ATTACHEMENT J - DRAINAGE STUDY

APPENDICES

FIGURES

TABLES

1.0 INTRODUCTION

This drainage study is prepared as part of the permit for the C.K. Facility in Lea County, New Mexico. All drainage analysis and design is in accordance with NMAC 19.15.36.

Existing and proposed hydrologic and hydraulic conditions of the site are detailed herein, as well as hydraulic structures design, erosion stability and the management of storm water run-on and run-off from the C. K. Facility site in the event of a 25-year, 24-hour storm event. All hydrologic computations were performed using United States Army Corps HEC-HMS software and SCS unit hydrograph hydrology. Selected appendices are provided following this report with detailed model input and output documents, as well as details for proposed hydraulic structures.

1.1 Summary of Calculation Methods

A. Rational Method Hydrology

Peak flow rates for top-of-waste perimeter channels and let-down channels were calculated using rational method hydrology:

$$\boldsymbol{Q_{25} = CI_{25}A}$$

Where:

- $Q_{25} = Design\ storm\ peak\ flow\ rate\ (cfs)$
- $I_{25} = Design\ storm\ rainfall\ intensity$

$$I_{25} = \frac{P_{25}}{t_c}$$

- $A = Drainage\ Area\ (acres)$
- $P_{25} = Total\ percipitation\ in\ a\ 25-year, 24-hour\ storm\ (inches)$

B. SCS Unit Hydrograph Hydrology

Peak flow rates for all drainage areas were calculated using SCS Unit Hydrograph analysis in HEC-HMS. Maximum volume of runoff for all drainage areas was also calculated using the SCS Unit Hydrograph method in HEC-HMS:

$$\boldsymbol{Type - II\ SCS\ Storm}$$
$$25-yr, 24-hr\ Storm\ Event = 4.8-in$$
$$Curve\ numbers\ (CN): Weighted\ by\ area,$$
$$considering\ soil\ type\ \&\ land\ use$$
$$Initial\ Abstraction\ (I_a) = 0.2S$$
$$S = \frac{1000 - 10CN}{CN}$$

C. Time of Concentration

Time of concentration for all watershed analyses, existing and proposed, was calculated using the Natural Resource Conservation Service (NRCS) Time of Concentration method as outlined in SCS Module 206-A hydraulic design manual:

$$t_c = t_{sh} + t_{sc} + t_{ch}$$

Where:

$$t_{sh} = \frac{0.007(n_{ol}L_{sh})^{0.8}}{(P_2)^{0.5}S_{sh}{}^{0.4}}$$

- $t_{sh} = sheet\ flow\ travel\ time\ (hr)$
- $n_{ol} = overland\ flow\ roughness\ coefficient$
- $L_{sh} = sheet\ flow\ length\ (ft)$
- $P_2 = 2\ year, 24 - hr\ rainfall\ depth\ (in)$
- $S_{sh} = sheet\ flow\ slope\ (ftft)$

$$t_{sc} = \frac{L_{sc}}{3600KS_{SC}{}^{0.5}}$$

- $t_{sc} = shallow\ concentrated\ flow\ travel\ time\ (hr)$
- $L_{sc} = shallow\ concentrated\ flow\ length\ (ft)$
- $S_{sc} = shallow\ concentrated\ flow\ slope\ (ftft)$
- $K = 16.13\ for\ unpaved\ surface, 2.32\ for\ paved\ surface$

$$t_{ch} = \frac{L_{ch}}{3600\frac{1.49}{n}R^{2/3}S_{ch}{}^{0.5}}$$

- $t_{ch} = channel\ flow\ travel\ time\ (hr)$
- $L_{ch} = channel\ flow\ length\ (ft)$
- $S_{ch} = channel\ flow\ slope\ (^{ft}/_{ft})$
- $n = Manning's\ roughness\ coefficient$

D. Culvert & Channel Hydraulics

All hydraulic calculations for flow capacity and flow velocity were computed using the Manning's Equation solution algorithm in Bentley FlowMaster computer software:

$$Q = \frac{1.49}{n} AR^{2/3}\sqrt{S}$$

Where:

- $Q = Design\ flow\ rate$
- $n = Manning's\ Roughness\ Coefficient$
- $A = Flow\ area$
- $R = Channel/culvert\ wetted\ perimeter$
- $S = Bed\ Slope$

1.2 Existing Site Hydrology

A. Existing Conditions

The permitted landfill site encompasses 316.97-acres, and is located within an approximate 4,784-acre drainage area. The property is on the south side of New Mexico State Highway 234, approximately 0.65-mile west of the New Mexico-Texas Border, east of Eunice, NM. Prevailing grade across is the site is to the southwest at 0.005-ft/ft with natural grass and mesquite trees serving as the main vegetative cover. The majority of the existing drainage area is undeveloped rural acreage, with some industrial impact in the upper half of the drainage area.

The landfill site lies on a ridge between two (2) sub-drainage areas, both of which drain to an unnamed draw (the Draw) approximately 2.0-mile southwest of the waste footprint. The Draw is not a design consideration for fully-developed landfill hydrology. A proximity to ephemeral water map can be seen in Figure J.9 in Appendix A. Also in Appendix A is a letter of certification from Lea County Floodplain Administrator, Cassie Corley, CFM, stating the permitted landfill is not in a regulated Special Flood Hazard Area (SFHA).

For the purpose of this report, the two (2) existing sub-drainage areas are referred to as DA-01 and DA-02. The two (2) existing drainage areas can be seen in Figure J.1 in Appendix A. A previously constructed berm (by others) immediately north of the C.K. Facility north property line prevents any off-site drainage from entering the permitted landfill facilities. This berm represents the upstream limits of DA-01 and is shown in Figure G-003.

As can be seen in the Figure J.3 (soil map), the majority of the soils in the drainage areas are hydrologic drainage Class B soils. Undeveloped areas of natural grass and mesquite were modeled as 'fair brush' and assigned Natural Resource Conservation Service (NRCS) curve numbers found in SCS Technical Report 55. Industrial areas were also assigned NRCS curve numbers based on an average impervious area of 72%. Asphalt

and caliche-paved roads were modeled as impervious areas and assigned a curve number of 98. A soil detail page and weighted curve number analysis can be seen in Appendix A.

B. Existing Drainage Calculations

Existing drainage for the site was analyzed in two (2) separate sub-drainage areas. As can be seen in Figure J.1, each drainage area discharges into the Draw southwest of the permitted landfill site through sheet flow or shallow concentrated flow. No flow is transferred from one drainage area to another, and there are no point discharges from these drainage areas into the Draw.

Because there are no discernable gullies in either DA-01 or DA-02, time of concentration for each existing drainage area was calculated with no consideration for channelized flow. Time of concentration and a weighted NRCS curve number were input into HEC-HMS along with total drainage area acreage. For this analysis, an initial abstraction ratio of 0.2S was applied to both drainage areas. No curve number reduction factor was applied.

An existing hydrologic conditions summary table is shown below, with detailed calculations and model input outlined in Appendix A.

Table J.1 – 25-YEAR HYDROLOGY: EXISTING

DA	Acres	T_c (min)	CN	Peak Flow (cfs)	Average Velocity (ft/s)	Volume (Ac-ft)
1	1117.40	181	54.69	209.30	1.97	484.6
2	3662.80	392	64.71	728.50	2.70	89.8

1.3 Post-Development Site Hydrology

A. Developed Conditions

Once the landfill is fully developed, the waste footprint will cover 141.78-acres of the 316.97-acre property. This waste footprint will have a maximum height above adjacent grade of 143-foot, with sideslopes at 4H:1V.

Construction of the C.K. Facility will alter existing drainage patterns across the site. Once fully developed, drainage from the two (2) existing drainage areas will be divided into ten (10) drainage areas. These drainage areas will contribute to the areas of existing DA-01 and DA-02 which are not disturbed by landfill construction.

The undisturbed areas of existing DA-01 and DA-02 are modeled as proposed areas DA-09 and DA-10. Developed drainage areas DA-01 through DA-08 discharge into DA-09 and DA-10 via drainage structures, which are discussed in §1.4 of this report. The referenced drainage structures ensure that discharge into developed areas DA-09 and DA-10 does not exceed existing volume or flow-rates generated in a 25-year, 24-hour storm event. Fully developed drainage areas can be seen on Figure J.4 in Appendix B.

