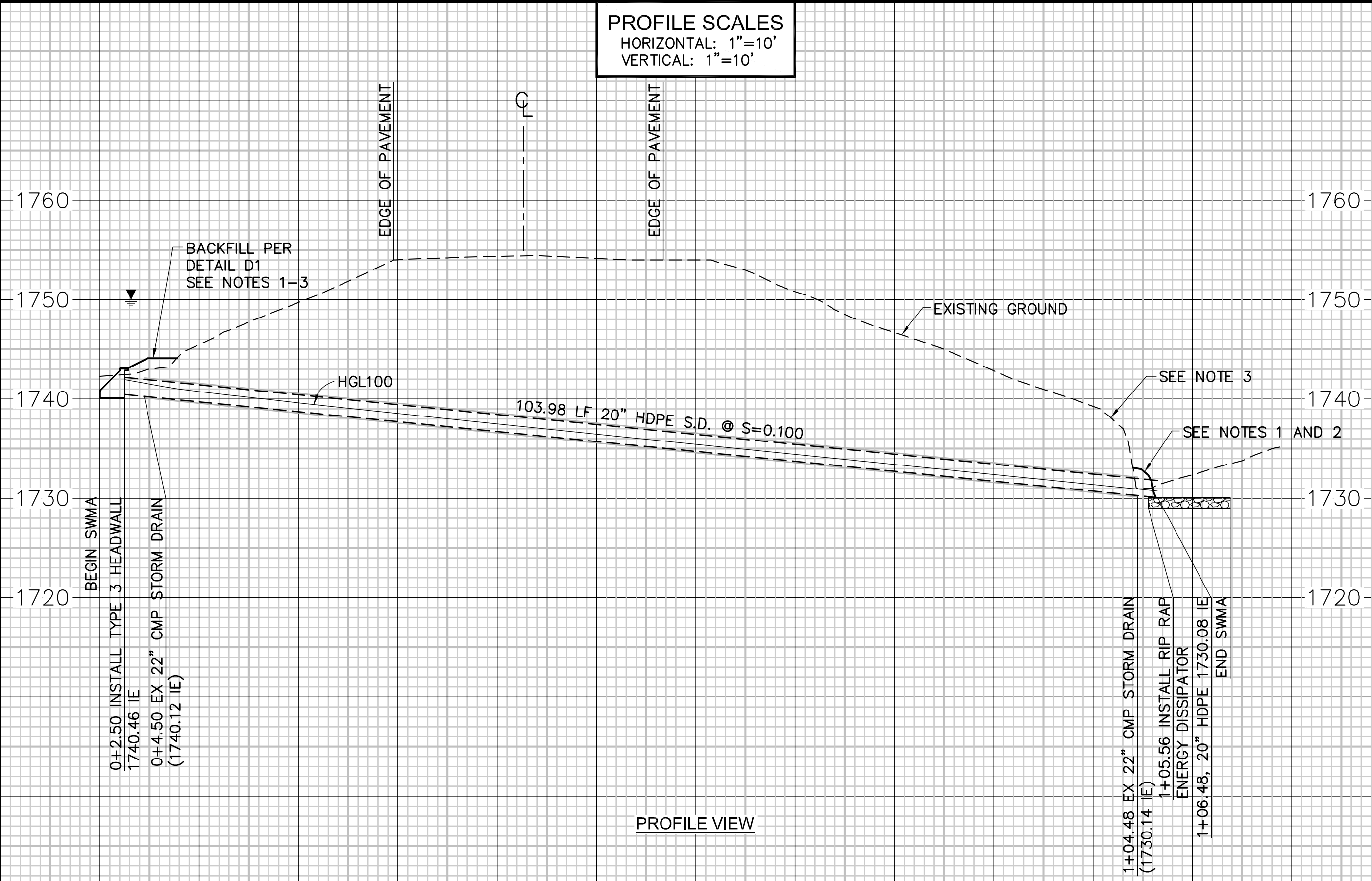
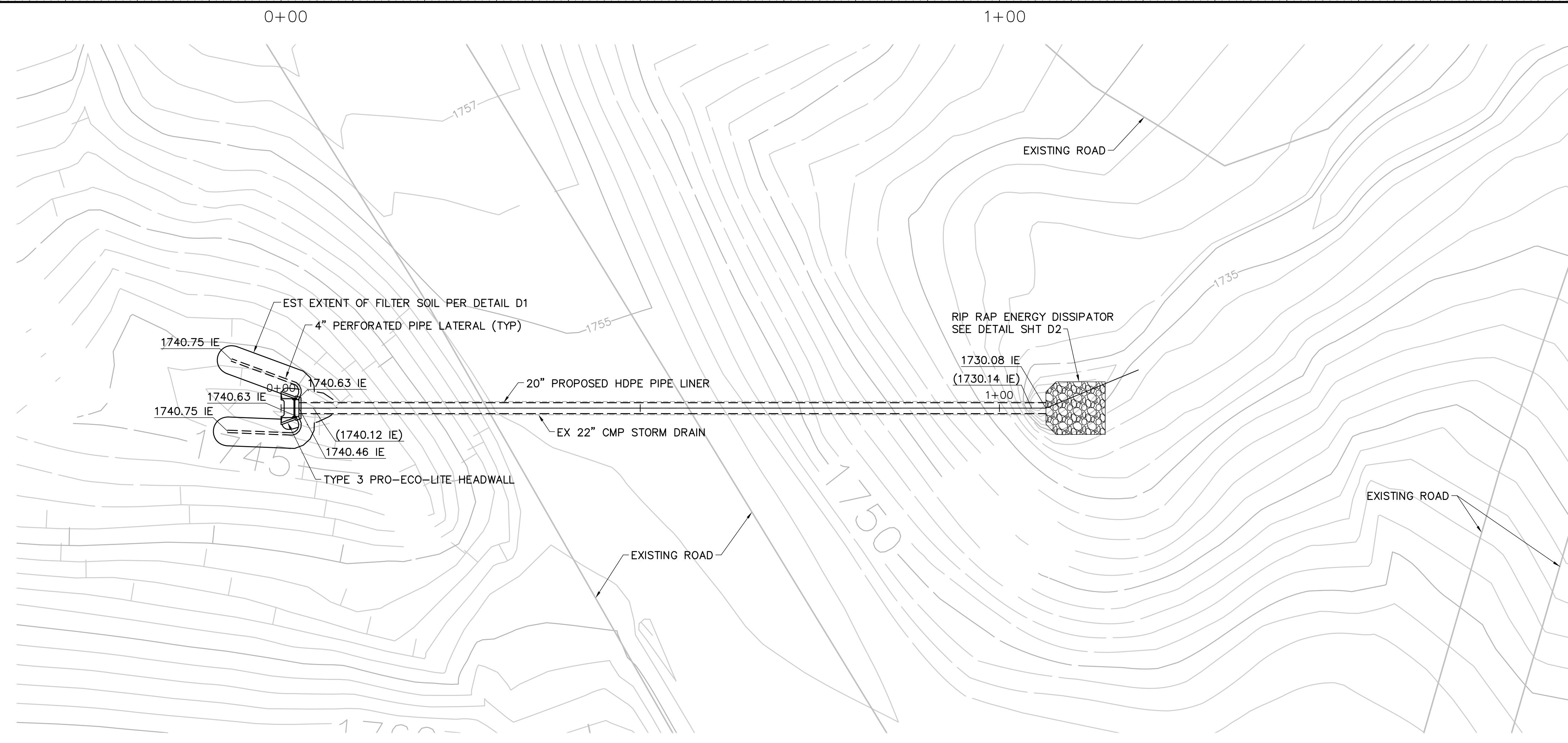


APPENDIX K
CULVERT DESIGN DIAGRAMS



PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'

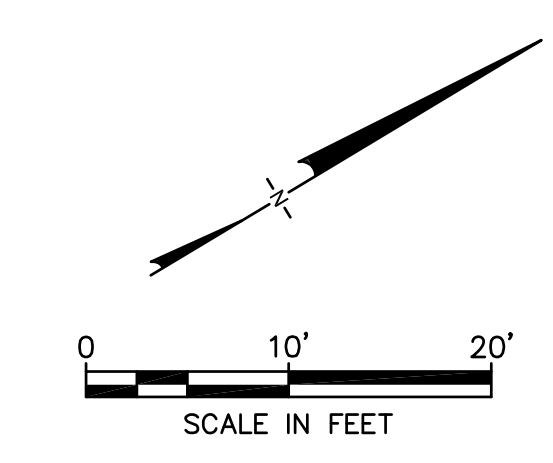
PROFILE VIEW



PLAN VIEW

LEGEND

	EXISTING GROUND ELEVATION (FEET)
	PROPERTY BOUNDARY
	PROPOSED FINISHED GRADE
	EXISTING GROUND (PROFILE)
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	RIP RAP ENERGY DISSIPATOR
	PROPOSED CULVERT TERMINAL FINISH
	PERFORATED LATERAL DRAIN
	WATER SURFACE ELEVATION



- NOTES:
1. PROVIDE STABLE SURFACE FOR PIPE EXTENSIONS VIA ROCK BACKFILL, COMPACTED FILL, OR AS DIRECTED BY THE ENGINEER.
 2. PLACE A 1' MIN. COVER OVER ALL EXPOSED PIPE.
 3. FENCE OFF OAK TREES & PROTECTED PLANTS AS DIRECTED BY THE CONSTRUCTION MANAGER.

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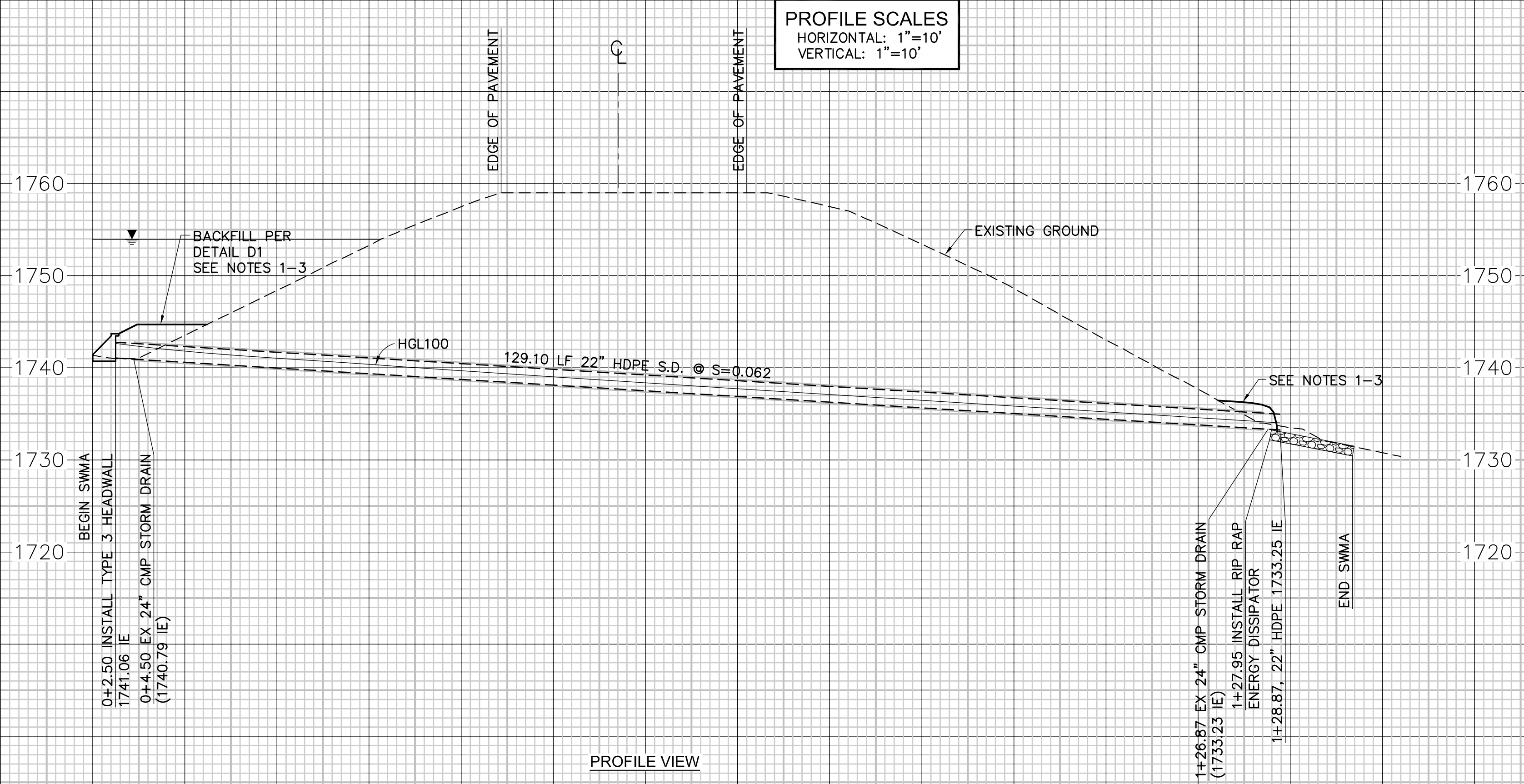
CULVERT MAINTENANCE 2
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

SHEET	
OF	
DRAWING NO.	CM2

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 DEVELOPMENT SERVICES**

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 DATE: _____
 BY: _____
 MANAGER, DEVELOPMENT SERVICES

