1 Conventional Shallow Foundations

General

Conventional shallow foundations may be used bearing on firm and relatively unyielding in-situ soil (terrace deposits) or engineered fill per section 7.2.2.

Foundation excavations must be checked by the Geotechnical Engineer before steel is placed and concrete is poured.

Footing Dimensions

Footing widths should be based on the allowable bearing value but not less than 12 inches. The minimum recommended depth of embedment is 12 inches for footing bearing on in-situ soil or engineered fill. Embedment depths should not be allowed to be affected adversely, such as through erosion, softening, digging, etc. Should local building codes require deeper embedment of the footings or wider footings, the local codes must apply.

Bearing Capacity

The allowable bearing capacity used should not exceed 2,000 psf for footings bearing on in-situ soil or engineered fill. The allowable bearing capacity may be increased by one-third in the case of short duration loads, such as those induced by wind or seismic forces.

In the event that footings are founded on structural fill consisting of imported materials, the allowable bearing capacities will depend on the type of these materials and should be re-evaluated.

All engineered fill weather sourced on-site or imported should extend two feet laterally of foundation elements.

Lateral Resistance

Friction coefficient - 0.35, between the engineered fill and rough concrete. A passive resistance of 350 pcf may be assumed below a depth of 12 inches for in-situ soil or engineered fill. Where both friction and the passive resistance are utilized for sliding resistance, either of the values indicated should be reduced by one-third.

7.3.2 Concrete Slabs-on-Grade

General

We recommend that concrete slab-on-grades be founded on engineered fill per section 7.2.2.

The subgrade should be proof-rolled just prior to construction to provide a firm, relatively unyielding surface, especially if the surface has been loosened by the passage of construction traffic.

7.4 Retaining Structures

7.4.1 Cantilevered Retaining Walls

Retaining walls may be founded on a conventional shallow foundation bearing on firm in-situ soil or engineered fill per sections 7.2.2 and 7.3.1.

Footing excavations must be checked by the Geotechnical Engineer before steel is placed and concrete is poured.

7.4.2 Lateral Earth Pressures

The lateral earth pressures presented in Table 2 are recommended for the design of retaining structures with a gravel blanket and backfill soil consisting of the on-site soil placed as engineered fill. Should the slope behind the retaining walls be other than level, supplemental design criteria will be provided for the active earth or at-rest pressures for the particular slope angle.

Table 2. Lateral Earth Pressures

Type	Soil Pressure (psf/ft)	
	Level	2:1
Active Pressure	40	55
Passive Pressure	350	N/A

If desired, an earthquake load (ultimate) may be considered for critical walls. A seismic load of $12H^2$ and $17H^2$ may be applied at a height of 0.6H from the base of the wall for unrestrained and restrained walls, respectively. A factor of safety of 1.1 is considered appropriate with respect to earthquake loading.

Pressure due to any surcharge loads from adjacent footings, traffic, etc., should be analyzed separately. Pressures due to these loading can be supplied upon receipt of the appropriate plans and loads. Refer to Appendix A, Figure A-1.

7.4.3 Backfill

Backfill should be placed under engineering control. Backfill should be compacted per Subsection 7.2, however, precautions should be taken to ensure that heavy compaction equipment is not used immediately adjacent to walls, so as to prevent undue pressures against, and movement of, the walls.

The granular backfill should be capped with at least 12 inches of relatively impermeable material.

7.4.4 Backfill Drainage

Backdrains should consist of 4 inch diameter Schedule 40, PVC pipe or equivalent, embedded in 3/8 inch to 3/4 inch, clean crushed gravel, enveloped in **Mirafi 180N** filter fabric or approved equivalent. The drain should be a minimum of 18 inches in thickness and should extend to within 12 inches from the surface. The pipe should be 4± inches above the trench bottom; a gradient of 2± percent being provided to the pipe and trench bottom; discharging into suitably protected outlets. See Appendix A, Figure A-3 for the standard detail for the backdrain.

Perforations in backdrains are recommended as follows: 3/8 inch diameter, in 2 rows at the ends of a 120 degree arc, at 3 inch centers in each row, staggered between rows, placed downward.

Vertical cleanouts should be provided at all angles and termination points of the backdrain.

Backdrains should be approved by the Geotechnical Engineer after placement of filter fabric, gravel bedding and perforated drain pipe and prior to being enveloped in the clean crushed gravel.

An unobstructed outlet should be provided at the lower end of each segment of backdrain. The outlet should consist of an unperforated pipe of the same diameter, connected to the perforated pipe and extended to a protected outlet at a lower elevation on a continuous gradient of at least 1 percent.

7.5 Settlements

Total and differential settlements beneath the new foundation elements are expected to be within tolerable limits under static conditions. Vertical movements are not expected to exceed 1 inch. Differential movements are expected to be within the normal range (½ inch) for the anticipated loads.

7.6 Plan Review

The recommendations presented in this report are based on preliminary design information for the proposed project and on the findings of our geotechnical investigation. When completed, the Grading Plans, Foundation Plans and design loads should be reviewed by Butano Geotechnical Engineering, Inc. prior to submitting the plans and contract bidding. Additional field exploration and laboratory testing may be required upon review of the final project design plans.