The final landfill cover is comprised of 3-foot of soil covered with native grasses and vegetation. As such, the final landfill top slope and perimeter slopes were modeled as

meadow, and assigned NRCS curve numbers assuming a hydrologic drainage Class B soil.

Areas within the property limits but not impacted by landfill construction were modified from a 'brush' cover description to a 'meadow' cover description. This modification of curve numbers is based on the assumption that these areas will be mowed periodically, causing natural grass cover to increase.

An area of 28.89-acres was removed from the developed drainage calculations. This area will contain twelve (12) evaporation ponds and will not discharge any surface drainage into the developed drainage structures. The evaporation ponds are each 9.73-ac/ft in size, and have 3.5-foot of freeboard. This results in a surplus storage of 75.40-ac/ft which will fully contain all surface drainage from roads within this 28.89-acre area.

B. Developed Drainage Calculations

Peak flow and total volume of runoff for developed condition hydrology were calculated with SCS unit hydrograph methodology using HEC-HMS software. A 25-year, 24-hour storm event was analyzed which is a total P_{25} = 4.88-inches. An initial abstraction value of 0.2S was applied to all developed drainage areas, with no curve number reduction factor.

Time of concentration was calculated for each drainage area using NRCS time of concentration formulas outlined in SCS module 206-A. Travel times were analyzed for sheet flow, shallow concentrated flow, and channelized flow. A detailed time of concentration calculation sheet can be found in Appendix B.

Comparison points CP-A and CP-B can be seen on Figure J.4. These are locations where developed drainage areas discharge into areas not impacted by construction. Downstream of CP-A and CP-B developed hydrology discharges into the Draw in the same manner of sheet flow and shallow concentrated flow as existing hydrology. A full comparison of existing vs. developed hydrology is discussed in §1.3 of this report.

Below is a fully-developed hydrology summary table with detailed calculations and model input outlined in Appendix B.

Table J.2 – 25-YEAR HYDROLOGY: PROPOSED

DA	Acres	T_c (min)	CN	Peak Flow (cfs)	Average Velocity (ft/s)	Volume (Ac-ft)	
1	35.80	15	57.85	50.50	3.0	4.3	Run-off
2	30.90	24	58.53	31.20	2.3	3.2	Run-off
3	23.70	33	58.91	21.50	1.1	2.6	Run-off
4	23.19	43	73.78	47.30	1.1	6.3	Run-off
5	44.50	9	58.90	66.20	3.0	4.6	Run-off
6	43.75	9	59.69	71.10	3.0	5	Run-off
7	44.70	9	59.70	73.40	3.7	5.1	Run-off
8	45.30	10	60.10	75.50	3.0	5.2	Run-off
9	834.30	146	53.24	165.30	2.0	63	Run-off
10	3662.80	395	64.89	733.00	2.7	488.4	Run-on

*Minimum time of concentration used for hydrologic calculation is 10-min.

1.4 Existing/Post-Development Hydrology Comparison

Existing hydrology produces a total of 574.4-ac/ft. of runoff at a maximum flow rate of 728.5-cfs. There is no concentrated discharge point from any existing drainage area. All flow discharged into the Draw is discharged as sheet flow or shallow concentrated flow. Fully developed drainage will produce a total of 587.7-ac/ft. of discharge into the Draw at a maximum flow rate of 733-cfs.

99.3-ac/ft. of discharge from developed hydrology will be run-off drainage from the C.K. Facility. This will occur initially as sheet flow and shallow concentrated flow and will be intercepted by drainage channels. The flow will then be concentrated in one of two (2) detention ponds which will be constructed on the property. These detention ponds will overflow into drainage areas downstream of the landfill which are not impacted by construction. The two (2) detention pond overflow areas are identified as CP-A and CP-B in the developed hydrology map seen on Figure J.4. Overflow weir construction at these detention ponds ensures that discharge in a 25-year, 24-hour storm event will not exceed flow rates experienced by the downstream watersheds under existing hydrologic conditions.

448-ac/ft of developed hydrology discharge into the Draw will occur as run-on drainage. All run-on drainage will occur as sheet flow and shallow concentrated flow from upstream reaches of existing drainage areas that will not be impacted by construction. Most of the drainage experienced in DA-10 will pass by the landfill without impacting developed hydrology. Any sheet flow or shallow concentrated flow that does impact the landfill will be routed through Detention Pond 1 before it reaches the active working face.

Any precipitation that falls directly onto the active working face will be treated as contaminated surface water and transmitted to the leachate evaporation pond via the leachate collection system. The evaporation pond will store leachate and allow it to

naturally evaporate. If the pond nears the high water volume, it will be drained and transported to the onsite liquid waste evaporate ponds as outlined in Section III.4 of this Permit.

1.5 Hydraulic Structure Design

All hydraulic structures are shown on Figures J.6 and J.7 in Appendix C.

A. Channel Design

The three (3) trapezoidal open channels planned for the fully-developed C.K. Facility were designed using the Manning's Formula Friction Solution in the Bentley FlowMaster program. For a given channel, the maximum flow rate calculated using the NRCS unit hydrograph method during developed hydrology calculations was applied to a proposed cross section. Manning's friction coefficient, channel slope, and proposed geometry are input parameters for Bentley FlowMaster, which yields a normal depth and velocity for the proposed geometry based on input parameters. A 6-in freeboard has been applied to every channel depth above the normal depth calculations yielded by Bentley FlowMaster. A Manning's n value of 0.05 was applied to each channel to accurately model re-vegetation of channels with natural grasses following construction.

B. Culvert Design

All culverts were designed similarly using the Manning's formula friction solution in Bentley FlowMaster. A Manning's n value of .015 was applied to each culvert and as peak flow from the upstream channel. All culverts will be constructed of reinforced concrete pipe, reinforced concrete box, or corrugated metal pipe.

C. Weir Design

The broad-crested weirs drainage which serves as overflow crests from the site detention basins into the downstream drainage areas, were also designed using Bentley FlowMaster. Because both weirs will discharge sheet flow into their respective downstream drainage, areas over a crest of 1-foot, no tailwater effects were considered in the broad-crested weir design. Both weirs will have a gravel crest with a minimum crest width of 6-inches.

D. Hydraulic Structure Maintenance

All hydraulic structures should be inspected weekly, and within 48-hrs of any precipitation event. Inspection should ensure that all channels, culverts, and inlet structures are free from obstruction and sediment buildup. Any necessary maintenance identified by an inspection should be initiated within one (1) calendar week of identification.

1.6 Erosion Control

Erosion control will be managed during construction by employing best management practices. An intermediate cover of 6-inches. natural soil will be applied to any exposed working face at the end of each working day.

As each new cell is opened, the perimeter road and perimeter drainage channel will be constructed past the most upstream and downstream extents of new construction to ensure than any run-off drainage will be intercepted and re-routed away from the working face.

As final cover is established, perimeter channels constructed of articulated concrete block mattress will be installed at the top of slope. These channels will minimize sheet flow down the final perimeter slopes, which will have a final 25% grade, by intercepting sheet flow from the top slope and transferring it to one (1) of four (4) let-down channels. These channels will be constructed of articulated concrete block mattress and will transfer storm water runoff from the final cap to the perimeter drainage channel at the toe of slope.

By intercepting sheet flow from the top slope, the maximum sheet flow velocity across the final top slope in a 25-yr, 24-hr storm is 1.61-fps. The corresponding maximum velocity of sheet flow down the perimeter slopes 1.34-fps. Example velocity calculations for final cover slopes can be seen in Appendix C.

Final cover drainage structures are detailed in Figure J.7.

1.7 Conclusions

In conclusion, existing drainage patterns are not adversely affected by development of the C.K. Facility. A 25-yr, 24-hr storm event will be managed by hydraulic structures on the permitted site, which will ensure developed discharge rates into downstream drainage areas are not increased. A 100-yr, 24-hr storm can also be passed through the developed hydraulic structures.