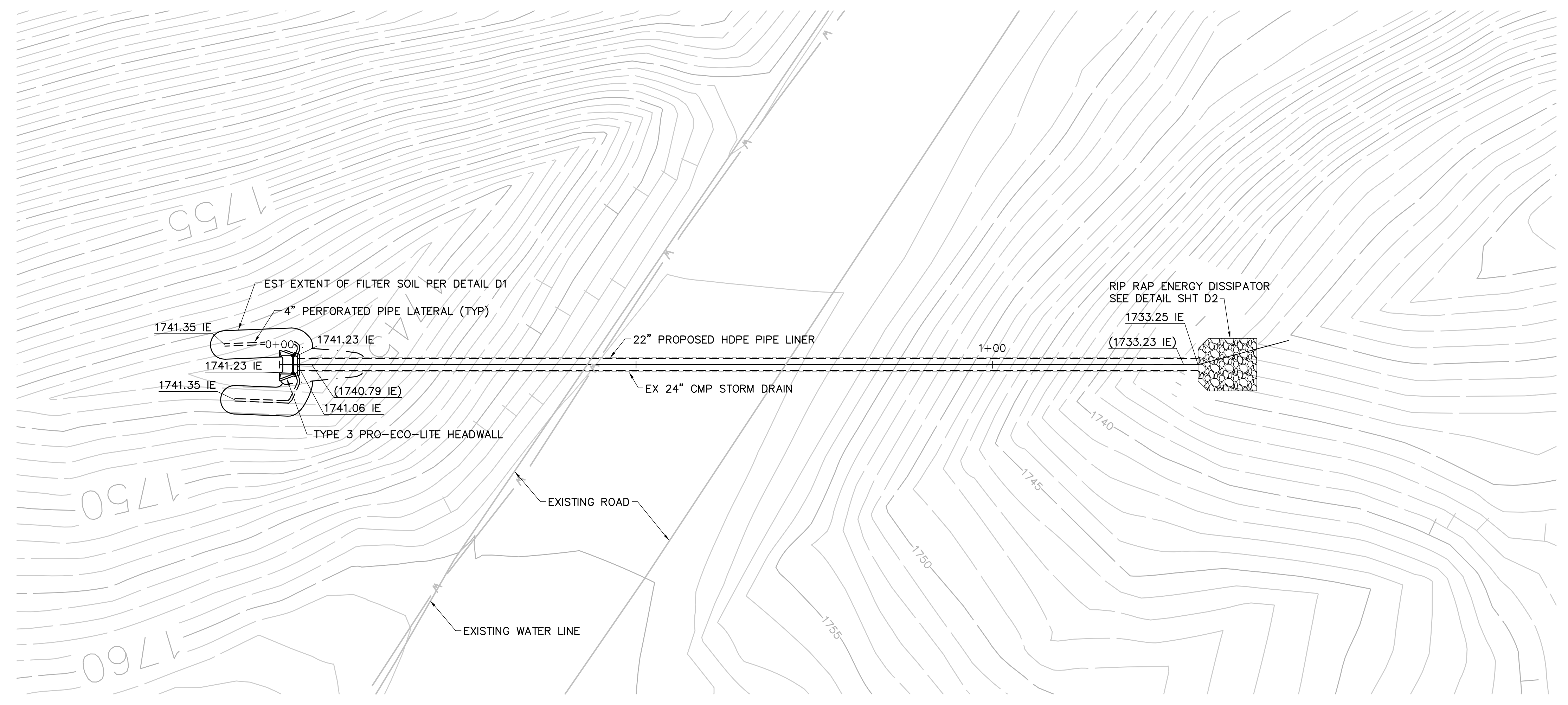
DESCRIPTION OF REVISION	RCE	APP.	DATE



PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'

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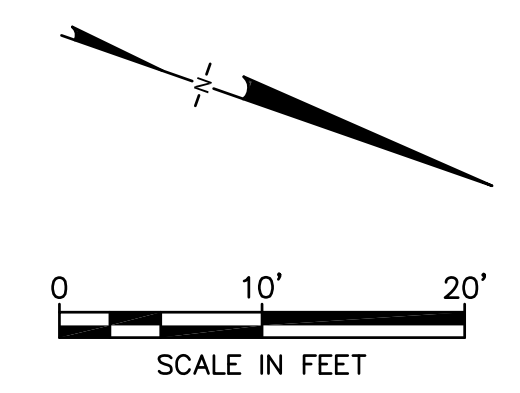
PROFILE VIEW



PLAN VIEW

LEGEND

- EXISTING GROUND ELEVATION (FEET)
- PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- EXISTING GROUND (PROFILE)
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- RIP RAP ENERGY DISSIPATOR
- PROPOSED CULVERT TERMINAL FINISH
- PERFORATED LATERAL DRAIN
- WATER SURFACE ELEVATION



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 PUBLIC WORKS AGENCY
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 BY: _____
 MANAGER, DEVELOPMENT SERVICES

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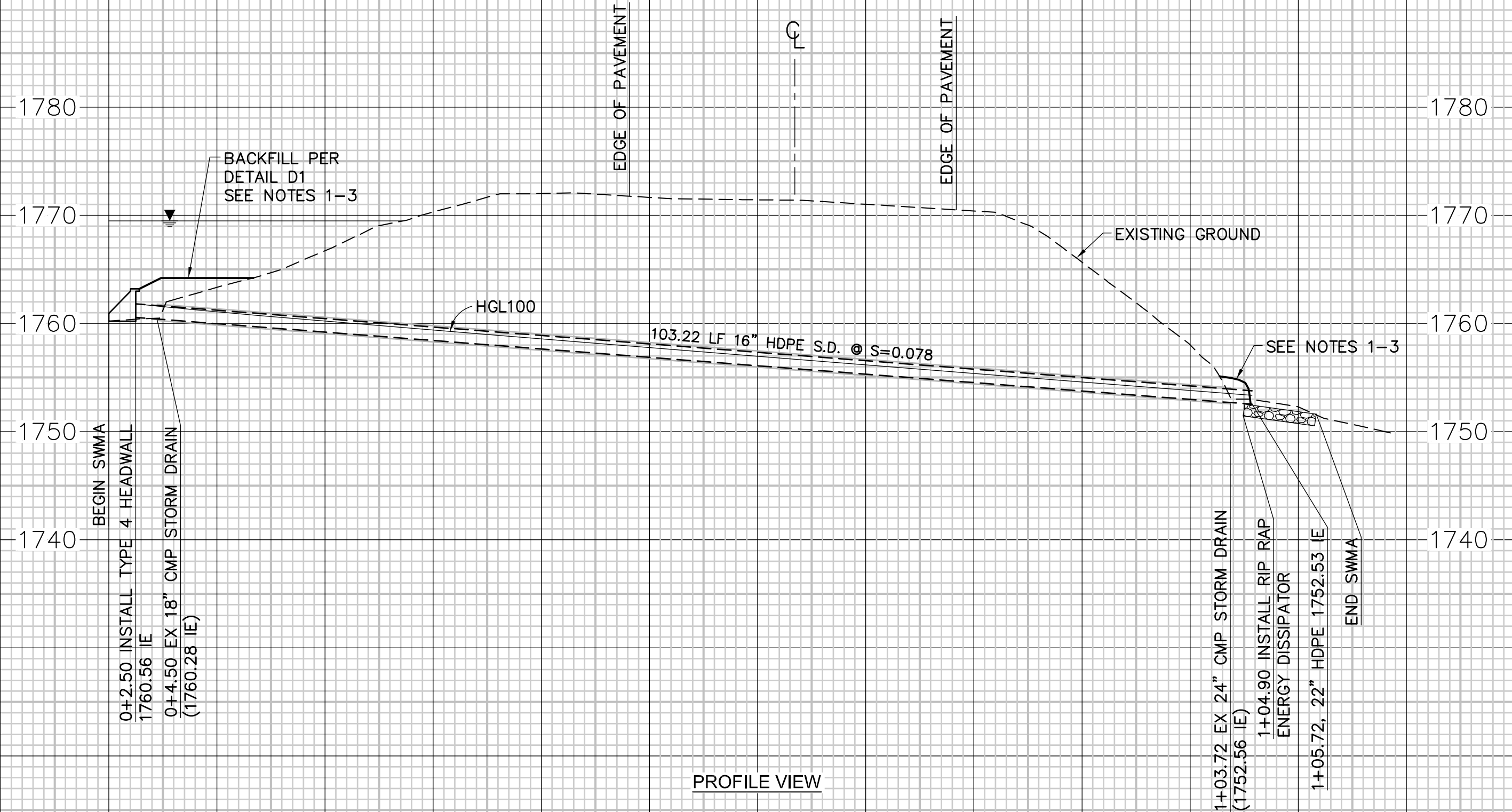
 PROJ. NO.

CULVERT MAINTENANCE 3
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

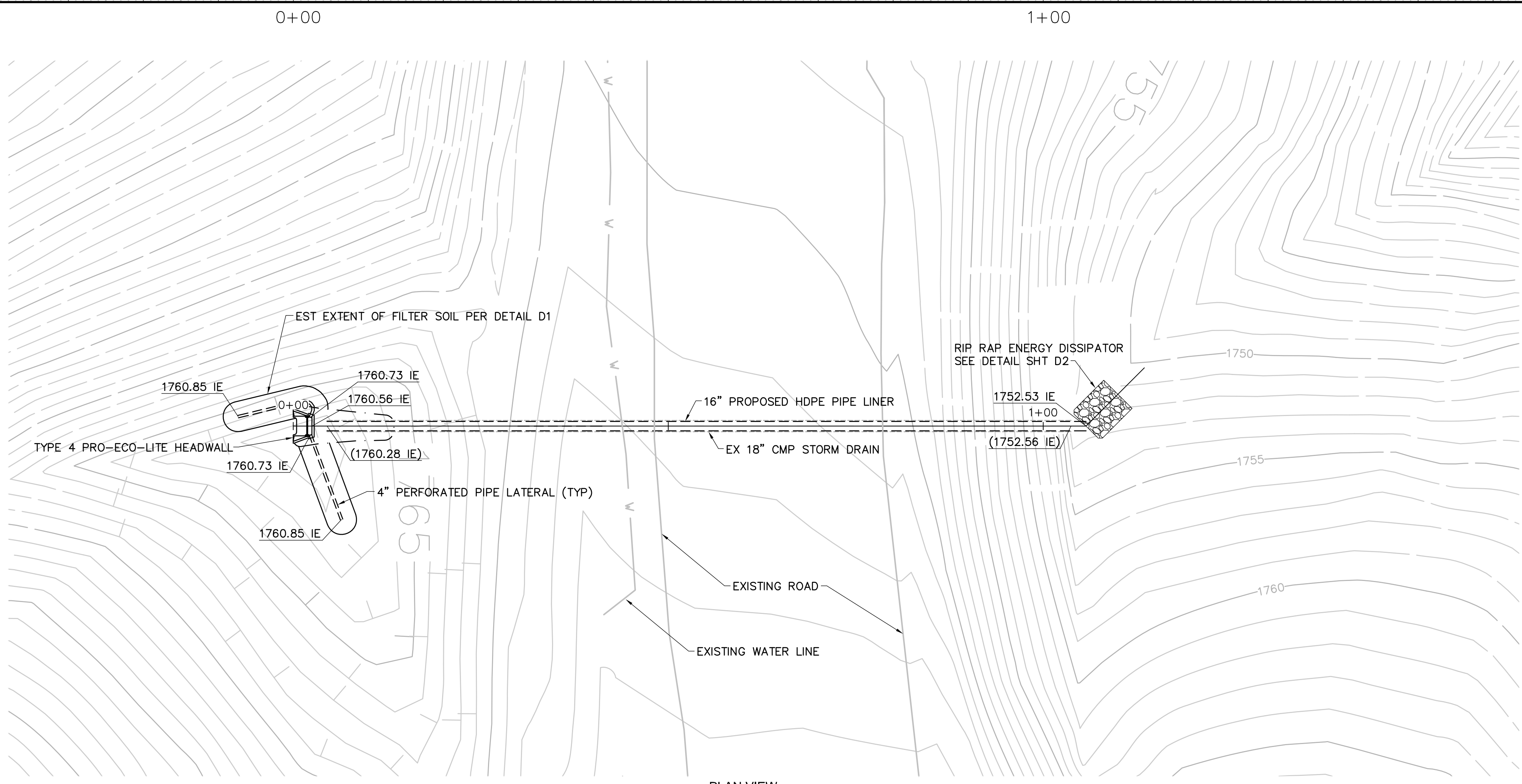
SHEET _____
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CM3

REVISION	DESCRIPTION OF REVISION	RCE	APP.	DATE
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PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



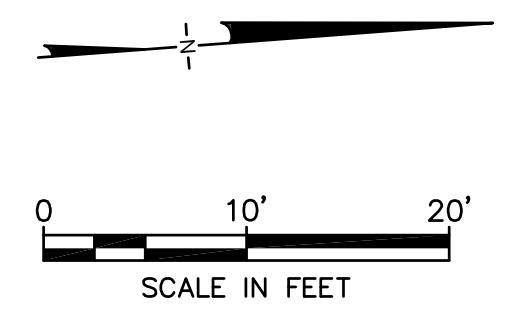
PROFILE VIEW



PLAN VIEW

LEGEND

- EXISTING GROUND ELEVATION (FEET)
- - - PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- - - EXISTING GROUND (PROFILE)
- - - EXISTING STORM DRAIN
- - - PROPOSED STORM DRAIN
- [Pattern] RIP RAP ENERGY DISSIPATOR
- [Symbol] PROPOSED CULVERT TERMINAL FINISH
- - - PERFORATED LATERAL DRAIN
- ▽ WATER SURFACE ELEVATION



NOTES:

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 BY: _____
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 PUBLIC WORKS AGENCY
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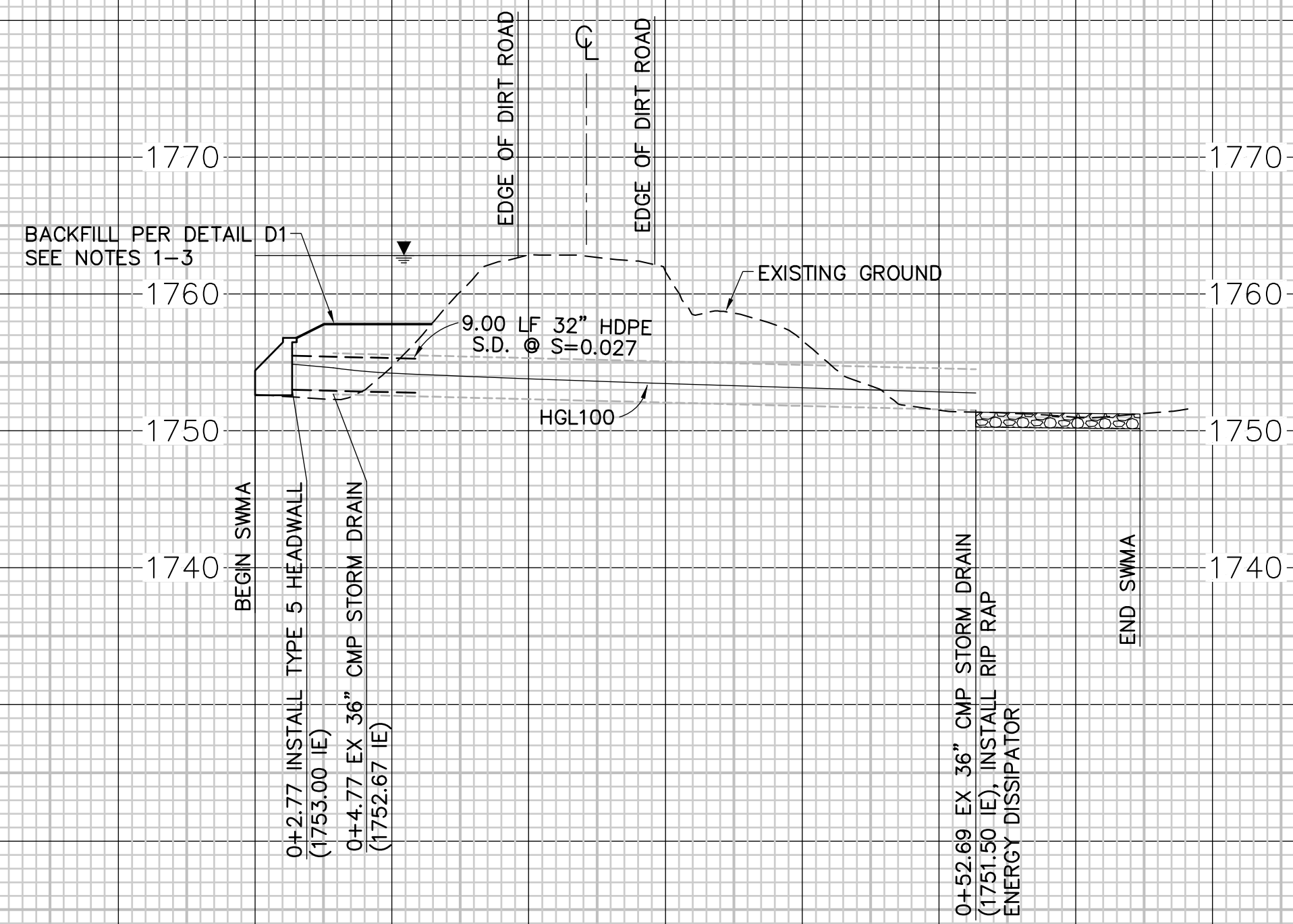
SPEC. NO.