7.7 Observation and Testing

Field observation and testing should be provided by a representative of Butano Geotechnical Engineering, Inc. to enable them to form an opinion regarding the adequacy of the site preparation, the adequacy of fill materials, and the extent to which the earthwork is performed in accordance with the geotechnical conditions present, the requirements of the regulating agencies, the project specifications, and the recommendations presented in this report.

Butano Geotechnical Engineering, Inc. should be notified **at least 5 working days** prior to any site clearing or other earthwork operations on the subject project in order to observe the stripping and disposal of unsuitable materials and to ensure coordination with the grading contractor. During this period, a preconstruction meeting should be held on the site to discuss project specifications, observation and testing requirements and responsibilities, and scheduling.

8.0 LIMITATIONS

The recommendations contained in this report are based on our field explorations, laboratory testing, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the borings drilled during our field investigation. Variation in soil, geologic, and groundwater conditions can vary significantly between sample locations. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the Project Geotechnical Engineer, and revised recommendations be provided as required. In addition, if the scope of the proposed construction changes from the described in this report, our firm should also be notified.

Our investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report.

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 Engineer for the project and incorporated into the plans, and that it is ensured that the Contractor and Subcontractors implement such recommendations in the field. The use of information contained in this report for bidding purposes should be done at the Contractor’s option and risk.

This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we are not responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the Contractor. The Contractor should notify the Owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on this or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they

result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The scope of our services mutually agreed upon did not include any environmental assessment or study for the presence of hazardous to toxic materials in the soil, surface water, or air, on or below or around the site. Butano Geotechnical Engineering, Inc. is not a mold prevention consultant; none of our services performed in connection with the proposed project are for the purpose of mold prevention. Proper implementation of the recommendations conveyed in our reports will not itself be sufficient to prevent mold from growing in or on the structures involved.

REFERENCES

ASTM International (2016). *Annual Book of ASTM Standards, Section Four, Construction*. Volume 4.08, Soil and Rock (I): D 430 - D 5611.

ASTM International (2016). *Annual Book of ASTM Standards, Section Four, Construction*. Volume 4.09, Soil and Rock (II): D 5714 - Latest.

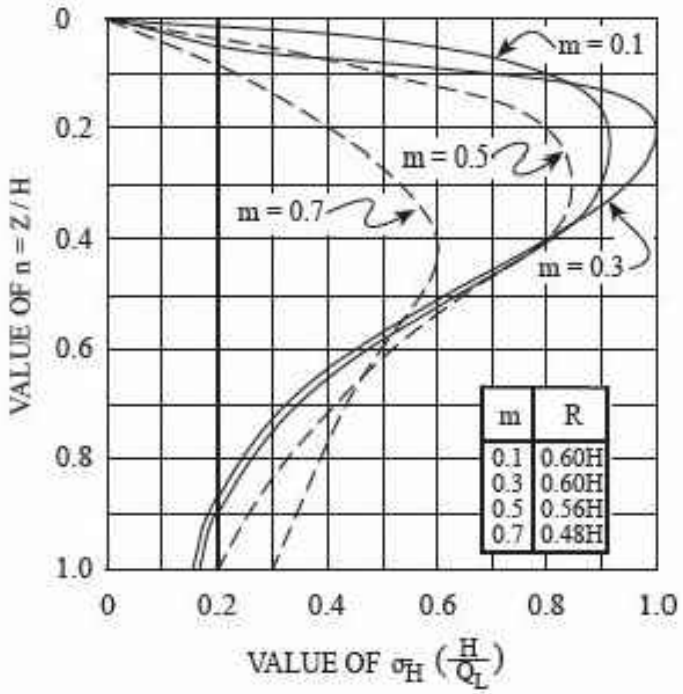
Brabb, E.E. (1989). *Geologic Map of Santa Cruz County, California*. U.S. Geological Survey Miscellaneous Investigation Series, Map I-1905, scale 1:62500

California Building Code (2016).

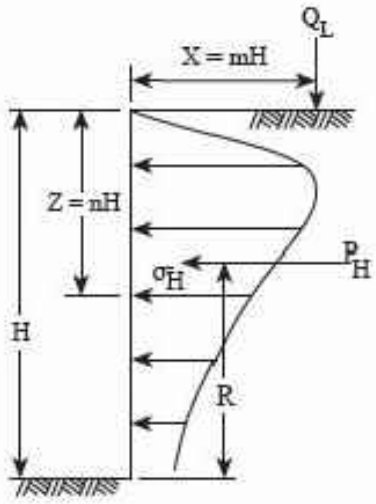
APPENDIX A

FIGURES AND STANDARD DETAILS

LINE LOAD



m	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H



FOR m ≦ 0.4:

$$\sigma_H \left(\frac{H}{Q_L}\right) = \frac{0.20\,n}{(0.16+n^2)^2}$$

$$P_H = 0.55\,Q_L$$

FOR m > 0.4:

$$\sigma_H \left(\frac{H}{Q_L}\right) = \frac{1.28\,m^2 n}{(m^2+n^2)^2}$$

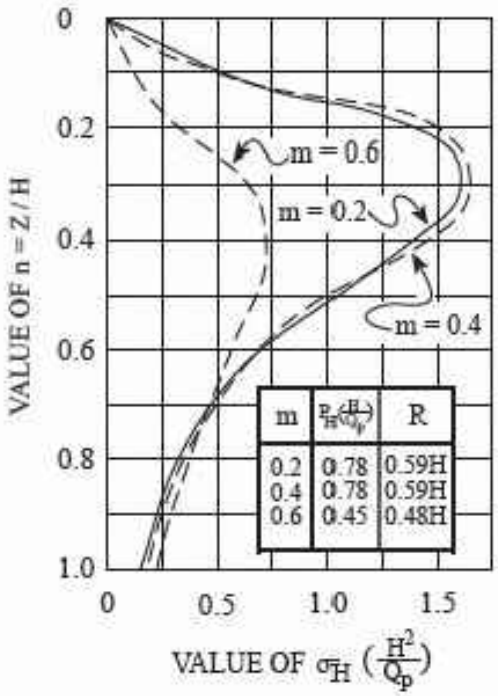
RESULTANT $P_H = \frac{0.64\,Q_L}{(m^2+1)}$

PRESSURES FROM LINE LOAD Q_L

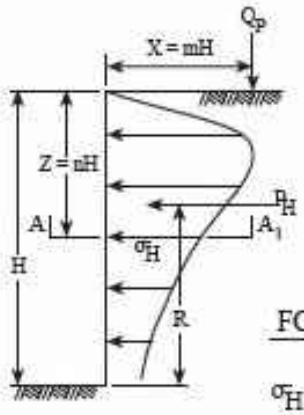
(BOISSINESQ EQUATION MODIFIED BY EXPERMENT)

REFERENCE: Design Manual
NAVFAC DM-7.02
Figure 11
Page 7.2-74

POINT LOAD



m	$\frac{P_H}{Q_p}\left(\frac{H}{Q_p}\right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



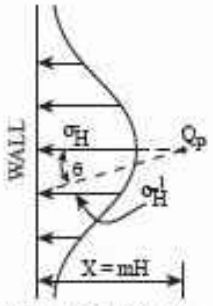
FOR m ≦ 0.4:

$$\sigma_H \left(\frac{H^2}{Q_p}\right) = \frac{0.28\,n^2}{(0.16+n^2)^3}$$

FOR m > 0.4:

$$\sigma_H \left(\frac{H^2}{Q_p}\right) = \frac{1.77\,m^2 n^2}{(m^2+n^2)^3}$$

$$\sigma_H^1 = \sigma_H \cos^2(1.1\,\theta)$$

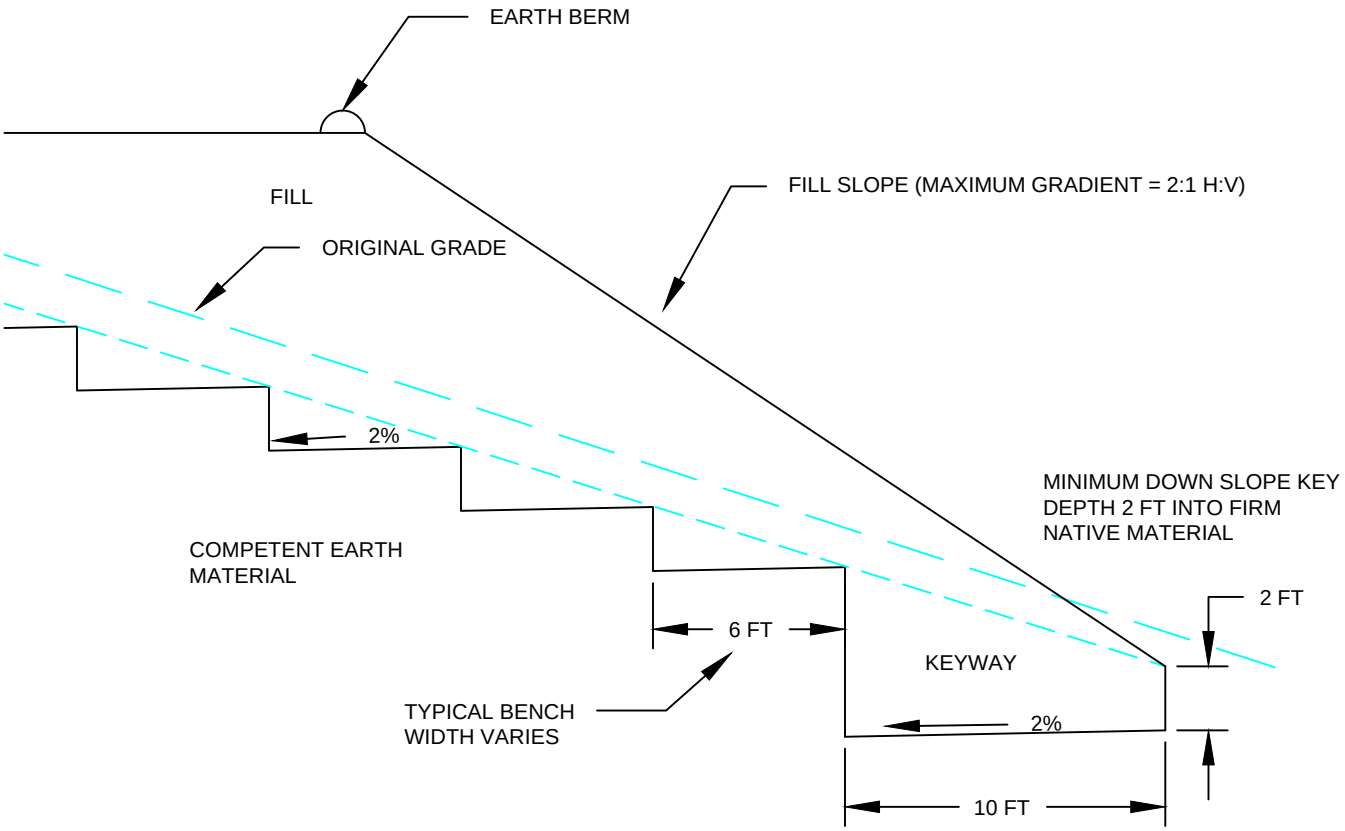


SECTION A-A_1

PRESSURES FROM POINT LOAD Q_P

(BOISSINESQ EQUATION MODIFIED BY EXPERMENT)

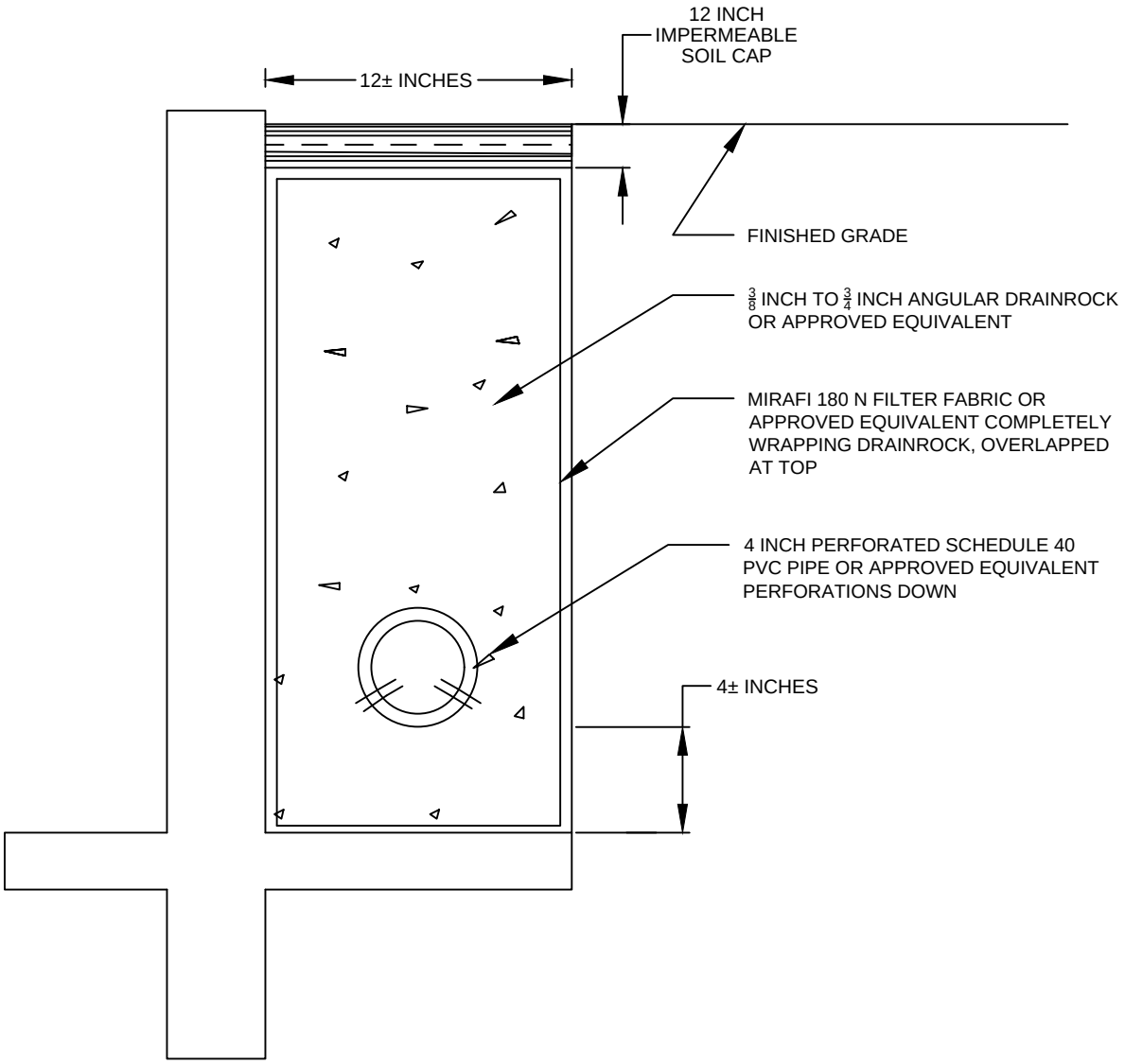
BUTANO GEOTECHNICAL ENGINEERING, INC.	**SURCHARGE PRESSURE DIAGRAM**	FIGURE A-1



NOTES:

1. DRAWING IS NOT TO SCALE
2. FILLS SITUATED ON SLOPES STEEPER THAN 5:1 (H:V) SHOULD BE KEYED AND BENCHED.
3. FILL MATERIAL SHOULD BE PLACED PER THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.
4. LOCATIONS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL ENGINEER.