APPENDIX A

EXISTING DRAINAGE

Existing Drainage Curve Number Analysis

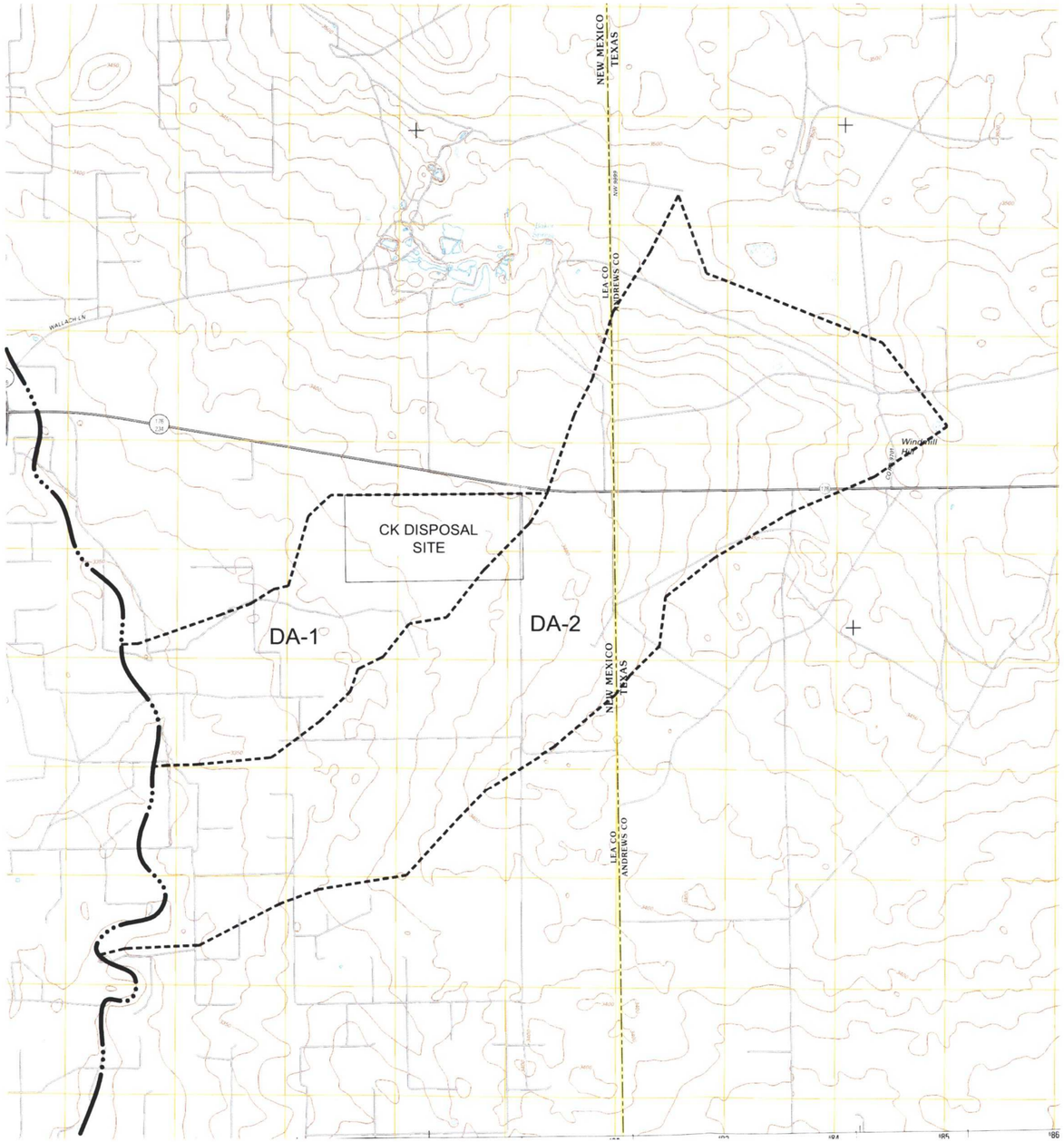
Existing Drainage Area 1			
Acres	Percent of Total Area	Description	CN
947.8	84.8%	brush - fair 'B'	56
134.0	12.0%	brush - fair 'A'	35
4.4	0.4%	Industrial 'B'	88
25.0	2.2%	Pavement	98
6.2	0.6%	Industrial – 'A'	81
1117.4	100.0%	**Weighted Cumulative**	54.69

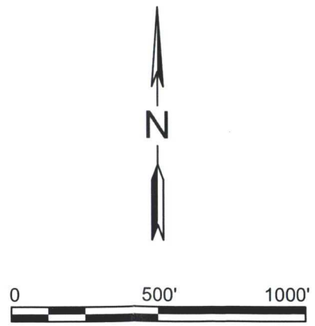
Existing Drainage Area 2			
Acres	Percent of Total Area	Description	CN
2408.5	65.8%	brush - fair 'B'	56
385.7	10.5%	brush – 'D'	77
116.2	3.2%	Brush - Fair 'A'	35
18.4	0.5%	Industrial – 'A'	81
380.3	10.4%	Industrial 'D'	93
39.4	1.1%	Pavement	98
314.3	8.6%	Industrial – 'B'	88
3662.8	100.0%	**Weighted Cumulative**	64.71

Existing Drainage Time of Concentration Analysis

Existing Area 1				
DA-1	**Linear Feet**	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	11912	0.005	2.90	174
t_{ch}	-	-	-	-
			Cumulative T_c	181

Existing Area 2				
DA-2	**Linear Feet**	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.1	0.03	2
t_{sc}	26671	0.005	6.50	390
t_{ch}			-	-
			Cumulative T_c	392





LEGEND

- LANDFILL PROPERTY/PERMIT BOUNDARY
- EXISTING DRAINAGE AREA
- EPHEMERAL STREAM
- DA-1 DRAINAGE AREA LABEL

MAP REFERENCE

United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 13S
10 000-foot ticks: Texas Coordinate System of 1983 (north central zone), New Mexico Coordinate System of 1983 (east zone)

North American Vertical Datum of 1998
Eunice NE, TX-NM
2012

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11/6/2015

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C. K. DISPOSAL E & P LANDFILL & PROCESSING FACILITY

NMED PERMIT NO. ___

NEW LANDFILL SITE & PROCESSING FACILITY

LEA COUNTY, NEW MEXICO

KEY PLAN

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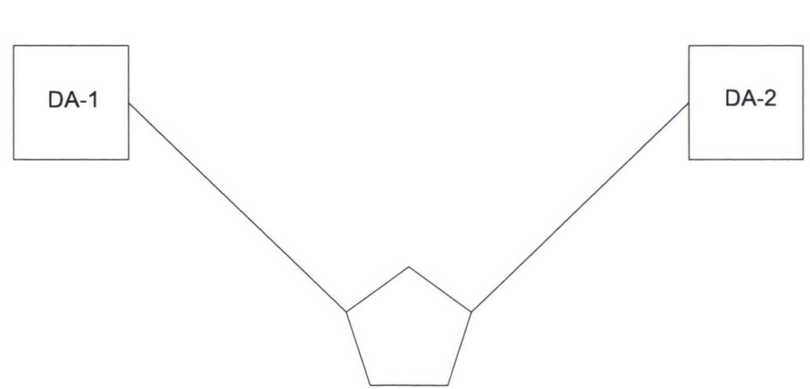
EXISTING DRAINAGE AREAS

FIG.J.1

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMITATT-J\FIG.J.1. - EXISTING DRAINAGE AREAS.dwg LAYOUT NAME: FIG.J.1 PRINTED: Thursday, November 05, 2015 - 7:45pm USER: TKrueger