 PROJ. NO.

CULVERT MAINTENANCE 4
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

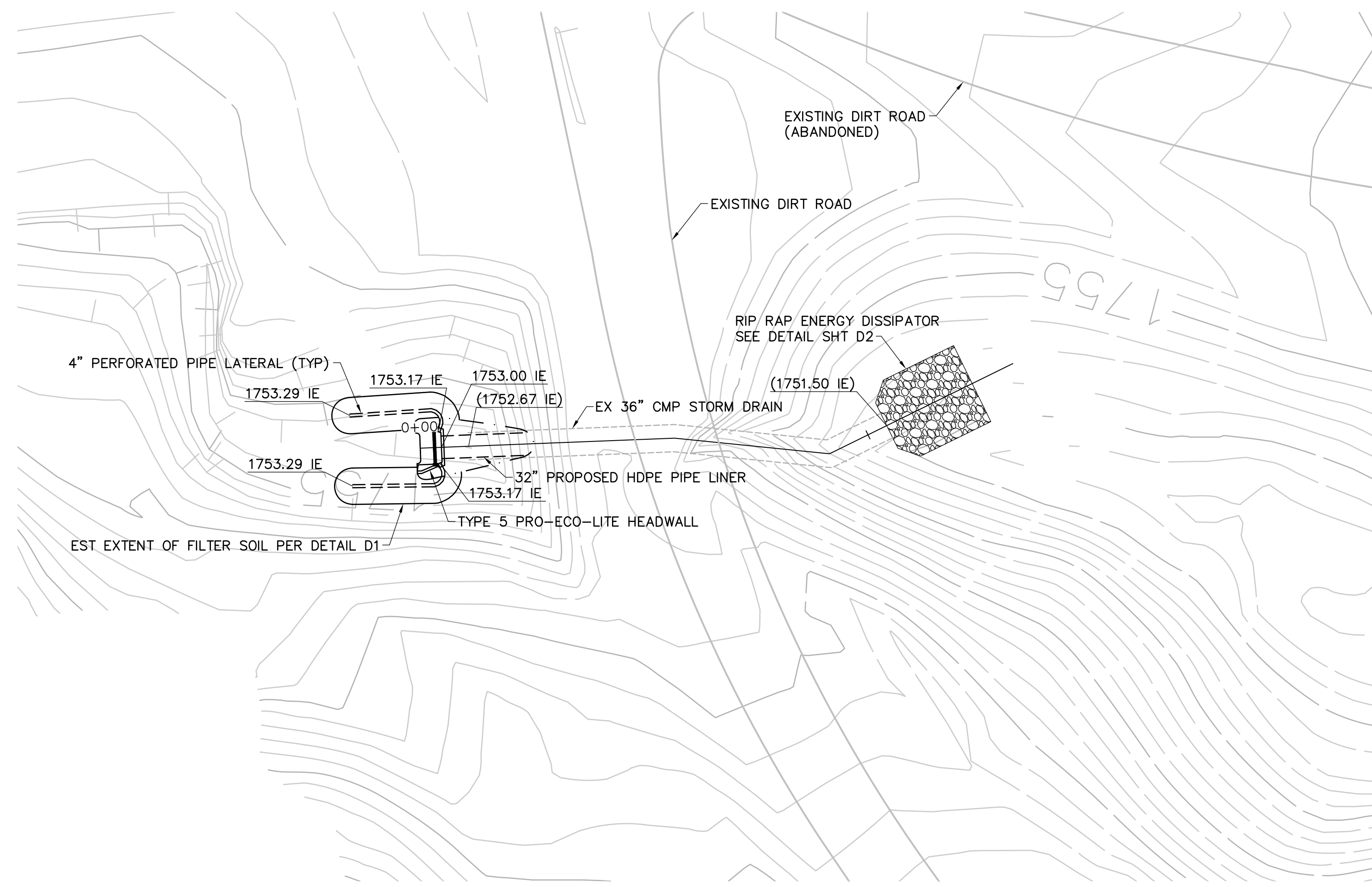
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CM4

PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



PROFILE VIEW

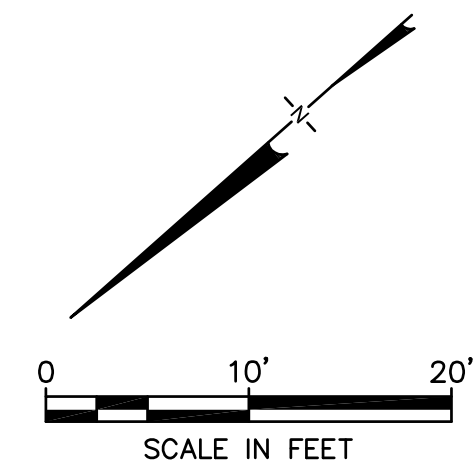
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PLAN VIEW

LEGEND

- EXISTING GROUND ELEVATION (FEET)
- - - PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- - - EXISTING GROUND (PROFILE)
- - - EXISTING STORM DRAIN
- - - PROPOSED STORM DRAIN
- [Pattern] RIP RAP ENERGY DISSIPATOR
- [Symbol] PROPOSED CULVERT TERMINAL FINISH
- - - PERFORATED LATERAL DRAIN
- [Symbol] WATER SURFACE ELEVATION



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SB0363M

DATE

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OF

DRAWING NO.

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BY: _____
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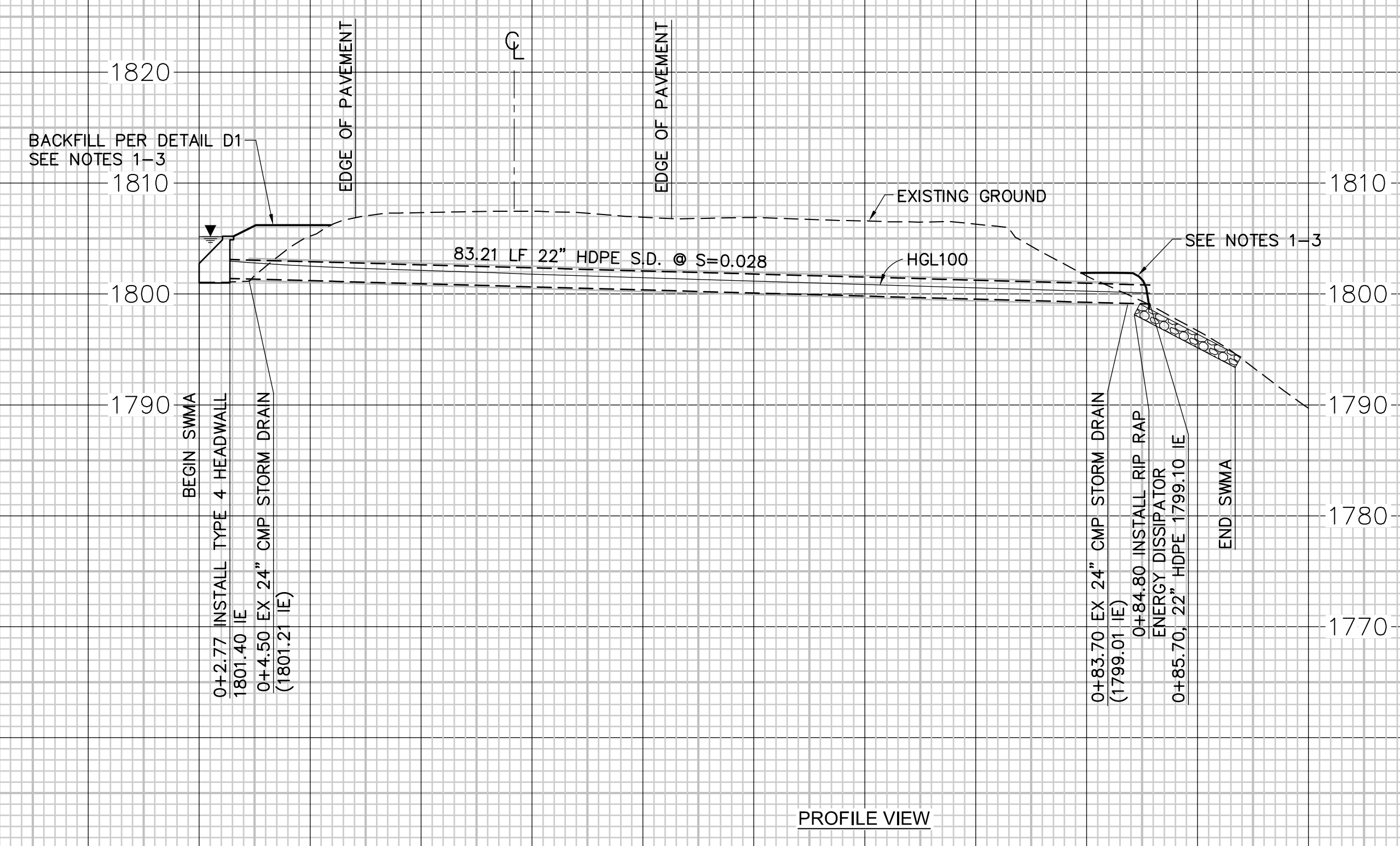
COUNTY OF VENTURA
 PUBLIC WORKS AGENCY
 DEVELOPMENT SERVICES

SPEC. NO.

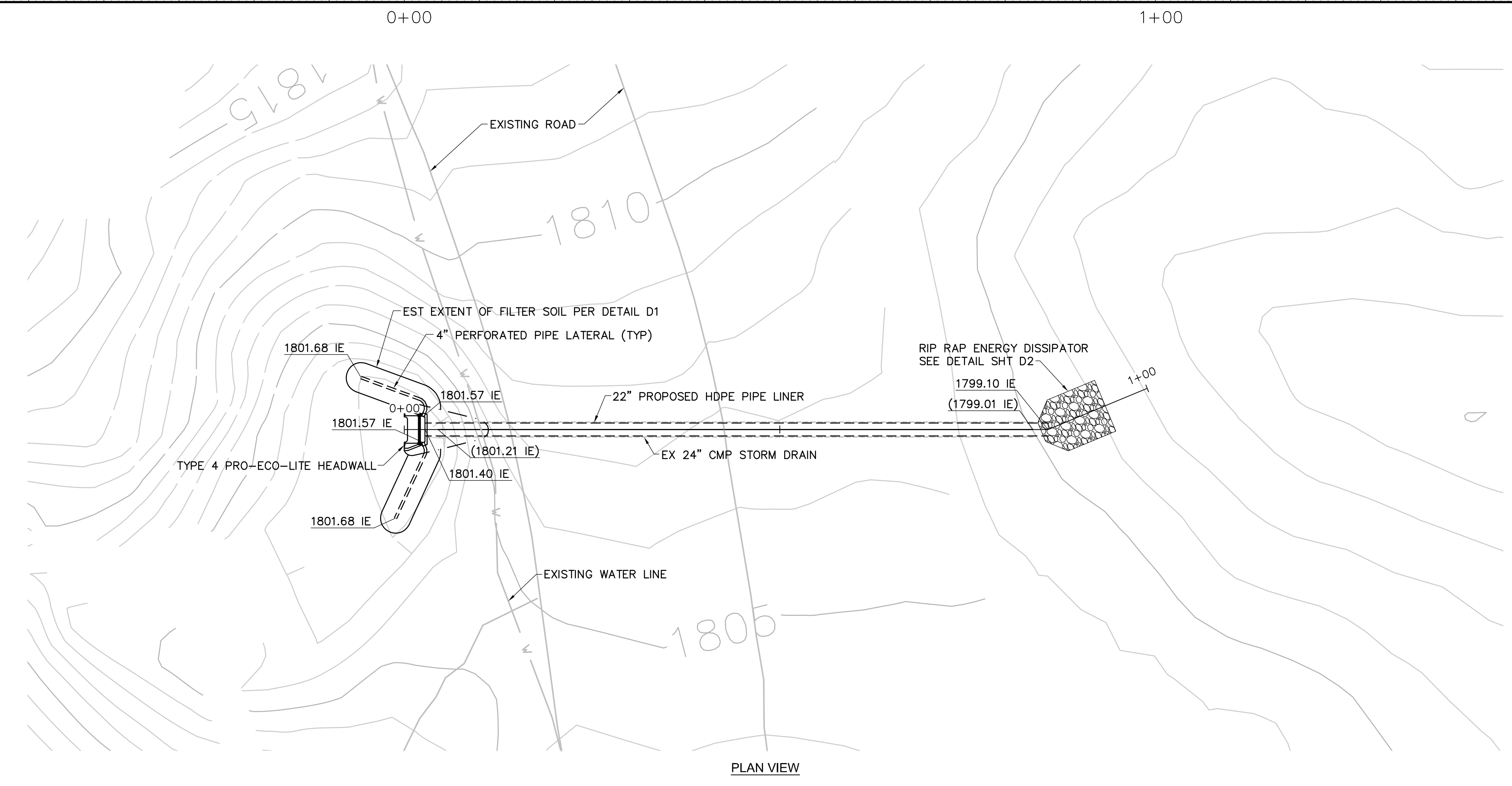
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PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