BUTANO GEOTECHNICAL ENGINEERING, INC.	**KEYING AND BENCHING TYPICAL**	FIGURE A-2



NOTES:

1. DRAWING IS NOT TO SCALE.
2. 2±% GRADIENT TO PIPE AND TRENCH BOTTOM CONNECTED TO A CLOSED CONDUIT THAT DISCHARGES TO AN APPROVED LOCATION.

BUTANO GEOTECHNICAL ENGINEERING, INC.	**RETAINING WALL BACKDRAIN TYPICAL**	FIGURE A-3

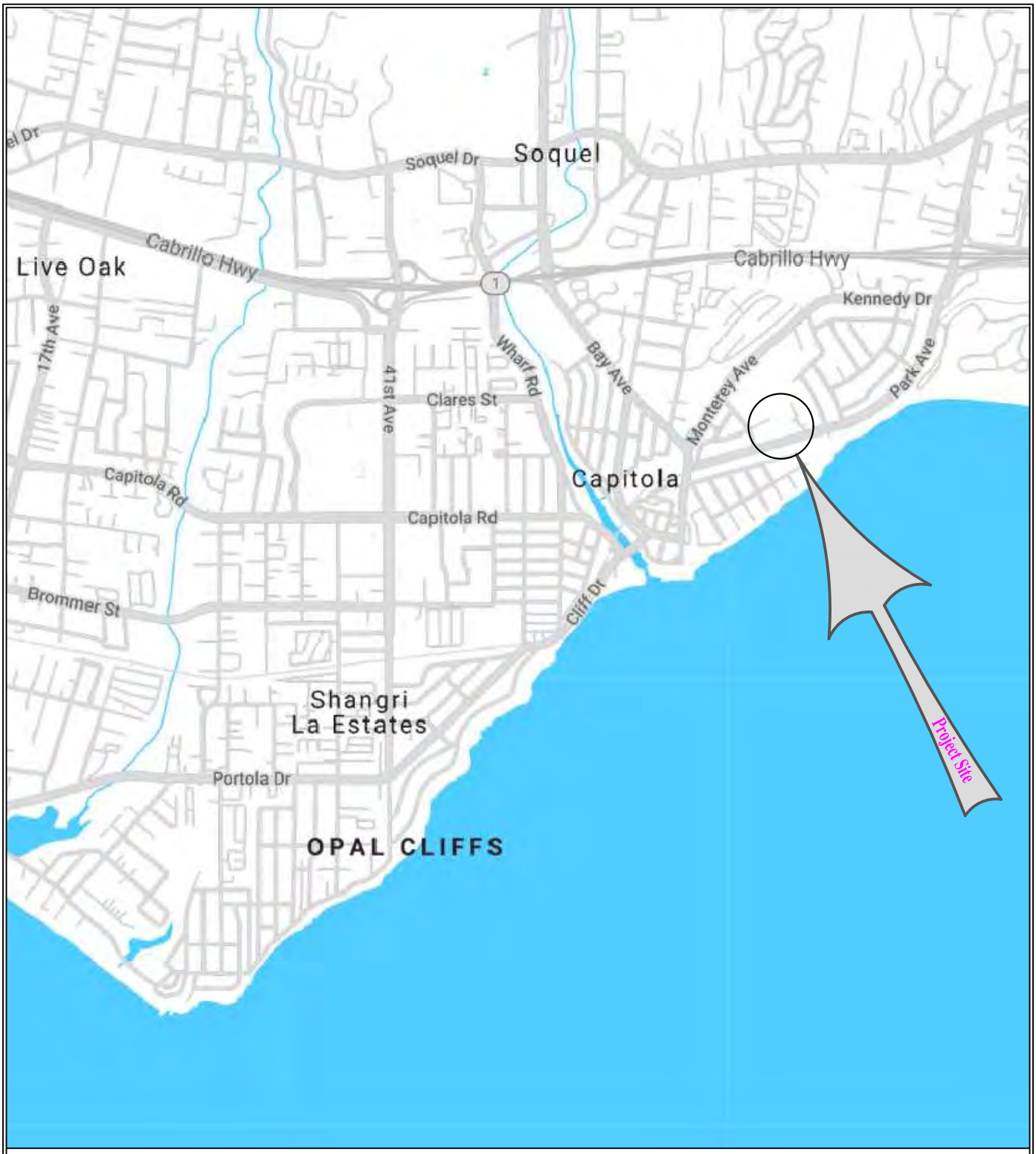
APPENDIX B

FIELD EXPLORATION PROGRAM

FIELD EXPLORATION PROCEDURES

Subsurface conditions were explored by advancing 2 borings below existing grade. The borings were advanced using a six inch solid stem auger on a tractor mounted drill. The Key to The Logs and the Logs of the Borings are included in Appendix B, Figures B-3 through B-5. The approximate locations of the borings are shown on the Boring Site Plan, Figure B-2. The boring holes were located in the field by tape measurements from known landmarks. Their locations as shown are therefore within the accuracy of such measurement

The soils encountered in the borings were continuously logged in the field by a representative of Butano Geotechnical Engineering, Inc. Bulk and relatively undisturbed soil samples for identification and laboratory testing were obtained in the field. These soils were classified based on field observations and laboratory tests. The classifications are accordance with the Unified Soil Classification System (USCS: Figure B-3).