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LEGEND

- DRAINAGE AREA #
- DETENTION POND
- OUTLET
- JUNCTION
- REACH
- CONNECTION

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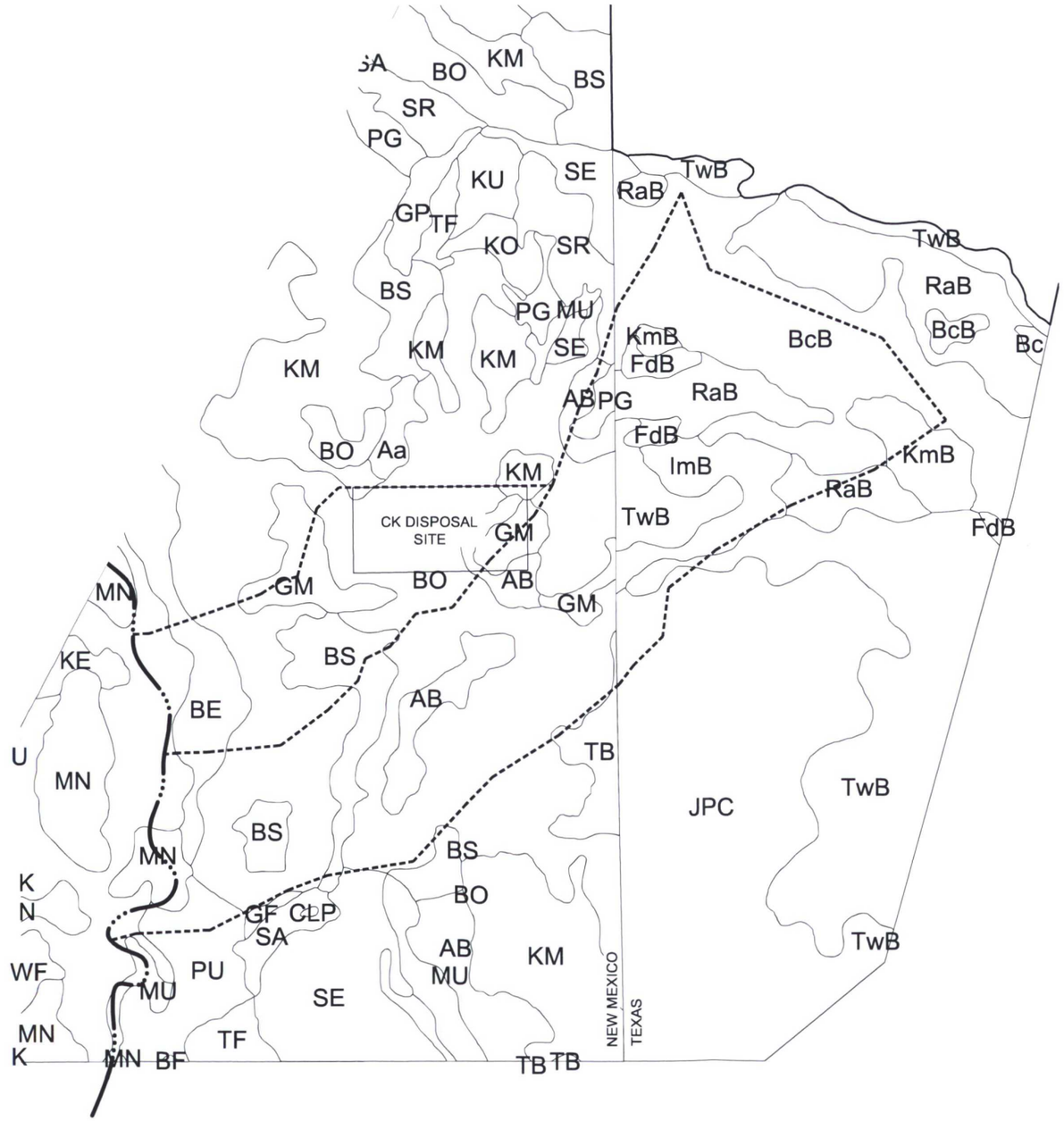
EXISTING DRAINAGE HEC-HMS SCHEMATIC

FIG.J.2



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LEGEND

- LANDFILL PROPERTY/PERMIT BOUNDARY
- EXISTING DRAINAGE AREA
- SOIL TYPE AREAS
- BcB SOIL TYPE IDENTIFICATIONS
- EPHEMERAL STREAM

MAP REFERENCE

NATURAL RESOURCE CONSERVATION SERVICE
WEB SOIL SURVEY (WSS)
NATIONAL COOPERATIVE SOIL SURVEY

NOTE:
SOILS LEGEND IS ON FOLLOWING PAGE

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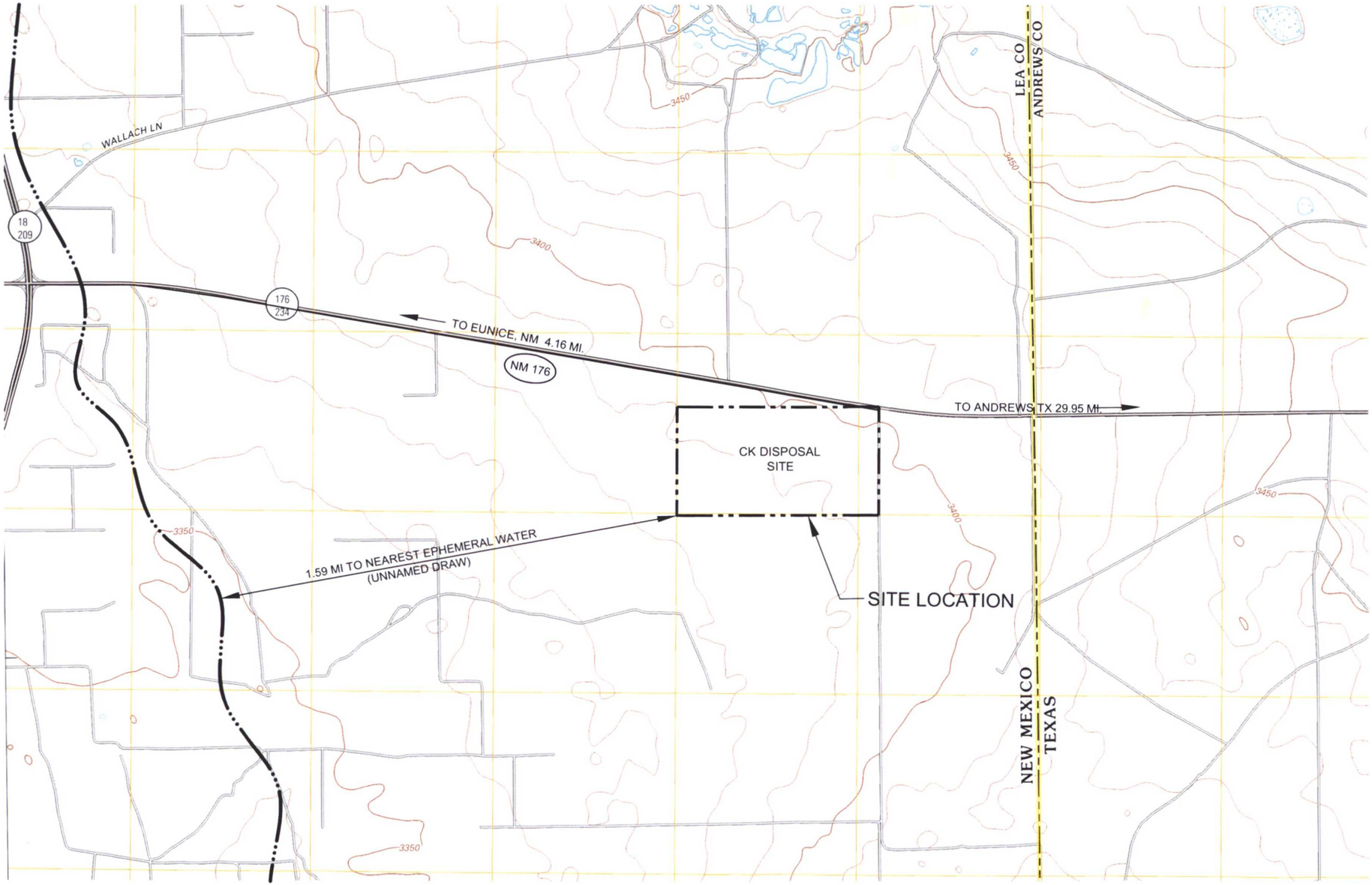
SOILS MAP

FIG.J.3

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMITATT-J\FIG.J.3 - SOILS MAP.dwg LAYOUT NAME: FIG.J.3 PRINTED: Thursday, November 05, 2015 - 7:46pm USER: TKrueger



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N

0 2000' 4000'

MAP REFERENCE

United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 13S
10 000-foot ticks: Texas Coordinate System of 1983 (north central zone), New Mexico Coordinate System of 1983 (east zone)
North American Vertical Datum of 1998
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2012

LEGEND

SITE BOUNDARY
EPHEMERAL STREAM

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NEAREST EPHEMERAL WATER

FIG.J.9

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMITVATT-J\FIG.J.9 - NEAREST EPHEMERAL WATER.dwg LAYOUT NAME: FIG.J.9 PRINTED: Thursday, November 05, 2015 - 7:49pm USER: TKrueger