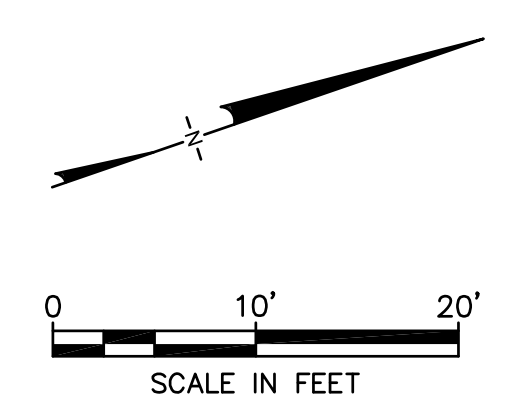
PROFILE VIEW



PLAN VIEW

LEGEND

	EXISTING GROUND ELEVATION (FEET)
	PROPERTY BOUNDARY
	PROPOSED FINISHED GRADE
	EXISTING GROUND (PROFILE)
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	RIP RAP ENERGY DISSIPATOR
	PROPOSED CULVERT TERMINAL FINISH
	PERFORATED LATERAL DRAIN
	WATER SURFACE ELEVATION



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 BY: _____
 MANAGER, DEVELOPMENT SERVICES

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 PUBLIC WORKS AGENCY
 DEVELOPMENT SERVICES**

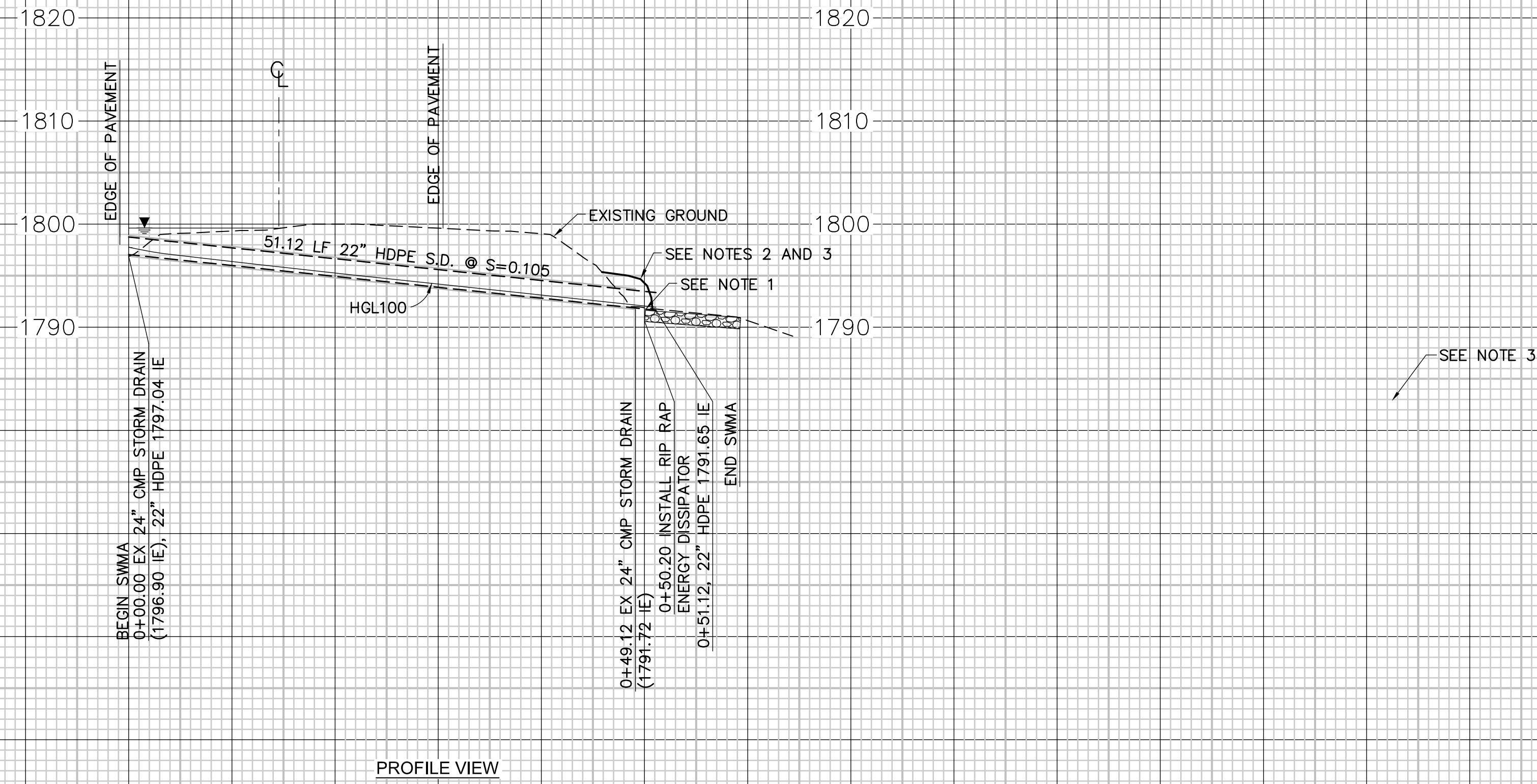
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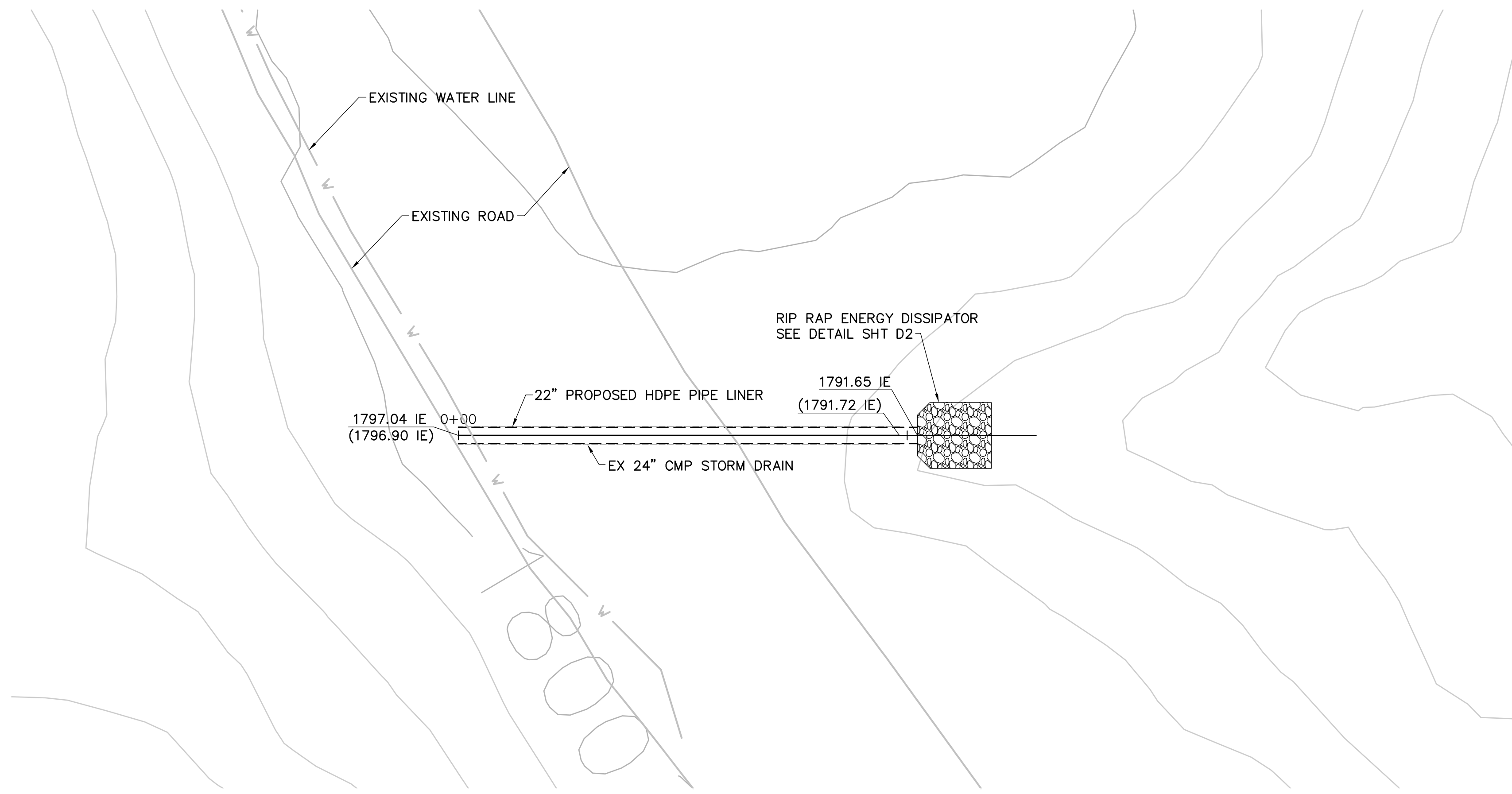
CULVERT MAINTENANCE 6
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

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PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



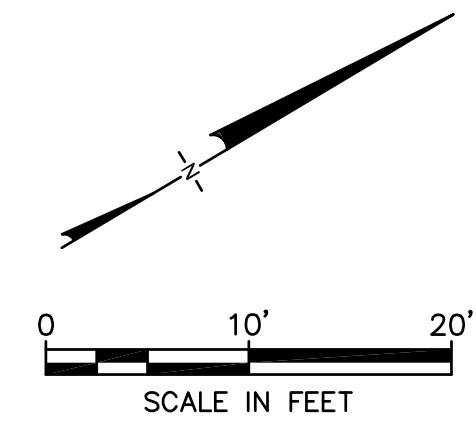
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PLAN VIEW

LEGEND

	EXISTING GROUND ELEVATION (FEET)
	PROPERTY BOUNDARY
	PROPOSED FINISHED GRADE
	EXISTING GROUND (PROFILE)
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	RIP RAP ENERGY DISSIPATOR
	PROPOSED CULVERT TERMINAL FINISH
	PERFORATED LATERAL DRAIN
	WATER SURFACE ELEVATION



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 OF _____
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 CM7

APPROVED: COUNTY OF VENTURA
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 BY: _____
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COUNTY OF VENTURA
 PUBLIC WORKS AGENCY
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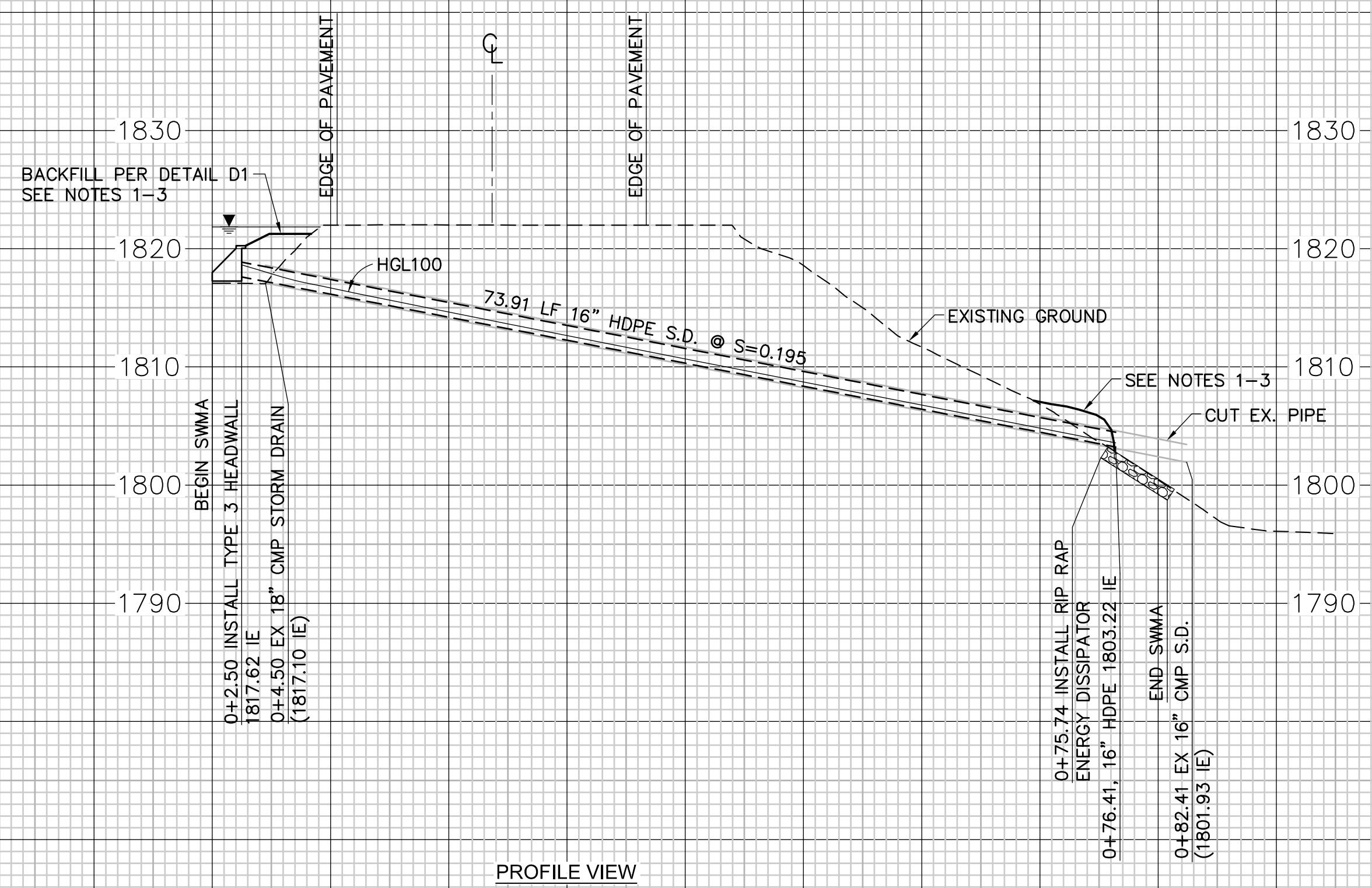
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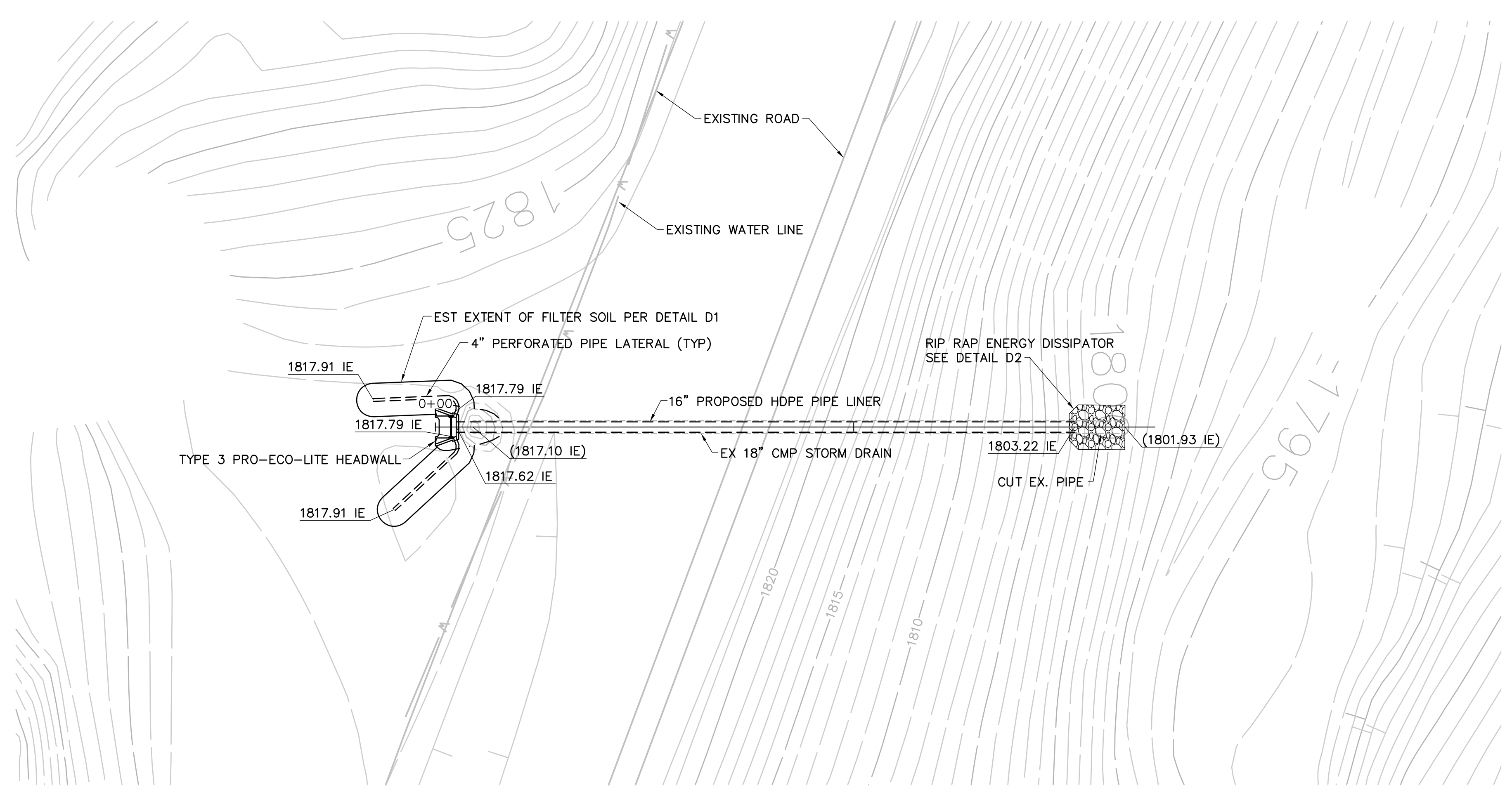
CULVERT MAINTENANCE 7
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