N.T.S.

BUTANO GEOTECHNICAL ENGINEERING, INC.	**SITE LOCATION PLAN** Park Avenue Sidewalk	FIGURE B-1

37-M-26

Approximate Extents of Non-Engineered Fill within the area of geotechnical exploration

Non-Engineered Fill May Continue Past Area Explored

Non-Engineered Fill May Continue Past Area Explored

PARK AVE (50')

BOLLARD

BOLLARD

600 PARK AVENUE APARTMENTS SIGN

SDCB 82.06±

SDCB 81.96±

STOP SIGN

JP / ELECTROLIER

COMM BOX

VLV BOX

VLV BOX

SSM 83.0

112
97.04
FD 11/2IP NT

46" RDWD

30" TREE STUMP

24" TREE STUMP

B1

B2

81
81.99
SET MAG/FLAG

SSMH
88.38

SSCO

SSMH
88.46

WM

WV

JP

MB

MB

DWY

BIKE LANE STRIPE

DOUBLE YELLOW LINE

MATCH LINE – SEE SHEET TP–5

N

Scale: 1" = 20'

B2 - Exploratory Boring

Note: This map shows only a portion of the project topographic map and is the area of the subject geotechnical investigation.

APN 36–9, 36–10, 36–15, 36–17

REVISED

BOWMAN & WILLIAMS CONSULTING CIVIL ENGINEERS 1011 CEDAR STREET SANTA CRUZ, CA 95060 (831) 426–3560	TOPOGRAPHIC MAP OF A PORTION OF PARK AVENUE PARK AVENUE SIDEWALK PROJECT CITY OF CAPITOLA 420 CAPITOLA AVENUE CAPITOLA, CALIFORNIA 95010

SCALE 1" = 20'	DRAWN DLN	JOB NO. 25704	SHEET
DATE SEPTEMBER 19, 2014	CHECKED JRN	INDEX SOQUEL 2	TP–4
DESIGN	DWG NAME 25704TPO	FILE NO. 25704	OF 5

BUTANO GEOTECHNICAL ENGINEERING, INC.	**BORING SITE PLAN** Park Avenue Sidewalk	FIGURE B-2

KEY TO LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS More than half of the material is larger than the No. 200 sieve	GRAVELS More than half of the coarse fraction is larger than the No. 4 sieve	CLEAN GRAVELS (Less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS More than half of the coarse fraction is smaller than the No. 4 sieve	CLEAN SANDS (Less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
FINE GRAINED SOILS More than half of the material is smaller than the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomacaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils

GRAIN SIZE LIMITS

SILT AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

No. 200 No. 40 No. 10 No. 4 3/4 in. 3 in. 12 in.

US STANDARD SIEVE SIZE

RELATIVE DENSITY	
SAND AND GRAVEL	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY	
SILT AND CLAY	BLOWS/FT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	OVER 32

MOISTURE CONDITION	
CLAY	DRY
	MOIST
	SATURATED
SAND	DRY
	DAMP
	WET
	SATURATED

* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D.) split spoon (ASTM D-1586).

LOG OF EXPLORATORY BORING

Project No.:	18-223-SC	Boring:	B1
Project:	Park Avenue Sidewalk	Location:	East Project
		Elevation:	
Date:	November 6, 2018	Method of Drilling:	6-inch solid stem auger on a
Logged By:	PE		tractor mounted drill

2" Ring Sample | 2.5" Ring Sample | Bulk Sample | Terzaghi Split Spoon Sample | Static Water Table

Depth (ft.)	Soil Type	Undisturbed	Bulk	Description	Blows / Foot	N_{60}	Dry Density (pcf)	Moisture Content (%)	Expansion Index	Fines Content (%)	Unconfined - q_u (psf)	Other Tests: Swell (psf)	Other Tests
	SC (FILL)	▨		Dark brown Clayey SAND, medium dense, damp, brick rubble, (FILL).	31	11	102.8	13.3					
				Medium dense, no sample collected.	13	10							
	CL			Dark grey Sandy Lean CLAY, soft, moist, (Qcl-Terrace Deposit).	5	4		23.9		51.6			
5	SC			Brown Clayey SAND, medium dense, damp.	27	23		17.8					
10	BR			Olive SANDSTONE, dense, damp, (Tp - Purisima Formation Bedrock). ▽	35	32		33.3					
15				Grey, very dense.	50-6"			29.2					
				Boring terminated at a depth of 17 1/2 feet.									
20				Groundwater encountered at 14 feet during drilling.									
25													
30													
35													