Soils Classification Chart		
Map Symbol	**Soil Name**	**Hydraulic Rating**
BcB	Blakeney and Conger soils	D
FdB	Faskin and Douro soils	B
ImB	Ima loamy fine sand	A
JPC	Jalmar-Penwell association	B
KmB	Kimbrough soils	D
RaB	Ratliff soils	B
TwB	Triomas and Wickett Soils	B
AB	Amarillo-Arvana loamy fine sands assoc.	B
BE	Berino-Cacique loamy fine sands assoc.	B
BF	Berino-Cacique fine sandy loams assoc.	B
BO	Brownfiend-Springer Assoc.	B
BS	Brownfield-Springer assoc. hummocky	B
CLP	Caliche pit	D
GF	Gomez fine sand	A
GM	Gomez loamy fine sand	A
KmB	Kermit soils and dune sand	A
MN	Ratliff-Wink fine sandy loams	B
MU	Mixed alluvial land	A
PG	Portales and fomez fine sandy loams	B
PU	Pyote and maljamar fine sands	A
SA	Sharvana loamy fine sand	D
SE	Simona fine sandy loam	D
SR	Simona Upton assco.	D
TB	Tivoli-Brownfield fine sands	A
TF	Tonuco loamy fine sand	D
WK	Wink loamy fine sand	A

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Basin: EXIST
     Last Modified Date: 17 September 2015
     Last Modified Time: 18:50:07
     Version: 3.5
     Filepath Separator: \
     Unit System: English
     Missing Flow To Zero: No
     Enable Flow Ratio: No
     Allow Blending: No
     Compute Local Flow At Junctions: No

     Enable Sediment Routing: No

     Enable Quality Routing: No
End:

Subbasin: DA-01
     Canvas X: -2360.197368421053
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     Area: 1.7
     Downstream: NO NAME DRAW

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 2.2
     Curve Number: 54.69

     Transform: SCS
     Lag: 108.4
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: DA-02
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     Canvas Y: 740.1315789473683
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     From Canvas Y: -1562.5
     Area: 5.72
     Downstream: NO NAME DRAW

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 1.1
     Curve Number: 64.71

     Transform: SCS
     Lag: 235.0
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Sink: NO NAME DRAW
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     Canvas Y: -1940.7894736842109
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     Maximum View N: 5000.0
     Maximum View S: -5000.0
     Maximum View W: -5000.0
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     Draw Icons: Yes
     Draw Icon Labels: Yes
     Draw Map Objects: No
     Draw Gridlines: No
     Draw Flow Direction: No
     Fix Element Locations: No
     Fix Hydrologic Order: No
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APPENDIX B

DEVELOPED DRAINAGE

Developed Drainage Curve Number Analysis

Developed Drainage Area 1			
Acres	Percent of Total Area	Description	CN
3.2	8.9%	Pavement	98
2.3	6.4%	Meadow - Good 'A'	30
30.3	84.6%	Meadow - Good 'B'	58
35.8	100.0%	**Weighted Cumulative**	57.85

Developed Drainage Area 2			
Acres	Percent of Total Area	Description	CN
29.3	94.8%	Meadow - Good 'B'	58
0.7	2.3%	Meadow - Good 'A'	30
0.9	2.9%	Pavement	98
30.9	100.0%	**Weighted Cumulative**	58.53

Developed Drainage Area 3			
Acres	Percent of Total Area	Description	CN
21.8	92.0%	Meadow- Good 'B'	58
0.8	3.4%	Meadow- Good 'A'	30
1.1	4.6%	Pavement	98
23.7	100.0%	**Weighted Cumulative**	58.91

Devleoped Drainage Area 4			
Acres	Percent of Total Area	Description	CN
9.15	39.5%	Pavement	98
14.0	60.5%	Meadow- Good 'B'	58
23.2	100.0%	**Weighted Cumulative**	73.78

Developed Drainage Area 5			
Acres	Percent of Total Area	Description	CN
1.0	2.2%	Pavement	98
43.5	97.8%	Meadow - Good 'B'	58
44.5	100.0%	**Weighted Cumulative**	58.90

Developed Drainage Area 6			
Acres	Percent of Total Area	Description	CN
41.9	95.8%	Meadow – Good 'B'	58
1.9	4.2%	Pavement	98
43.8	100.0%	**Weighted Cumulative**	59.69

Developed Drainage Area 7			
Acres	Percent of Total Area	Description	CN
42.8	95.7%	Meadow - Good 'B'	58
1.9	4.3%	Pavement	98
44.7	100.0%	**Weighted Cumulative**	59.70

Developed Drainage Area 8			
Acres	Percent of Total Area	Description	CN
43.7	97.8%	Meadow - Good 'B'	58
1.6	3.6%	Pavement	98
45.3	100.0%	**Weighted Cumulative**	60.21

Developed Drainage Area 9			
Acres	Percent of Total Area	Description	CN
712.3	85.4%	Brush - Good 'B'	58
103.5	12.4%	Brush - Good 'A'	30
18.5	2.2%	Pavement	98
834.3	100.0%	**Weighted Cumulative**	53.24

Developed Drainage Area 10			
Acres	Percent of Total Area	Description	CN
2408.5	65.8%	Brush - Fair 'B'	56
385.7	10.5%	Brush – 'D'	77
104.9	2.9%	Brush - Fair 'A'	35
18.4	0.5%	Industrial – 'A'	81
391.6	10.7%	Industrial 'D'	93
39.4	1.1%	Pavement	98
314.3	8.6%	Industrial – 'B'	88
3662.8	100.0%	**Weighted Cumulative**	64.89

Developed Drainage Time of Concentration Analysis

Developed Drainage Area 1				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	0	0.005	0.00	0
t_{ch}	2492	0.005	0.14	9
			Cumulative T_c	15

Developed Drainage Area 2				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	619	0.005	0.15	9
t_{ch}	2277	0.005	0.13	8
			Cumulative T_c	24

Developed Drainage Area 3				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	1799	0.005	0.44	26
t_{ch}	-	-	-	-
			Cumulative T_c	33

Developed Drainage Area 4				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	2479	0.005	0.60	36
t_{ch}	0	-	-	-
			Cumulative T_c	43

Developed Drainage Area 5				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.03	0.05	3
t_{sc}	1336	0.050	0.10	6
t_{ch}	30	0.250	0.00	0
			Cumulative T_c	9