DESCRIPTION OF REVISION	RCE	APP.	DATE
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PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



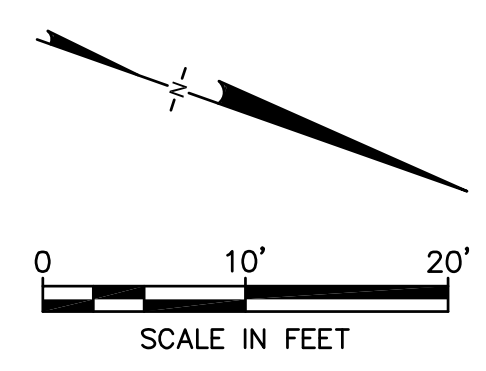
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PLAN VIEW

LEGEND

- EXISTING GROUND ELEVATION (FEET)
- - - - - PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- - - - - EXISTING GROUND (PROFILE)
- - - - - EXISTING STORM DRAIN
- - - - - PROPOSED STORM DRAIN
- [Pattern] RIP RAP ENERGY DISSIPATOR
- [Symbol] PROPOSED CULVERT TERMINAL FINISH
- - - - - PERFORATED LATERAL DRAIN
- WATER SURFACE ELEVATION



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 VENTURA COUNTY, CALIFORNIA

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APPROVED: COUNTY OF VENTURA
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 BY: _____
 MANAGER, DEVELOPMENT SERVICES

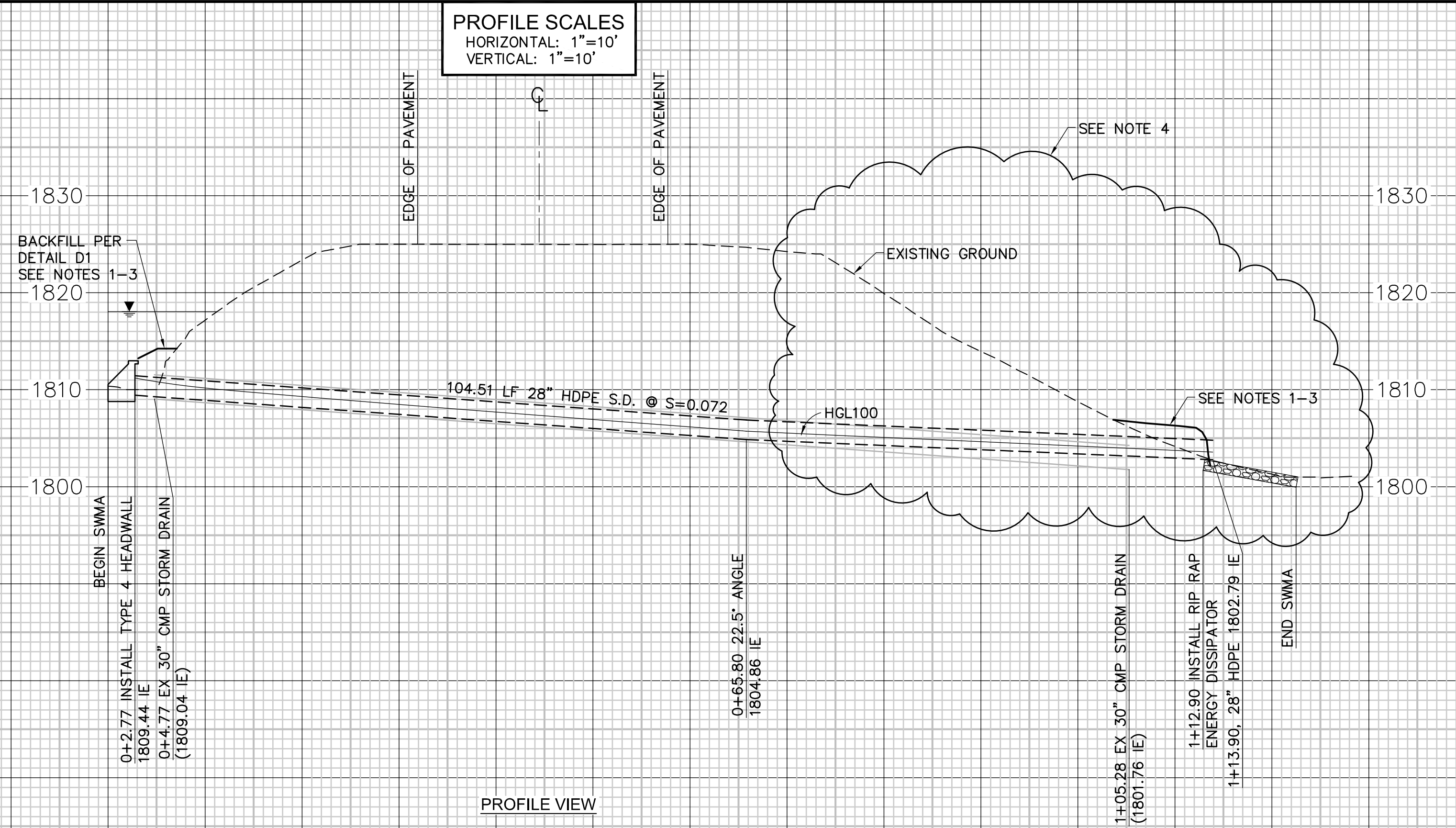
COUNTY OF VENTURA
 PUBLIC WORKS AGENCY
 DEVELOPMENT SERVICES

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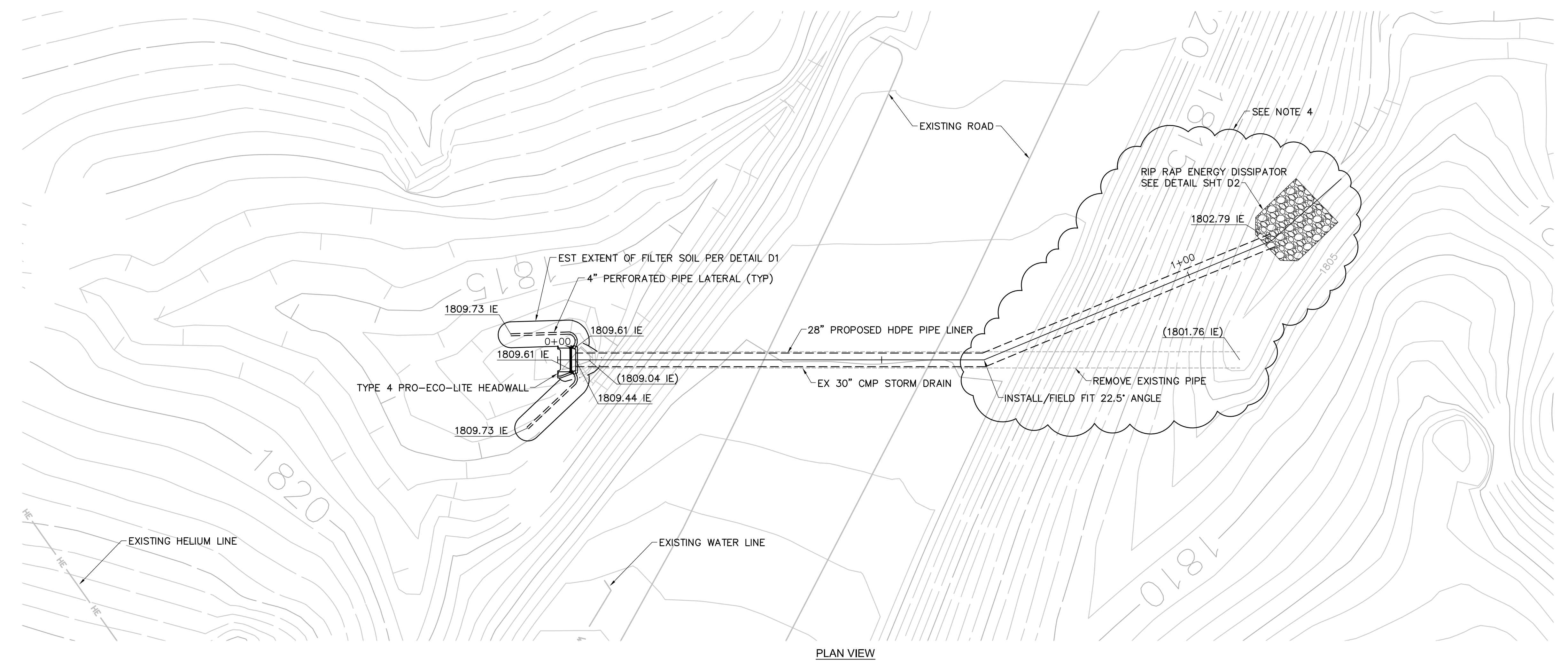
CULVERT MAINTENANCE 8
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

SHEET _____
 OF _____
 DRAWING NO.
CM8



PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'

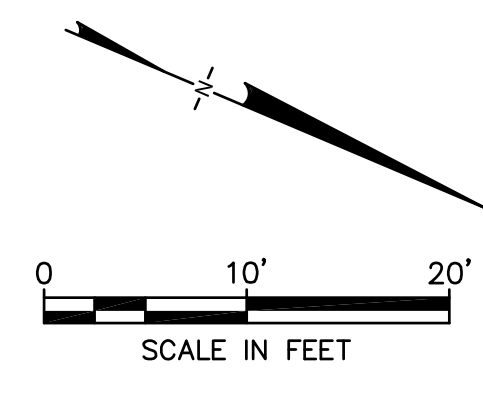
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PLAN VIEW

LEGEND

	EXISTING GROUND ELEVATION (FEET)
	PROPERTY BOUNDARY
	PROPOSED FINISHED GRADE
	EXISTING GROUND (PROFILE)
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	RIP RAP ENERGY DISSIPATOR
	PROPOSED CULVERT TERMINAL FINISH
	PERFORATED LATERAL DRAIN
	WATER SURFACE ELEVATION



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 2. PLACE A 1' MIN. COVER OVER ALL EXPOSED PIPE.
 3. FENCE OFF OAK TREES & PROTECTED PLANTS AS DIRECTED BY THE CONSTRUCTION MANAGER.
 4. DUE TO EXISTING PIPE DAMAGE REMOVE THE CMP AND REPLACE WITH HDPE PIPE AS PRESENTED. ALL EXCAVATION WITHIN THE ROAD EMBANKMENT SHOULD BE PERFORMED UNDER THE DIRECTION OF A GEOTECHNICAL ENGINEER.