LOG OF EXPLORATORY BORING

Project No.:	18-223-SC	Boring:	B2
Project:	Park Avenue Sidewalk	Location:	East Project
		Elevation:	
Date:	November 6, 2018	Method of Drilling:	6-inch solid stem auger on a tractor mounted drill
Logged By:	PE		

2" Ring Sample | 2.5" Ring Sample | Bulk Sample | Terzaghi Split Spoon Sample | Static Water Table

Depth (ft.)	Soil Type	Undisturbed	Bulk	Description	Blows / Foot	N_{60}	Dry Density (pcf)	Moisture Content (%)	Expansion Index	Fines Content (%)	Unconfined - q_u (psf)	Other Tests: Swell (psf)	Other Tests
0	SM			Brown Silty SAND, medium dense, damp, (Qcl-Terrace Deposit).	32	29		19.6					
					44	40		15.1		39.4			
5				Gravel lens encountered at 8 feet. Dense.	45	41		16.1					
10				Medium dense.	20	16		14.1					
15													
20				Dense.	58	53		7.5					
25	BR			Olive SANDSTONE, very dense, damp, (Tp - Purisima Formation Bedrock).									
30				Boring terminated at a depth of 12 1/2 feet. No groundwater encountered during drilling.									
35													

BUTANO GEOTECHNICAL ENGINEERING, INC.

FIGURE B-5

APPENDIX C

LABORATORY TESTING PROGRAM

LABORATORY TESTING PROCEDURES

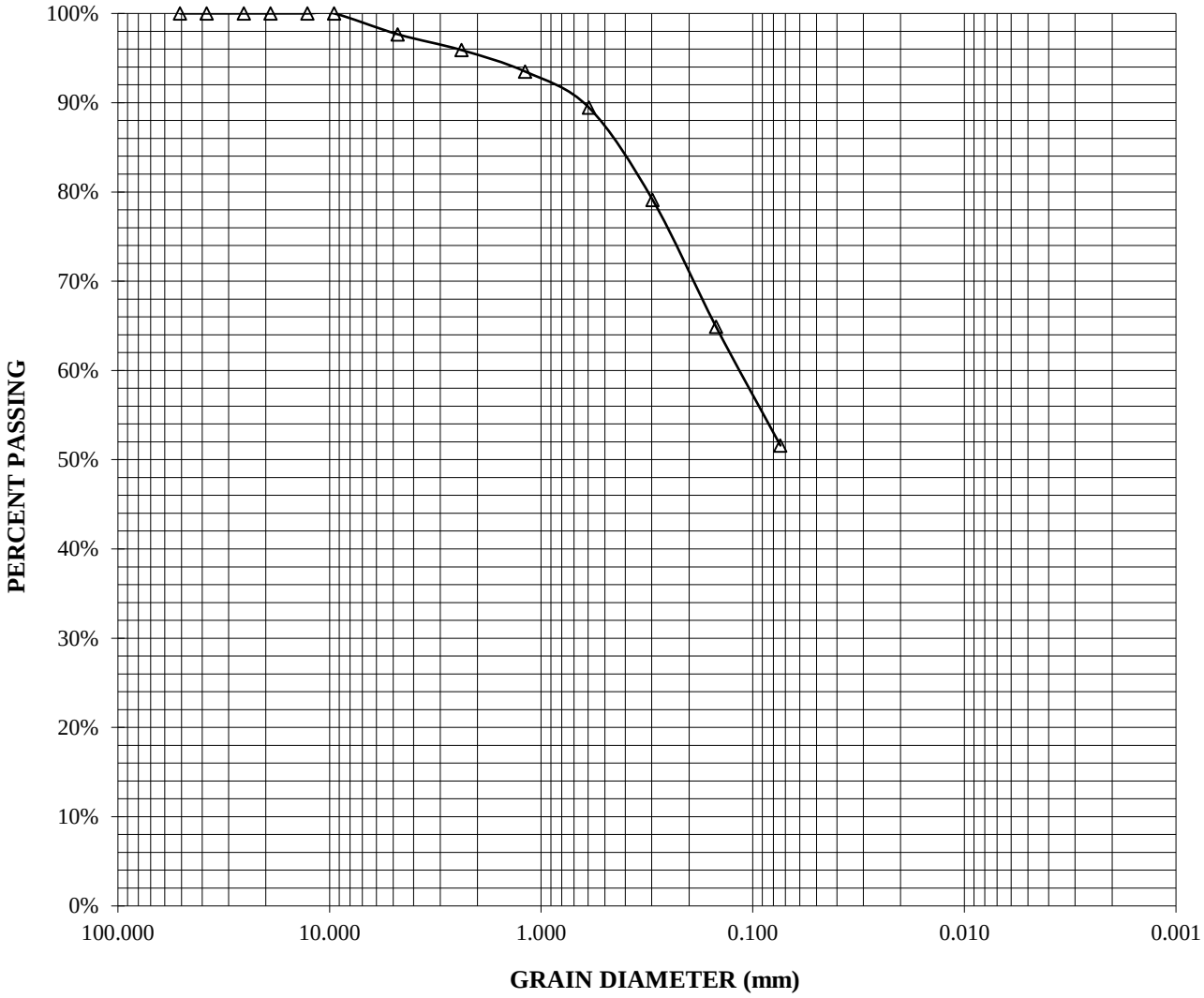
Classification

Soils were classified according to the Unified Soil Classification System in accordance with ASTM D 2487 and D 2488. Moisture content and density determinations were made for representative samples in accordance with ASTM D 2216. Results of moisture density determinations, together with classifications, are shown on the Boring Logs, Figures B-4 and B-5.