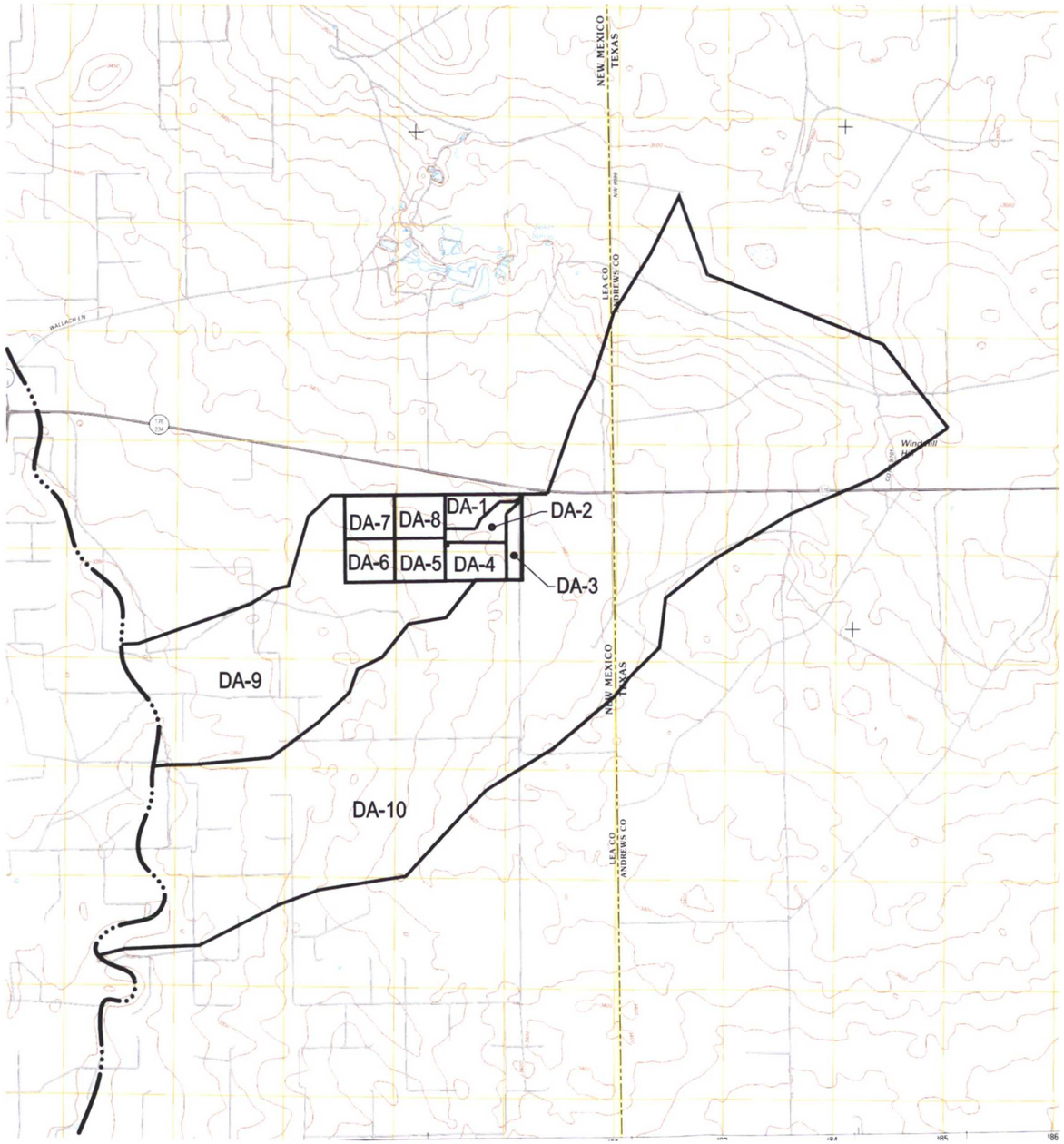
Developed Drainage Area 6				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.030	0.05	3
t_{sc}	1355	0.050	0.10	6
t_{ch}	30	0.250	0.00	0
			Cumulative T_c	9

Developed Drainage Area 7				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.030	0.05	3
t_{sc}	1707	0.050	0.10	6
t_{ch}	30	0.250	0.00	-
			Cumulative T_c	9

Developed Drainage Area 8				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.03	0.05	3
t_{sc}	1566	0.05	0.12	7
t_{ch}	30	0.250	0.00	-
			Cumulative T_c	10

Developed Drainage Area 9				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.005	0.11	7
t_{sc}	9520	0.005	2.32	139
t_{ch}	-	-	-	-
			Cumulative T_c	146

Developed Drainage Area 10				
	Linear Feet	**Slope (ft/ft)**	**T_c (Hr)**	**T_c (min)**
t_{sh}	300	0.01	0.08	5
t_{sc}	26671	0.005	6.50	390
t_{ch}	-	-	-	-
			Cumulative T_c	395



N

0 2000' 4000'

LEGEND

LANDFILL PROPERTY/PERMIT BOUNDARY

PROPOSED DRAINAGE AREA

DA-1 EPHEMERAL STREAM

DRAINAGE AREA LABEL

MAP REFERENCE

United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 13S 10 000-foot ticks: Texas Coordinate System of 1983 (north central zone), New Mexico Coordinate System of 1983 (east zone)
North American Vertical Datum of 1998
Eunice NE, TX-NM
2012

NICHOLAS N. YBARRA
NEW MEXICO
20683
PROFESSIONAL ENGINEER

11/6/2015

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LEA COUNTY, NEW MEXICO

KEY PLAN

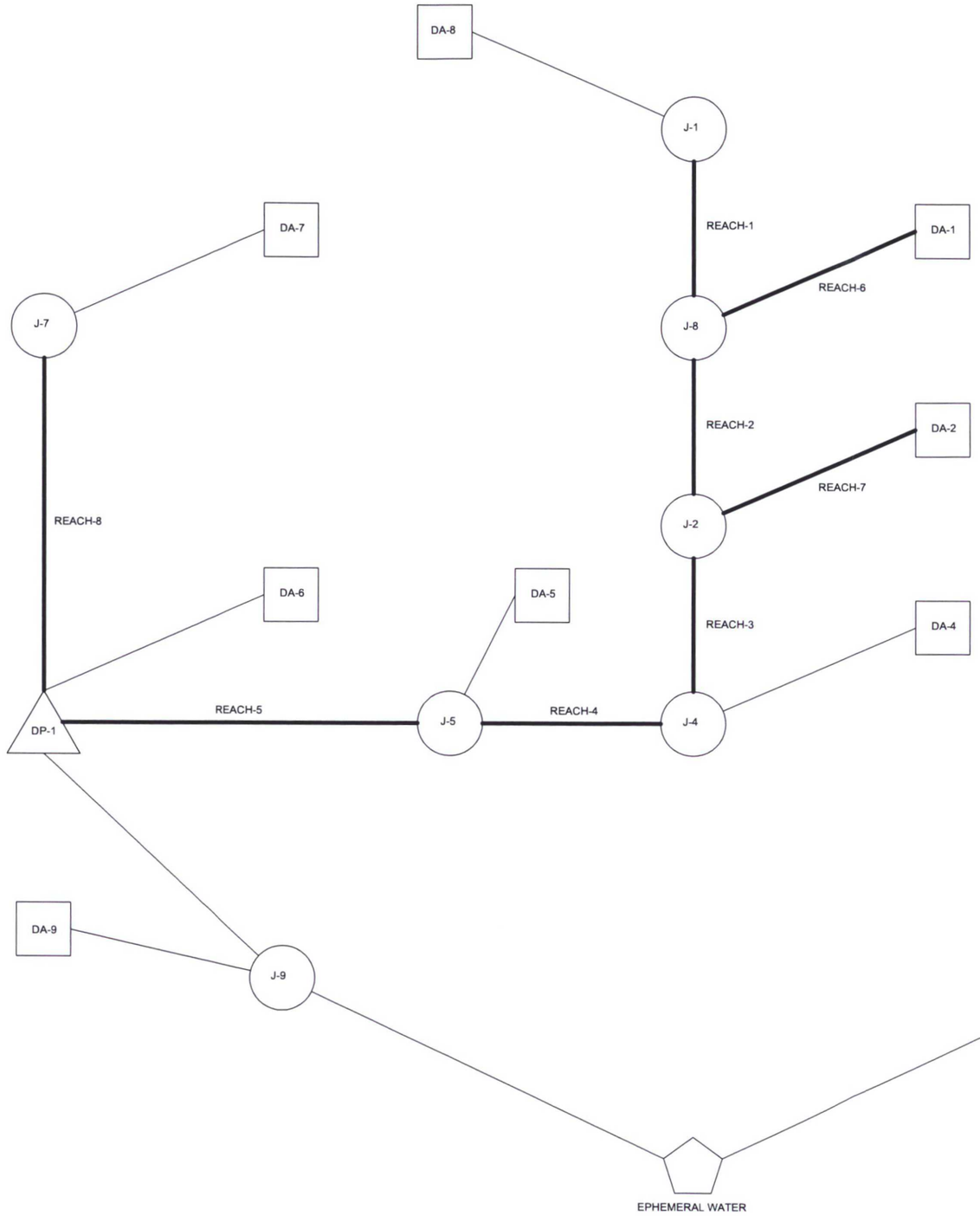
NO	DATE	DESCRIPTION
1	09/23/15	ISSUE FOR REVIEW

ISSUING OFFICE: EL PASO PROJECT NO: 0580.15

DEVELOPED DRAINAGE AREAS

FIG.J.4

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMIT\ATT-J\FIG.J.4 - DEVELOPED DRAINAGE AREAS.dwg LAYOUT NAME: FIG.J.4 PRINTED: Thursday, November 05, 2015 - 7:47pm USER: TKrueger



LEGEND

- DRAINAGE AREA #
- DETENTION POND
- OUTLET
- JUNCTION
- REACH
- CONNECTION

NICHOLAS N. YBARRA
NEW MEXICO
20683
PROFESSIONAL ENGINEER

11/6/2015

PSC
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ISSUING OFFICE: EL PASO PROJECT NO: 0580.15