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 BY: _____
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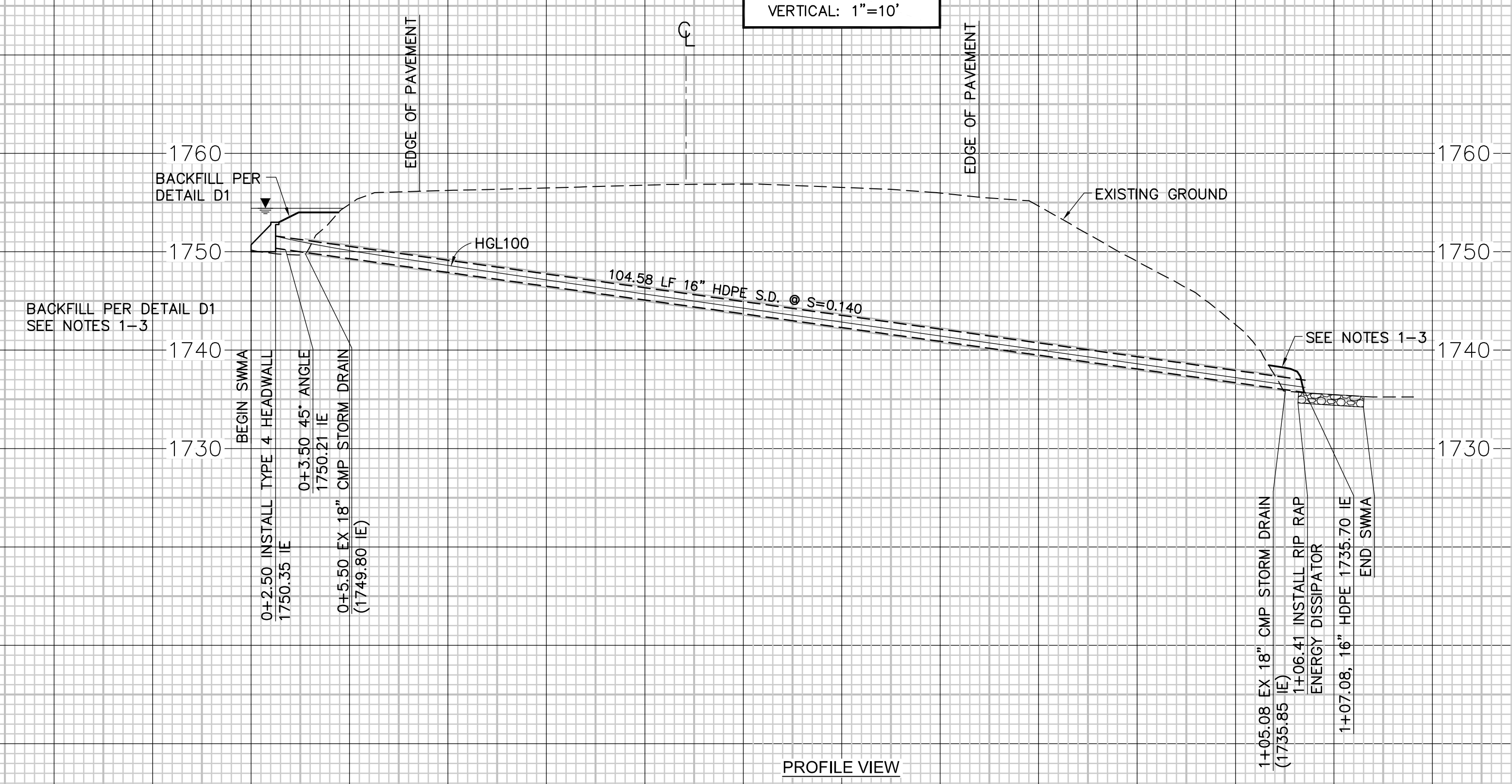
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SPEC. NO.
 PROJ. NO.

CULVERT MAINTENANCE 9
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

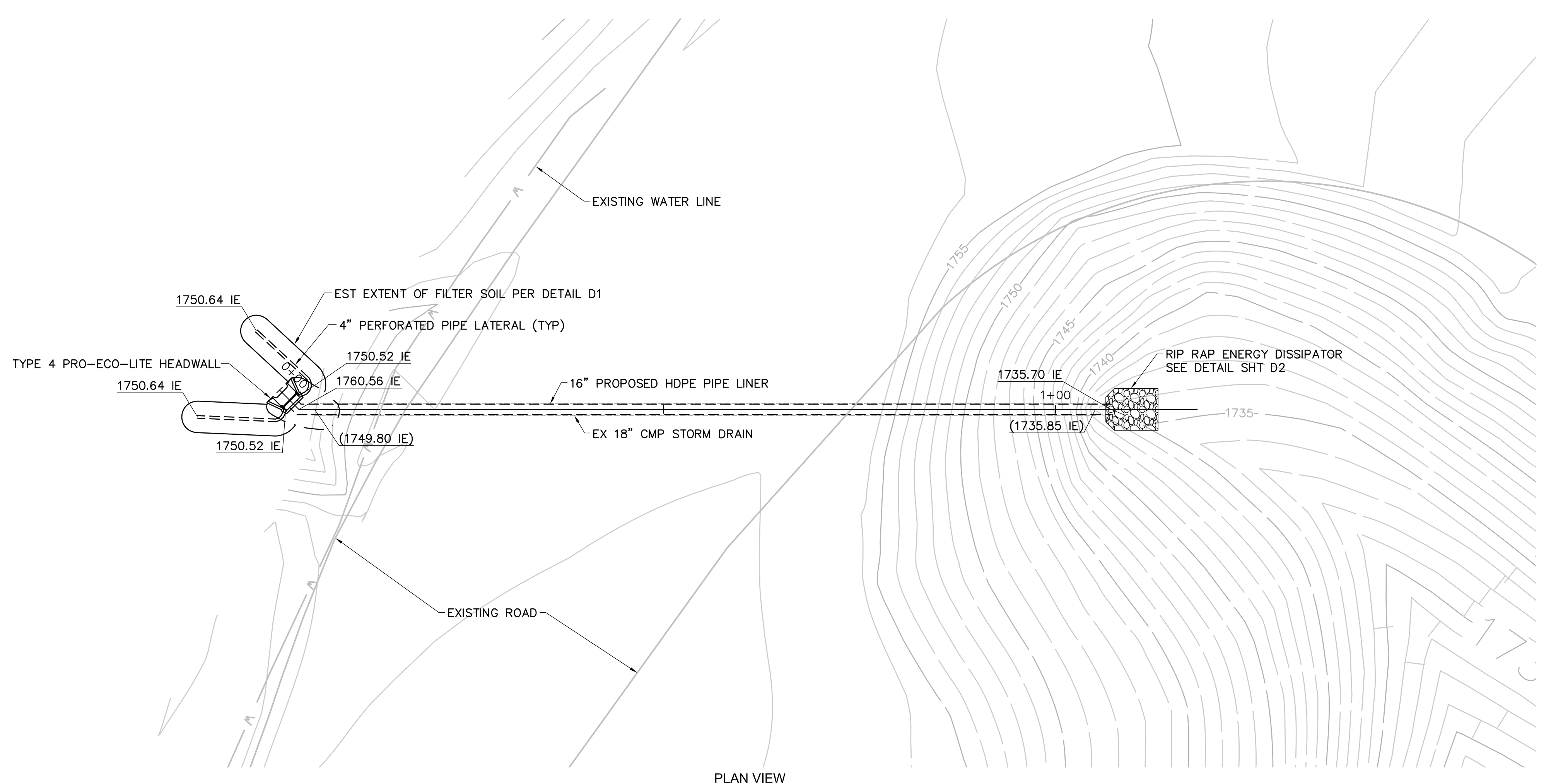
SHEET _____
 OF _____
 DRAWING NO.
CM9

PROFILE SCALES
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'



0+00 1+00

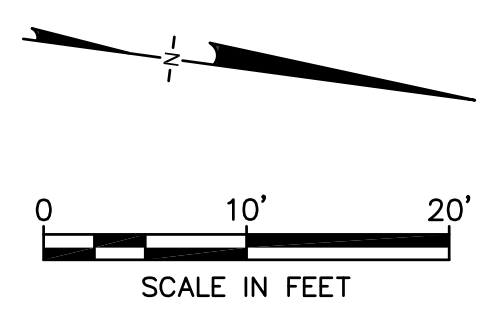
PROFILE VIEW



PLAN VIEW

LEGEND

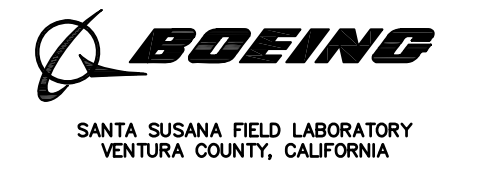
- EXISTING GROUND ELEVATION (FEET)
- - - PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- - - EXISTING GROUND (PROFILE)
- - - EXISTING STORM DRAIN
- - - PROPOSED STORM DRAIN
- [Pattern] RIP RAP ENERGY DISSIPATOR
- [Symbol] PROPOSED CULVERT TERMINAL FINISH
- - - PERFORATED LATERAL DRAIN
- [Symbol] WATER SURFACE ELEVATION



NOTES:

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DATE: _____
BY: _____
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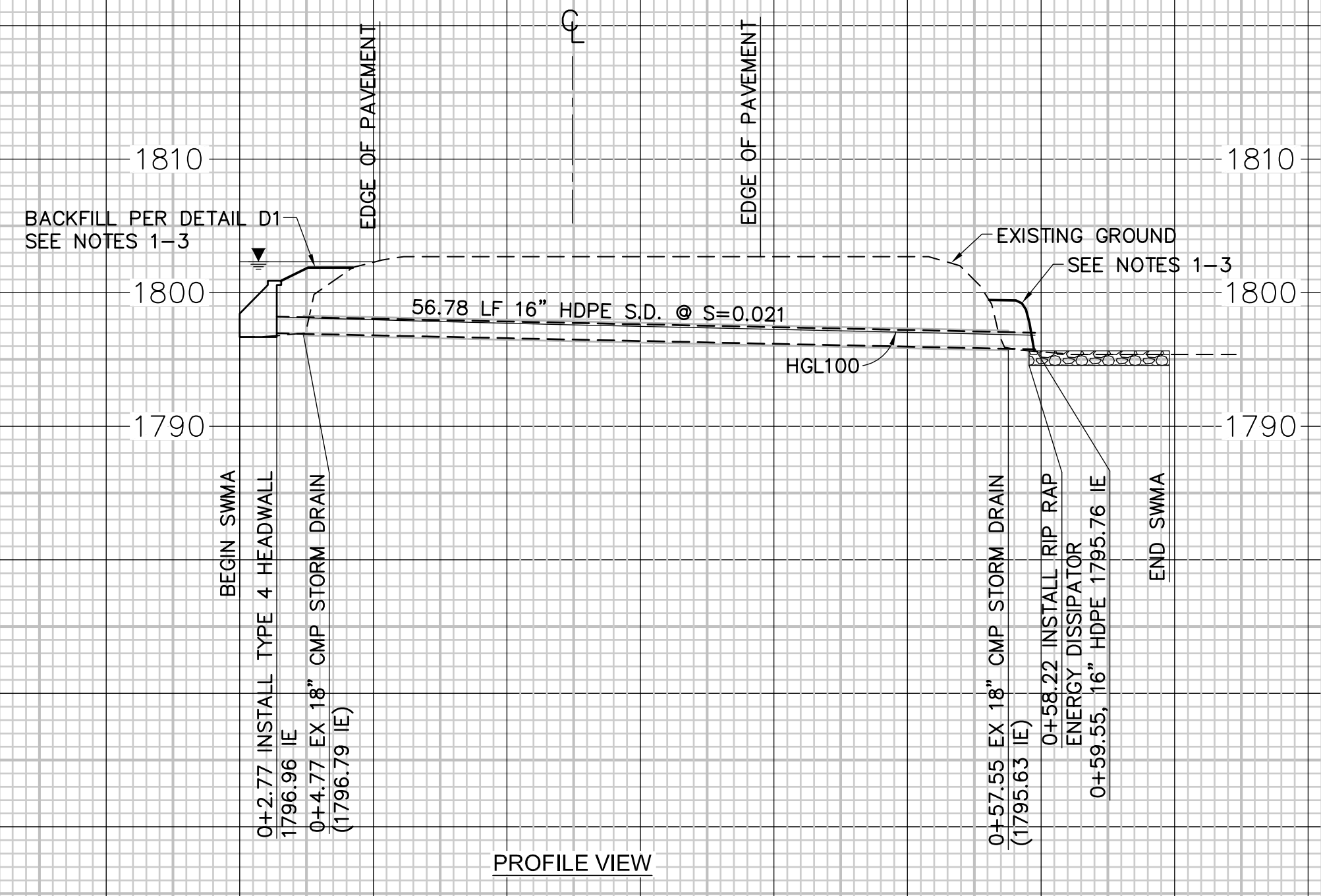
COUNTY OF VENTURA
PUBLIC WORKS AGENCY
DEVELOPMENT SERVICES

SPEC. NO.
PROJ. NO.

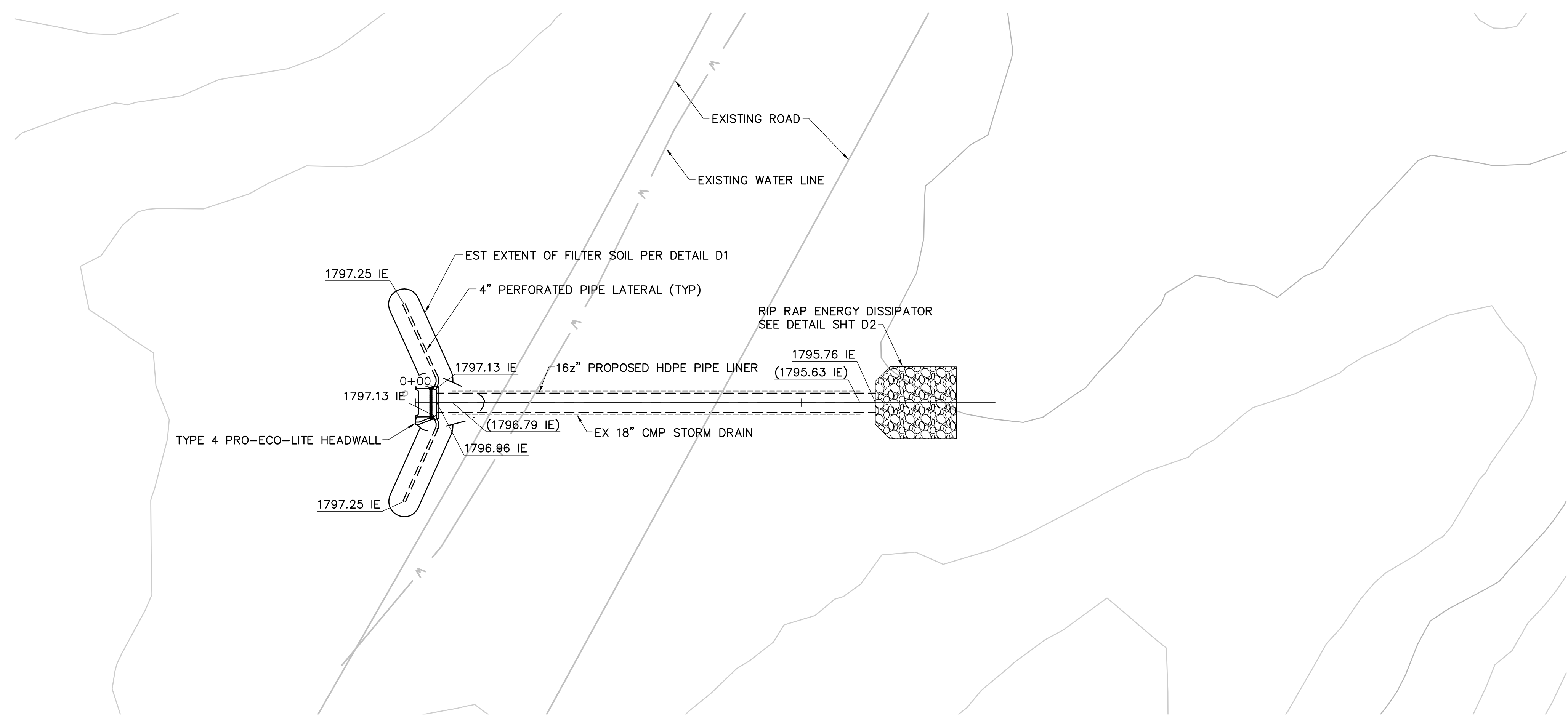
CULVERT MAINTENANCE 10
STORM WATER MAINTENANCE ACTIVITIES
BOEING SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