Particle Size Analysis

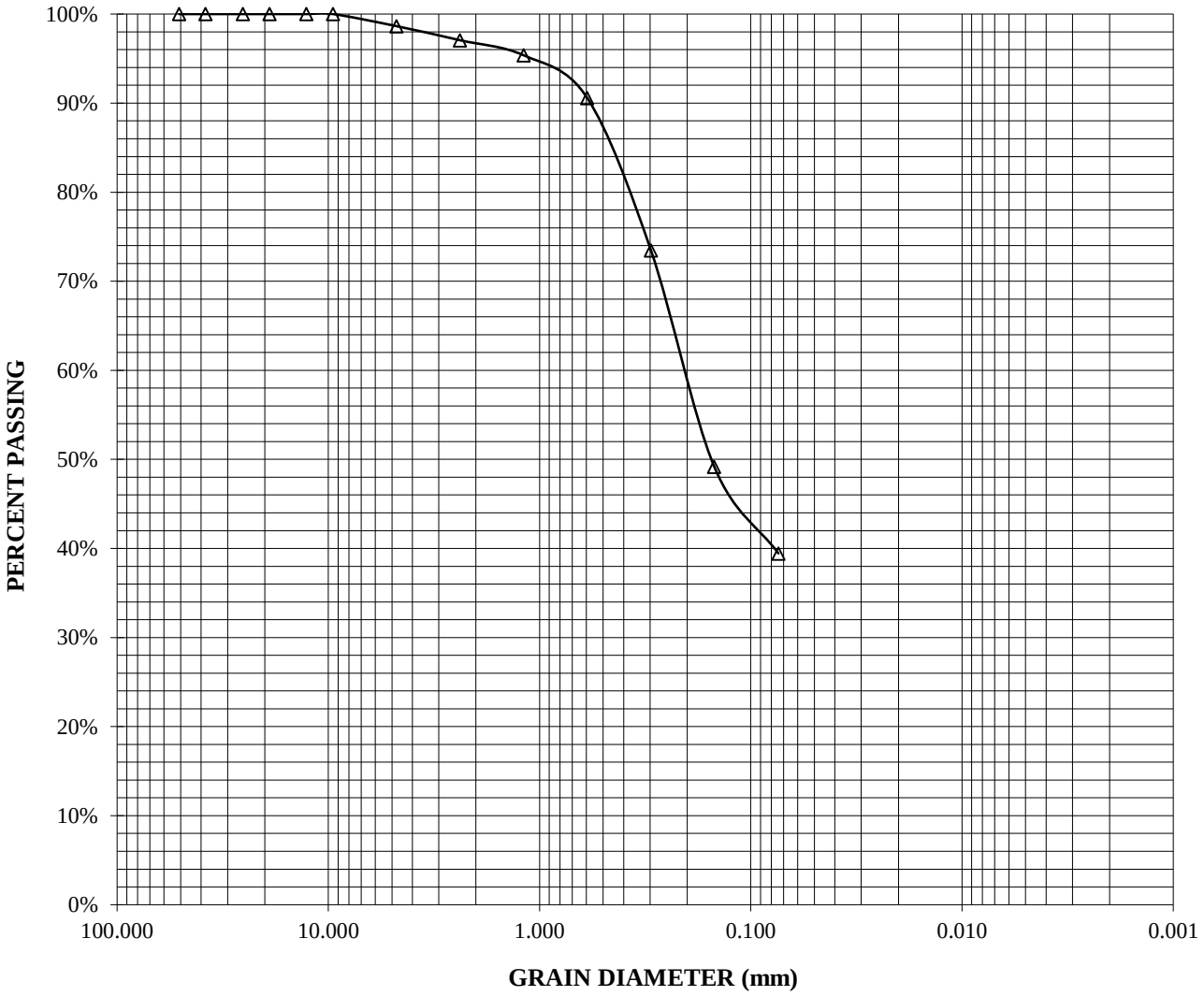
Two sieves were performed on representative samples in accordance with ASTM D 422. The grain size distributions from the results of the particle size analysis are shown on Figure C-1 and C-2.

BORING:	B1-3	PERCENT	PERCENT
DEPTH (ft):	4.0	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	CL	97.7%	51.6%



BUTANO	**GRAIN SIZE DISTRIBUTION**	FIGURE
GEOTECHNICAL ENGINEERING, INC.	Park Avenue Sidewalk	C-1

BORING:	B2-2	PERCENT	PERCENT
DEPTH (ft):	4.0	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SM	98.6%	39.4%



BUTANO	**GRAIN SIZE DISTRIBUTION**	FIGURE
GEOTECHNICAL ENGINEERING, INC.	Park Avenue Sidewalk	C-2

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

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