DEVELOPED DRAINAGE HEC-HMS SCHEMATIC

FIG.J.5

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMIT\ATT-J\FIG.J.5 - DEVELOPED DRAINAGE SCHEMATIC.dwg LAYOUT NAME: FIG.J.5 PRINTED: Thursday, November 05, 2015 - 7:47pm USER: TKrueger

Velocity for Final Cover Top Slope and Perimeter Slope

Top Slope						
P_d	0.7	in		Longest Run	1700	ft
t_c	10	min		Unit Flow Width	1	ft
I	5.9	in/hr		Area	0.039	ac
C	0.5			Slope	0.036	ft/ft
Manning's n	0.03			Q (flow)	0.115	cfs
				y (depth)	0.071	ft
				Velocity	1.614	fps

Perimeter Slope						
P_d	0.7	in		Longest Run	250	ft
t_c	10	min		Unit Flow Width	1	ft
I	5.9	in/hr		Area	0.006	ac
C	0.5			Slope	0.250	ft/ft
Manning's n	0.03			Q (flow)	0.017	cfs
				y (depth)	0.013	ft
				Velocity	1.344	fps

```
Basin: DEVELOPED
     Last Modified Date: 17 September 2015
     Last Modified Time: 18:43:09
     Version: 3.5
     Filepath Separator: \
     Unit System: English
     Missing Flow To Zero: No
     Enable Flow Ratio: No
     Allow Blending: No
     Compute Local Flow At Junctions: No

     Enable Sediment Routing: No

     Enable Quality Routing: No
End:

Subbasin: Subbasin-1
     Canvas X: 5738.461538461539
     Canvas Y: 3692.3076923076924
     Area: 0.056
     Downstream: Junction-8

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 8.9
     Curve Number: 57.85

     Transform: SCS
     Lag: 9.15
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-2
     Canvas X: 5507.6923076923085
     Canvas Y: 2507.6923076923076
     Area: 0.048
     Downstream: Reach-7

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 2.9
     Curve Number: 58.53

     Transform: SCS
     Lag: 14.1
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-3
     Canvas X: 6533.333333333334
     Canvas Y: 1628.5714285714284
     Area: 0.037
     Downstream: Detention 2
```

```
     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 4.6
     Curve Number: 58.91

     Transform: SCS
     Lag: 19.7
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-4
     Canvas X: 4430.577223088923
     Canvas Y: -257.4102964118565
     Area: 0.036
     Downstream: Junction-4

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 39.5
     Curve Number: 73.78

     Transform: SCS
     Lag: 25.7
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-5
     Canvas X: 764.8026315789475
     Canvas Y: -312.5
     Area: 0.070
     Downstream: Junction-5

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 2.2
     Curve Number: 58.9

     Transform: SCS
     Lag: 6
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-6
     Canvas X: -1932.5657894736842
     Canvas Y: -394.73684210526335
     Area: 0.068
     Downstream: Detention-1
```

```
     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 4.2
     Curve Number: 59.69

     Transform: SCS
     Lag: 6
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-7
     Canvas X: -2090.4836193447736
     Canvas Y: 3143.5257410296413
     Area: 0.070
     Downstream: Junction-7

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 4.3
     Curve Number: 59.7

     Transform: SCS
     Lag: 6
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-10
     Canvas X: 6190.476190476191
     Canvas Y: -1704.7619047619046
     Area: 5.72
     Downstream: Junction-10

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 1.1
     Curve Number: 64.89

     Transform: SCS
     Lag: 236
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-8
     Canvas X: 1446.1538461538457
     Canvas Y: 3430.7692307692305
     Label X: 6.0
     Label Y: -16.0
```

```
     Area: 0.071
     Downstream: Junction-1

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 3.6
     Curve Number: 60.21

     Transform: SCS
     Lag: 6
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Subbasin: Subbasin-9
     Canvas X: -5366.614664586583
     Canvas Y: -1318.252730109204
     Area: 1.30
     Downstream: Junction-9

     Canopy: None

     Surface: None

     LossRate: SCS
     Percent Impervious Area: 2.2
     Curve Number: 53.24

     Transform: SCS
     Lag: 87.4
     Unitgraph Type: STANDARD

     Baseflow: None
End:

Reservoir: Detention-1
     Canvas X: -3037.735849056604
     Canvas Y: -1358.4905660377362
     Rating Table Name: Detention 1
     Downstream: Junction-9

     Route: Modified Puls
     Routing Curve: Elevation-Area-Outflow
     Initial Outflow Equals Inflow: Yes
     Elevation-Area Table: Detention 1
     Elevation-Outflow Table: Detention 1
     Primary Table: Elevation-Outflow
End:

Reservoir: Detention 2
     Canvas X: 6533.333333333334
     Canvas Y: 142.85714285714312
     Rating Table Name: Detention 2
     Downstream: Junction-10

     Route: Modified Puls
     Routing Curve: Elevation-Area-Outflow
     Initial Outflow Equals Inflow: Yes
     Elevation-Area Table: Detention 2
```

```
     Elevation-Outflow Table: Detention 2
     Primary Table: Elevation-Outflow
End:

Reach: Reach-1
     Canvas X: 3775.3510140405615
     Canvas Y: 2503.90015600624
     From Canvas X: 3712.9485179407166
     From Canvas Y: 3346.3338533541346
     Label X: -67.0
     Label Y: 4.0
     Downstream: Junction-8

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 850
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.05
     Number of Increments: 2
     Width: 5
     Side Slope: 4
     Invert Elevation: 3392.5
     Channel Loss: None
End:

Junction: Junction-1
     Canvas X: 3712.9485179407166