SHEET _____
OF _____
DRAWING NO.
CM10

PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



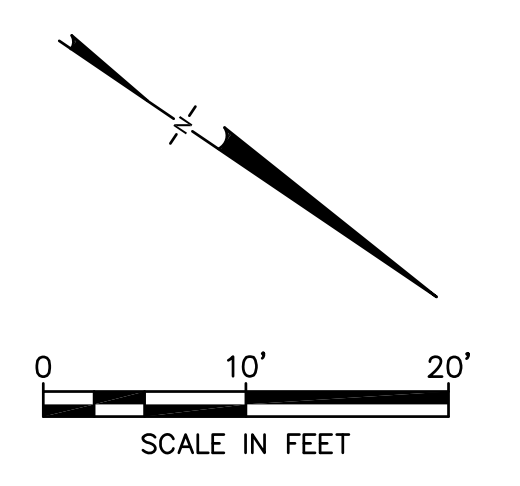
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PLAN VIEW

LEGEND

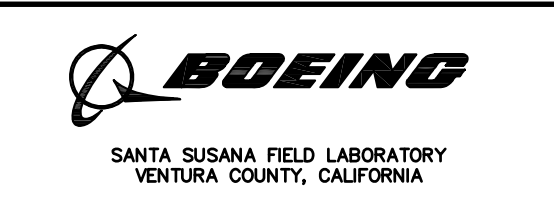
- EXISTING GROUND ELEVATION (FEET)
- - - PROPERTY BOUNDARY
- PROPOSED FINISHED GRADE
- - - EXISTING GROUND (PROFILE)
- - - EXISTING STORM DRAIN
- - - PROPOSED STORM DRAIN
- [Pattern] RIP RAP ENERGY DISSIPATOR
- [Symbol] PROPOSED CULVERT TERMINAL FINISH
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- WATER SURFACE ELEVATION



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SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

GEOSYNTEC PROJ. NO.
 SB0363M
 DATE
 SEP 2008

DESCRIPTION OF REVISION	RCE	APP.	DATE
D			
C			
B			
A			

APPROVED: COUNTY OF VENTURA
 DATE: _____
 BY: _____
 MANAGER, DEVELOPMENT SERVICES

COUNTY OF VENTURA
 PUBLIC WORKS AGENCY
 DEVELOPMENT SERVICES

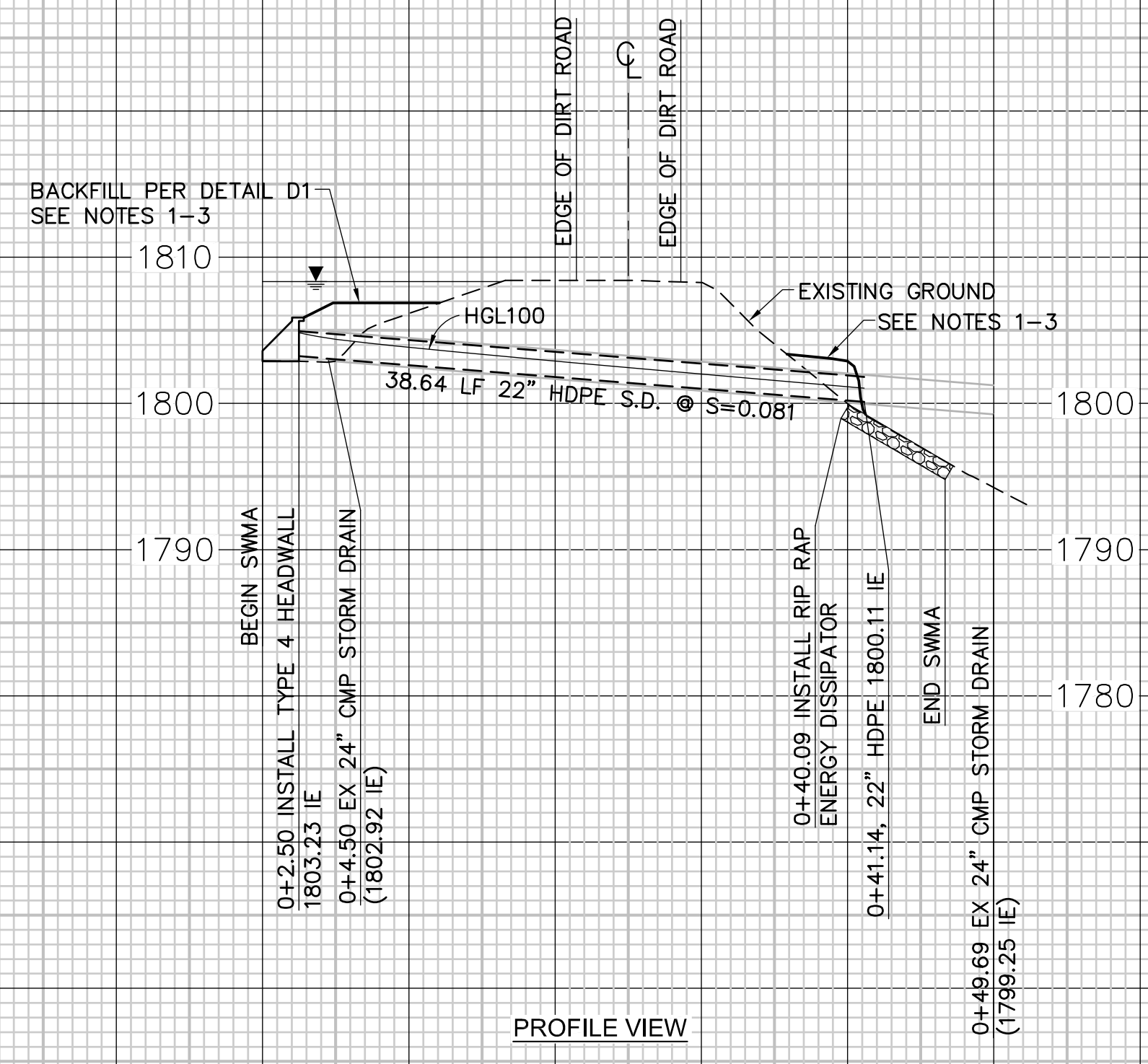
SPEC. NO.

 PROJ. NO.

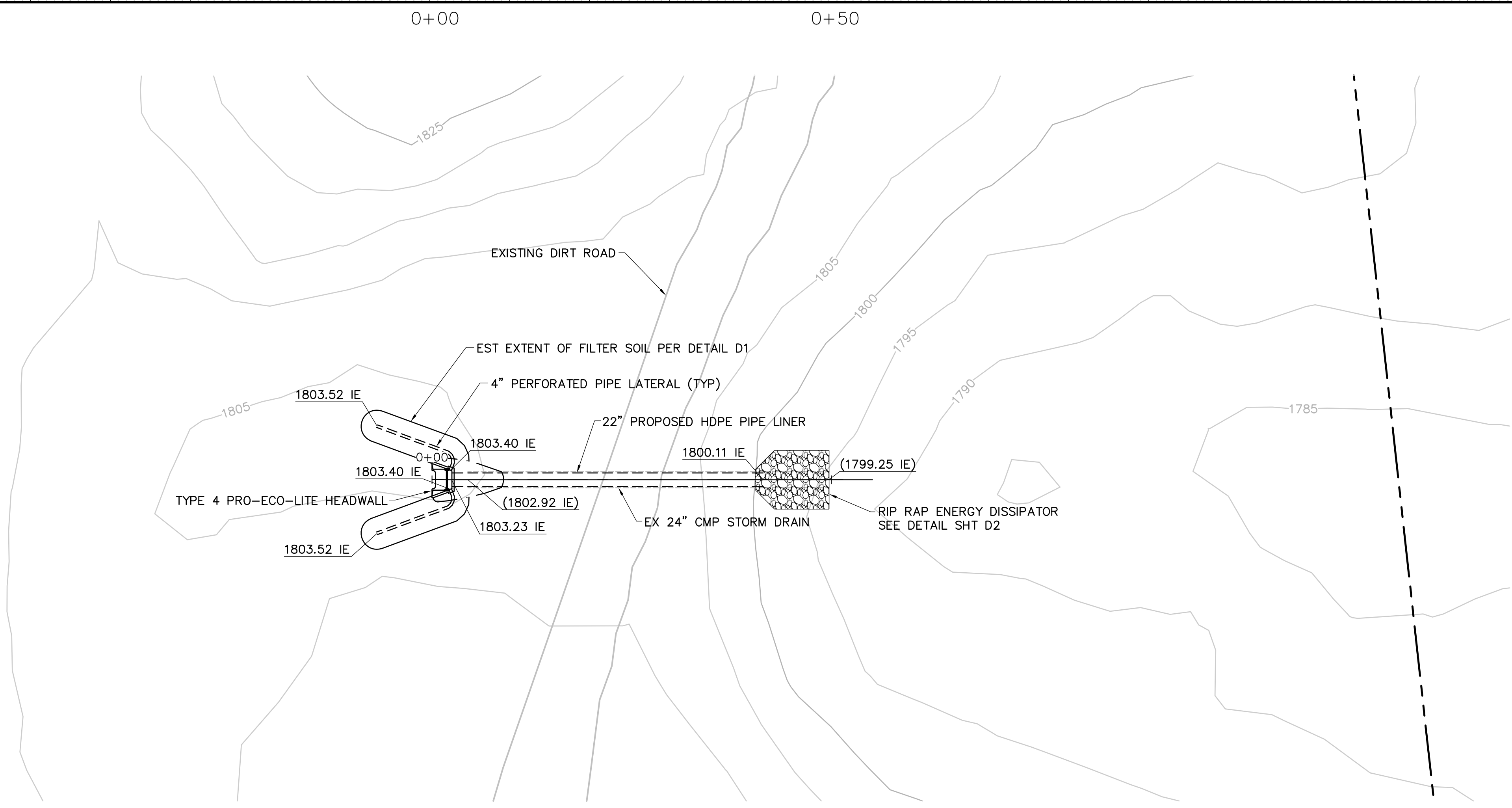
CULVERT MAINTENANCE 11
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

SHEET _____
 OF _____
 DRAWING NO.
 CM11

PROFILE SCALES
 HORIZONTAL: 1"=10'
 VERTICAL: 1"=10'



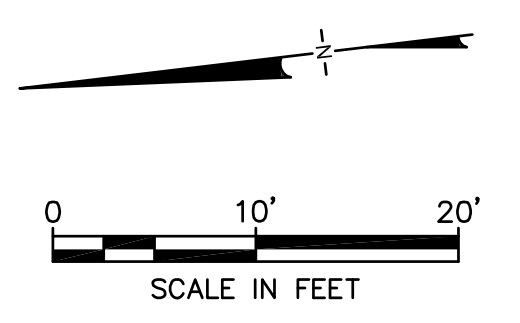
PROFILE VIEW



PLAN VIEW

LEGEND

	EXISTING GROUND ELEVATION (FEET)
	PROPERTY BOUNDARY
	PROPOSED FINISHED GRADE
	EXISTING GROUND (PROFILE)
	EXISTING STORM DRAIN
	PROPOSED STORM DRAIN
	RIP RAP ENERGY DISSIPATOR
	PROPOSED CULVERT TERMINAL FINISH
	PERFORATED LATERAL DRAIN
	WATER SURFACE ELEVATION



- NOTES:
1. PROVIDE STABLE SURFACE FOR PIPE EXTENSIONS VIA ROCK BACKFILL, COMPACTED FILL, OR AS DIRECTED BY THE ENGINEER.
 2. PLACE A 1' MIN. COVER OVER ALL EXPOSED PIPE.
 3. FENCE OFF OAK TREES & PROTECTED PLANTS AS DIRECTED BY THE CONSTRUCTION MANAGER.

Geosyntec
 consultants
 3990 OLD TOWN AVE., SUITE 8-101
 SAN DIEGO, CALIFORNIA 92110 USA
 PHONE: 619.297.1530

BOEING
 SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

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 MANAGER, DEVELOPMENT SERVICES

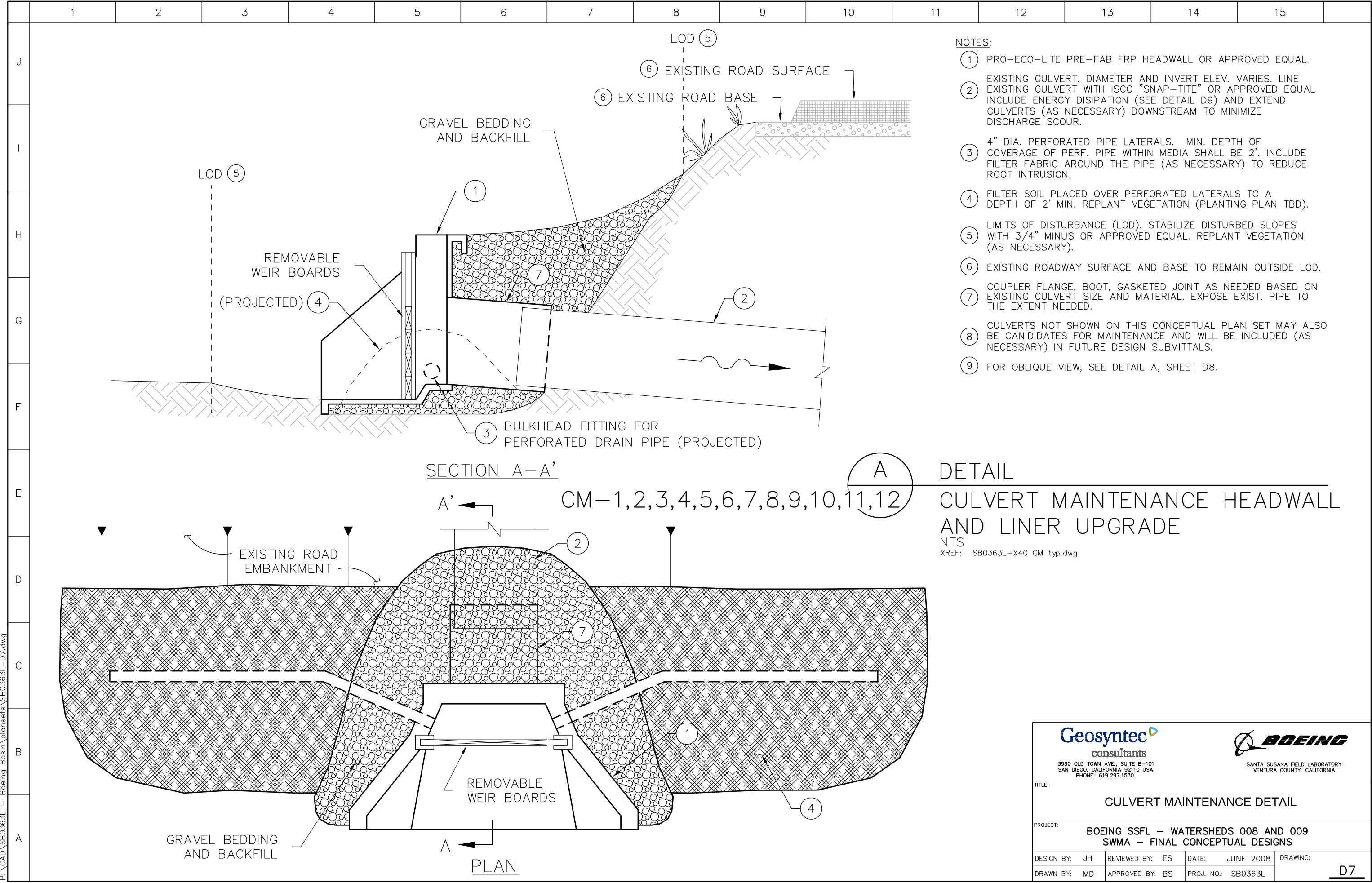
COUNTY OF VENTURA
 PUBLIC WORKS AGENCY
 DEVELOPMENT SERVICES

SPEC. NO.

 PROJ. NO.

CULVERT MAINTENANCE 12
 STORM WATER MAINTENANCE ACTIVITIES
 BOEING SANTA SUSANA FIELD LABORATORY
 VENTURA COUNTY, CALIFORNIA

SHEET _____
 OF _____
 DRAWING NO.
CM12



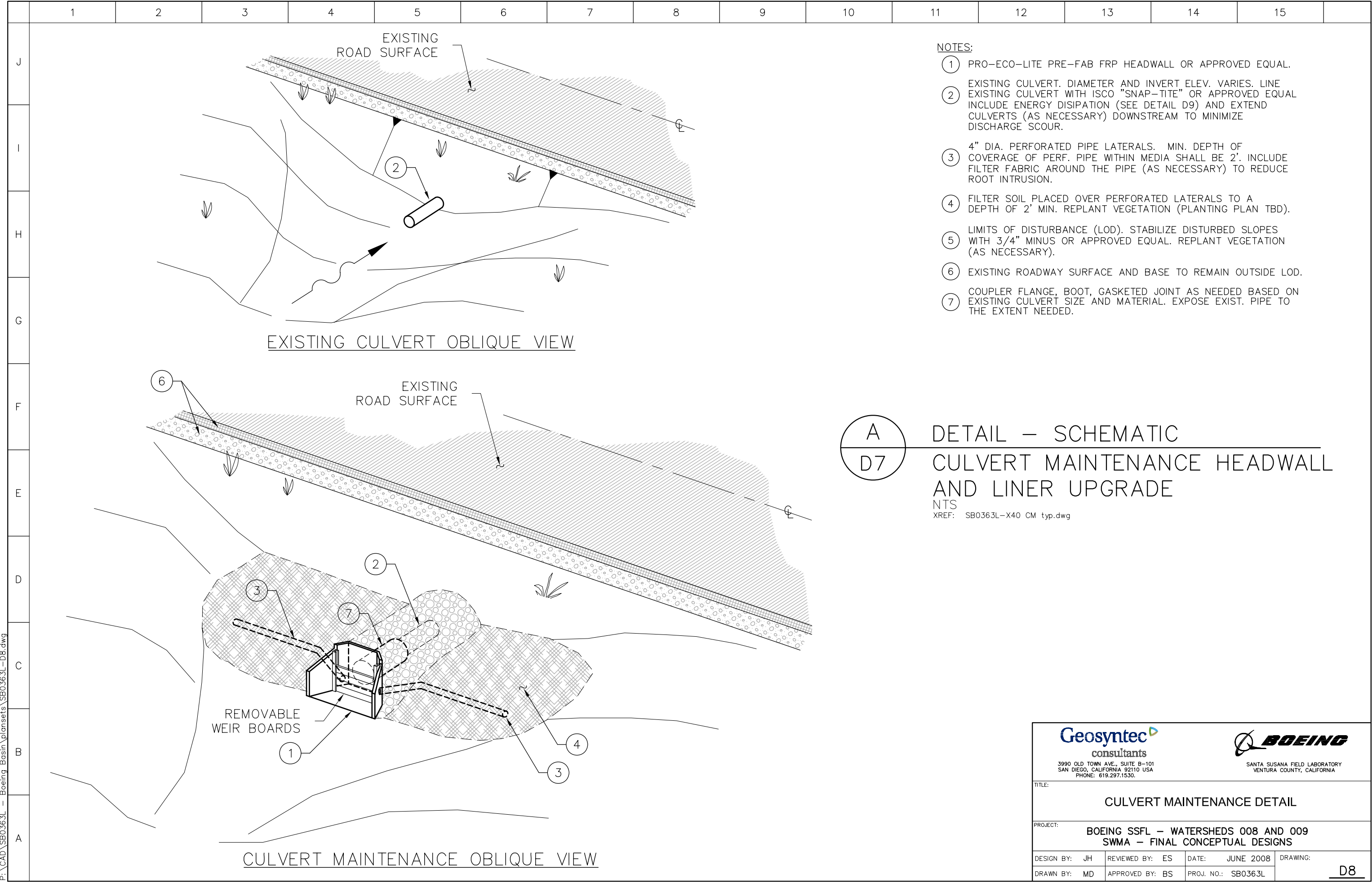
NOTES:

- ① PRO-ECO-LITE PRE-FAB FRP HEADWALL OR APPROVED EQUAL.
- ② EXISTING CULVERT. DIAMETER AND INVERT ELEV. VARIES. LINE INCLUDE ENERGY DISSIPATION (SEE DETAIL D9) AND EXTEND CULVERTS (AS NECESSARY) DOWNSTREAM TO MINIMIZE DISCHARGE SCOUR.
- ③ 4" DIA. PERFORATED PIPE LATERALS. MIN. DEPTH OF COVERAGE OF PERF. PIPE WITHIN MEDIA SHALL BE 2'. INCLUDE FILTER FABRIC AROUND THE PIPE (AS NECESSARY) TO REDUCE ROOT INTRUSION.
- ④ FILTER SOIL PLACED OVER PERFORATED LATERALS TO A DEPTH OF 2' MIN. REPLANT VEGETATION (PLANTING PLAN TBD).
- ⑤ LIMITS OF DISTURBANCE (LOD). STABILIZE DISTURBED SLOPES WITH 3/4" MINUS OR APPROVED EQUAL. REPLANT VEGETATION (AS NECESSARY).
- ⑥ EXISTING ROADWAY SURFACE AND BASE TO REMAIN OUTSIDE LOD.
- ⑦ COUPLER FLANGE, BOOT, GASKETED JOINT AS NEEDED BASED ON EXISTING CULVERT SIZE AND MATERIAL. EXPOSE EXIST. PIPE TO THE EXTENT NEEDED.
- ⑧ CULVERTS NOT SHOWN ON THIS CONCEPTUAL PLAN SET MAY ALSO BE CANDIDATES FOR MAINTENANCE AND WILL BE INCLUDED (AS NECESSARY) IN FUTURE DESIGN SUBMITTALS.
- ⑨ FOR OBLIQUE VIEW, SEE DETAIL A, SHEET D8.

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<small>3990 OLD TOWN AVE., SUITE B-101 SAN DIEGO, CALIFORNIA 92110 USA PHONE: 619.297.1530.</small>		<small>SANTA SUSANA FIELD LABORATORY VENTURA COUNTY, CALIFORNIA</small>	
TITLE: CULVERT MAINTENANCE DETAIL			
PROJECT: BOEING SSFL - WATERSHEDS 008 AND 009 SWMA - FINAL CONCEPTUAL DESIGNS			
DESIGN BY: JH	REVIEWED BY: ES	DATE: JUNE 2008	DRAWING:
DRAWN BY: MD	APPROVED BY: BS	PROJ. NO.: SB0363L	D7

REV-10



- NOTES:**
- ① PRO-ECO-LITE PRE-FAB FRP HEADWALL OR APPROVED EQUAL.
 - ② EXISTING CULVERT. DIAMETER AND INVERT ELEV. VARIES. LINE INCLUDE ENERGY DISSIPATION (SEE DETAIL D9) AND EXTEND CULVERTS (AS NECESSARY) DOWNSTREAM TO MINIMIZE DISCHARGE SCOUR.
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 - ⑥ EXISTING ROADWAY SURFACE AND BASE TO REMAIN OUTSIDE LOD.
 - ⑦ COUPLER FLANGE, BOOT, GASKETED JOINT AS NEEDED BASED ON EXISTING CULVERT SIZE AND MATERIAL. EXPOSE EXIST. PIPE TO THE EXTENT NEEDED.

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D7

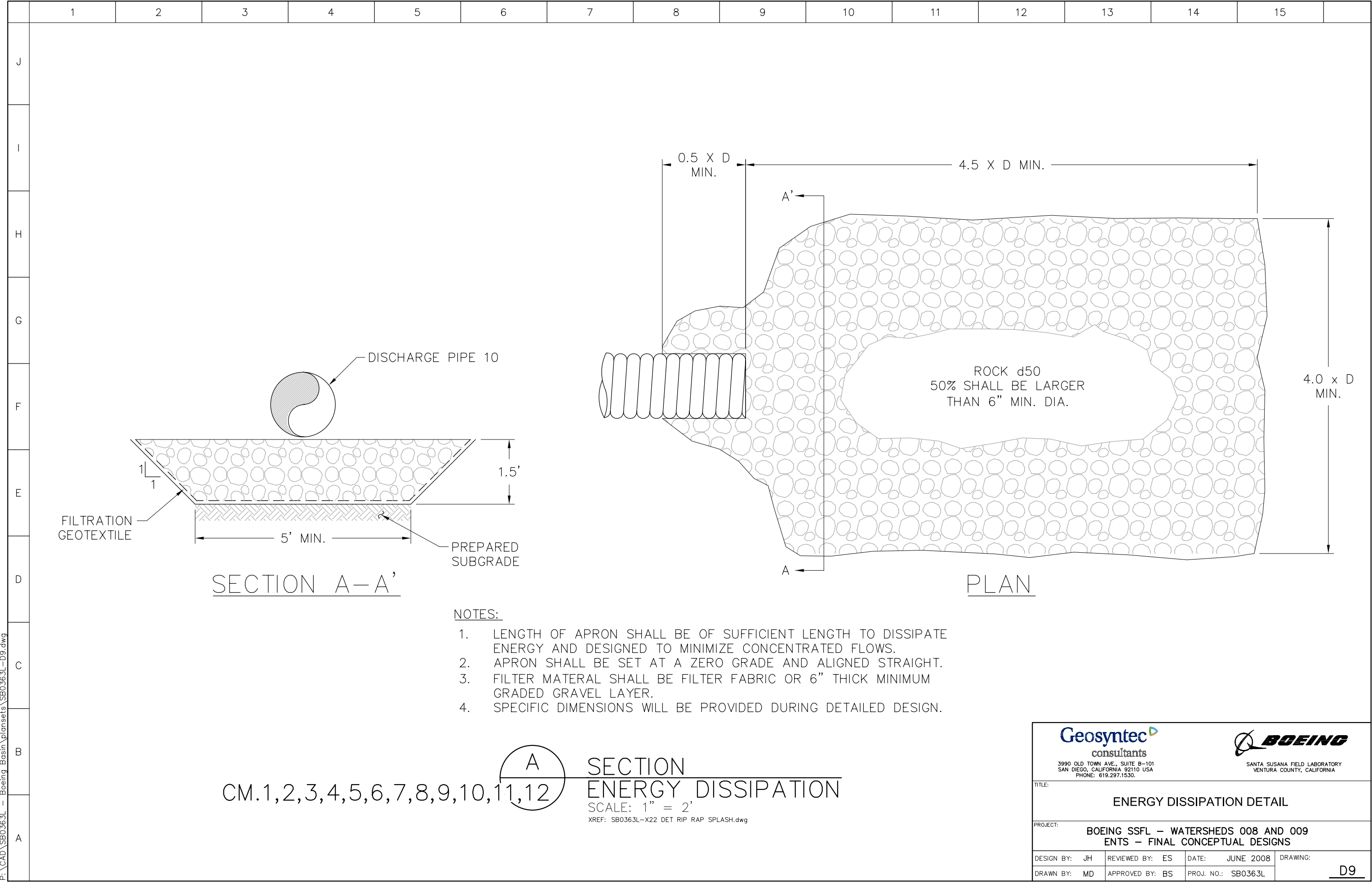
**DETAIL – SCHEMATIC
CULVERT MAINTENANCE HEADWALL
AND LINER UPGRADE**

NTS
XREF: SB0363L-X40 CM typ.dwg

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3990 OLD TOWN AVE., SUITE B-101 SAN DIEGO, CALIFORNIA 92110 USA PHONE: 619.297.1530.			
SANTA SUSANA FIELD LABORATORY VENTURA COUNTY, CALIFORNIA			
TITLE: CULVERT MAINTENANCE DETAIL			
PROJECT: BOEING SSFL – WATERSHEDS 008 AND 009 SWMA – FINAL CONCEPTUAL DESIGNS			
DESIGN BY: JH	REVIEWED BY: ES	DATE: JUNE 2008	DRAWING:
DRAWN BY: MD	APPROVED BY: BS	PROJ. NO.: SB0363L	D8



REV-10



- NOTES:
1. LENGTH OF APRON SHALL BE OF SUFFICIENT LENGTH TO DISSIPATE ENERGY AND DESIGNED TO MINIMIZE CONCENTRATED FLOWS.
 2. APRON SHALL BE SET AT A ZERO GRADE AND ALIGNED STRAIGHT.
 3. FILTER MATERIAL SHALL BE FILTER FABRIC OR 6" THICK MINIMUM GRADED GRAVEL LAYER.
 4. SPECIFIC DIMENSIONS WILL BE PROVIDED DURING DETAILED DESIGN.

A
SECTION
ENERGY DISSIPATION
 SCALE: 1" = 2'
 XREF: SB0363L-X22 DET RIP RAP SPLASH.dwg

CM.1,2,3,4,5,6,7,8,9,10,11,12

 <small>3990 OLD TOWN AVE., SUITE B-101 SAN DIEGO, CALIFORNIA 92110 USA PHONE: 619.297.1530.</small>		 <small>SANTA SUSANA FIELD LABORATORY VENTURA COUNTY, CALIFORNIA</small>	
TITLE: ENERGY DISSIPATION DETAIL			
PROJECT: BOEING SSFL – WATERSHEDS 008 AND 009 ENTS – FINAL CONCEPTUAL DESIGNS			
DESIGN BY: JH	REVIEWED BY: ES	DATE: JUNE 2008	DRAWING:
DRAWN BY: MD	APPROVED BY: BS	PROJ. NO.: SB0363L	D9

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REV-10