     Canvas Y: 3346.3338533541346
     Label X: -13.0
     Label Y: 34.0
     Downstream: Reach-1
End:

Reach: Reach-2
     Canvas X: 3744.14976599064
     Canvas Y: 1583.4633385335414
     From Canvas X: 3775.3510140405615
     From Canvas Y: 2503.90015600624
     Label X: -74.0
     Label Y: 3.0
     Downstream: Junction-2

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 700
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.05
     Number of Increments: 2
     Width: 5
     Side Slope: 4
     Invert Elevation: 3383.36
     Channel Loss: None
End:

Junction: Junction-2
     Canvas X: 3744.14976599064
     Canvas Y: 1583.4633385335414
     Downstream: Reach-3
End:

Reach: Reach-3
```

```
     Canvas X: 3619.344773790952
     Canvas Y: -928.2371294851791
     From Canvas X: 3744.14976599064
     From Canvas Y: 1583.4633385335414
     Label X: -71.0
     Label Y: 8.0
     Downstream: Junction-4

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 900
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.05
     Number of Increments: 2
     Width: 5
     Side Slope: 4
     Invert Elevation: 3379.86
     Channel Loss: None
End:

Reach: Reach-4
     Canvas X: 1372.8549141965677
     Canvas Y: -1443.0577223088922
     From Canvas X: 3619.344773790952
     From Canvas Y: -928.2371294851791
     Label X: -37.0
     Label Y: 15.0
     Downstream: Junction-5

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 100
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.05
     Number of Increments: 2
     Width: 6
     Side Slope: 4
     Invert Elevation: 3375.36
     Channel Loss: None
End:

Junction: Junction-4
     Canvas X: 3619.344773790952
     Canvas Y: -928.2371294851791
     Downstream: Reach-4
End:

Reach: Reach-5
     Canvas X: -3037.735849056604
     Canvas Y: -1358.4905660377362
     From Canvas X: 1372.8549141965677
     From Canvas Y: -1443.0577223088922
     Label X: -11.0
     Label Y: 14.0
     Downstream: Detention-1

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 1500
     Energy Slope: 0.005
     Shape: Trapezoid
```

```
     Mannings n: 0.05
     Number of Increments: 2
     Width: 6
     Side Slope: 4
     Invert Elevation: 3379.86
     Channel Loss: None
End:

Junction: Junction-5
     Canvas X: 1372.8549141965677
     Canvas Y: -1443.0577223088922
     Downstream: Reach-5
End:

Reach: Reach-7
     Canvas X: 3744.14976599064
     Canvas Y: 1583.4633385335414
     From Canvas X: 5400.0
     From Canvas Y: 2446.153846153846
     Downstream: Junction-2

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 1900
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.015
     Number of Increments: 2
     Width: 5
     Side Slope: 4
     Invert Elevation: 3389.36
     Channel Loss: None
End:

Junction: Junction-7
     Canvas X: -3088.9235569422776
     Canvas Y: 2488.2995319812794
     Downstream: Reach-8
End:

Reach: Reach-8
     Canvas X: -3037.735849056604
     Canvas Y: -1358.4905660377362
     From Canvas X: -3088.9235569422776
     From Canvas Y: 2488.2995319812794
     Downstream: Detention-1

     Route: Kinematic Wave
     Channel: Kinematic Wave
     Length: 100
     Energy Slope: 0.005
     Shape: Trapezoid
     Mannings n: 0.05
     Number of Increments: 2
     Width: 5
     Side Slope: 4
     Invert Elevation: 13
     Channel Loss: None
End:

Junction: Junction-8
     Canvas X: 3775.3510140405615
     Canvas Y: 2503.90015600624
```

```
     Label X: -94.0
     Label Y: 4.0
     Downstream: Reach-2
End:

Junction: Junction-9
     Canvas X: -3853.3541341653663
     Canvas Y: -2862.714508580343
     Downstream: No-Name Draw
End:

Junction: Junction-10
     Canvas X: 5070.202808112324
     Canvas Y: -2472.698907956318
     Downstream: No-Name Draw
End:

Sink: No-Name Draw
     Canvas X: 842.4336973478939
     Canvas Y: -4485.179407176287
End:

Basin Schematic Properties:
     Last View N: 5000.0
     Last View S: -5000.0
     Last View W: -5000.0
     Last View E: 5000.0
     Maximum View N: 5000.0
     Maximum View S: -5000.0
     Maximum View W: -5000.0
     Maximum View E: 5000.0
     Extent Method: Elements
     Buffer: 0
     Draw Icons: Yes
     Draw Icon Labels: Yes
     Draw Map Objects: No
     Draw Gridlines: No
     Draw Flow Direction: No
     Fix Element Locations: No
     Fix Hydrologic Order: No
End:
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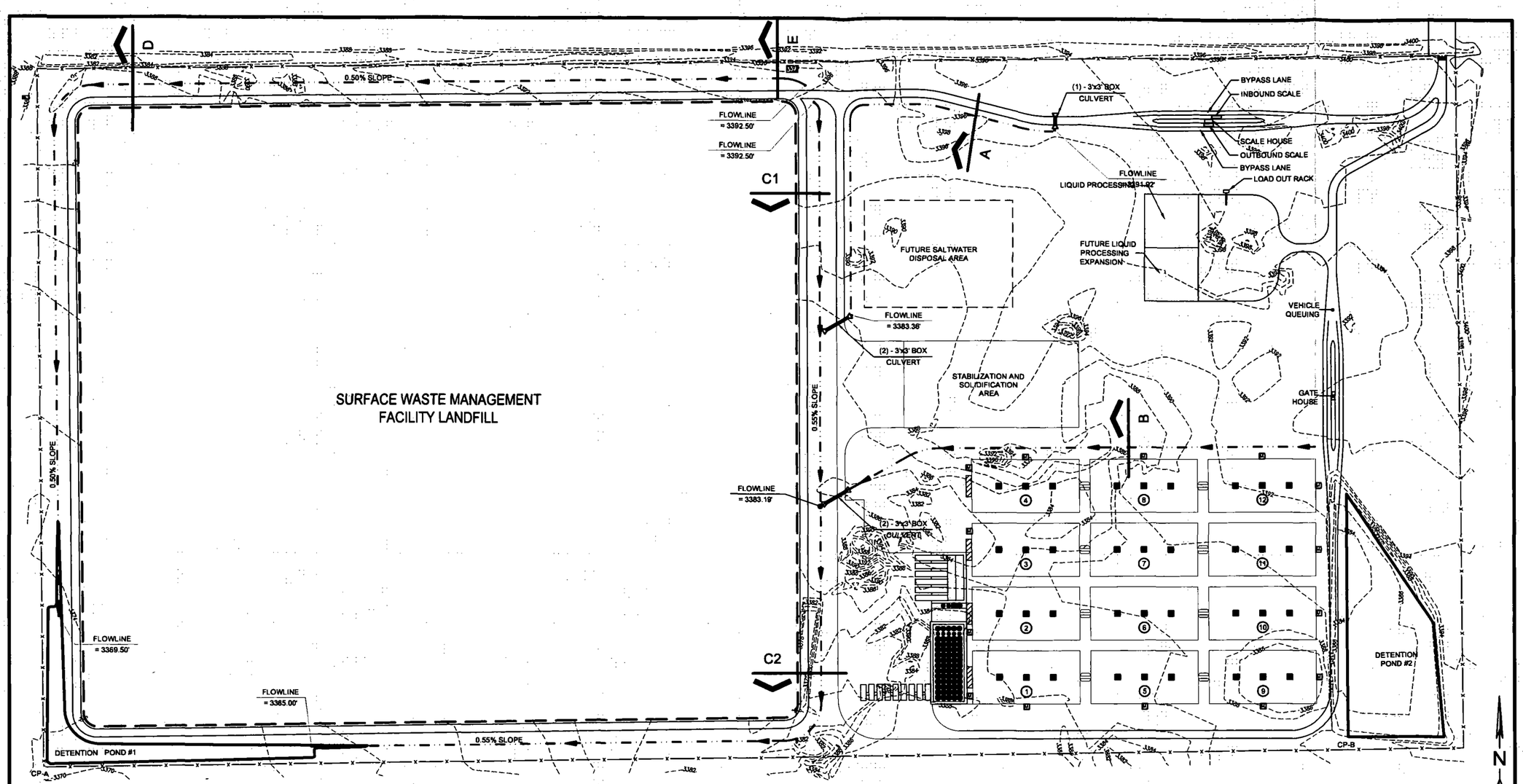
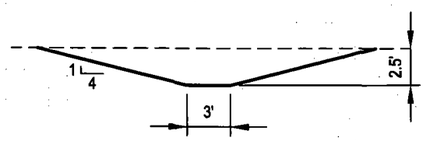
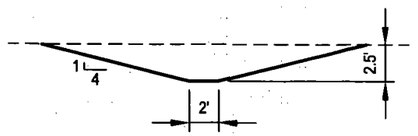
APPENDIX C

DEVELOPED HYDRAULIC STRUCTURES

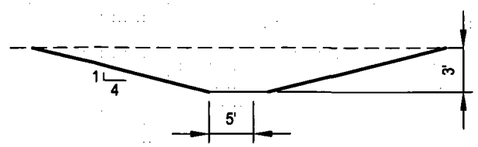




A DRAINAGE CHANNEL A
SCALE: 1" = 10'



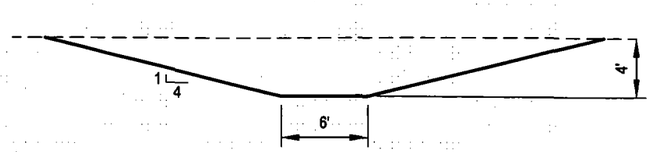
B DRAINAGE CHANNEL B
SCALE: 1" = 10'



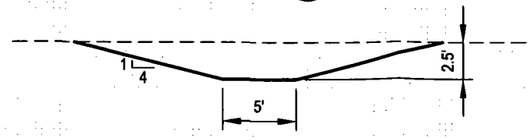
C1 DRAINAGE CHANNEL C1
SCALE: 1" = 10'

LEGEND

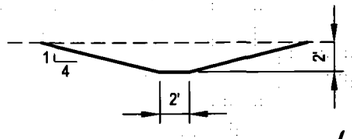
- LANDFILL FOOTPRINT
- CHANNEL CENTERLINE / DIRECTION OF FLOW



C2 DRAINAGE CHANNEL C2
SCALE: 1" = 10'



D DRAINAGE CHANNEL D
SCALE: 1" = 10'



E DRAINAGE CHANNEL E
SCALE: 1" = 10'

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PROFESSIONAL ENGINEER

11/6/2015

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C. K. DISPOSAL E & P LANDFILL & PROCESSING FACILITY

NMED PERMIT NO. ___

NEW LANDFILL SITE & PROCESSING FACILITY

LEA COUNTY, NEW MEXICO

KEY PLAN

NO	DATE	DESCRIPTION
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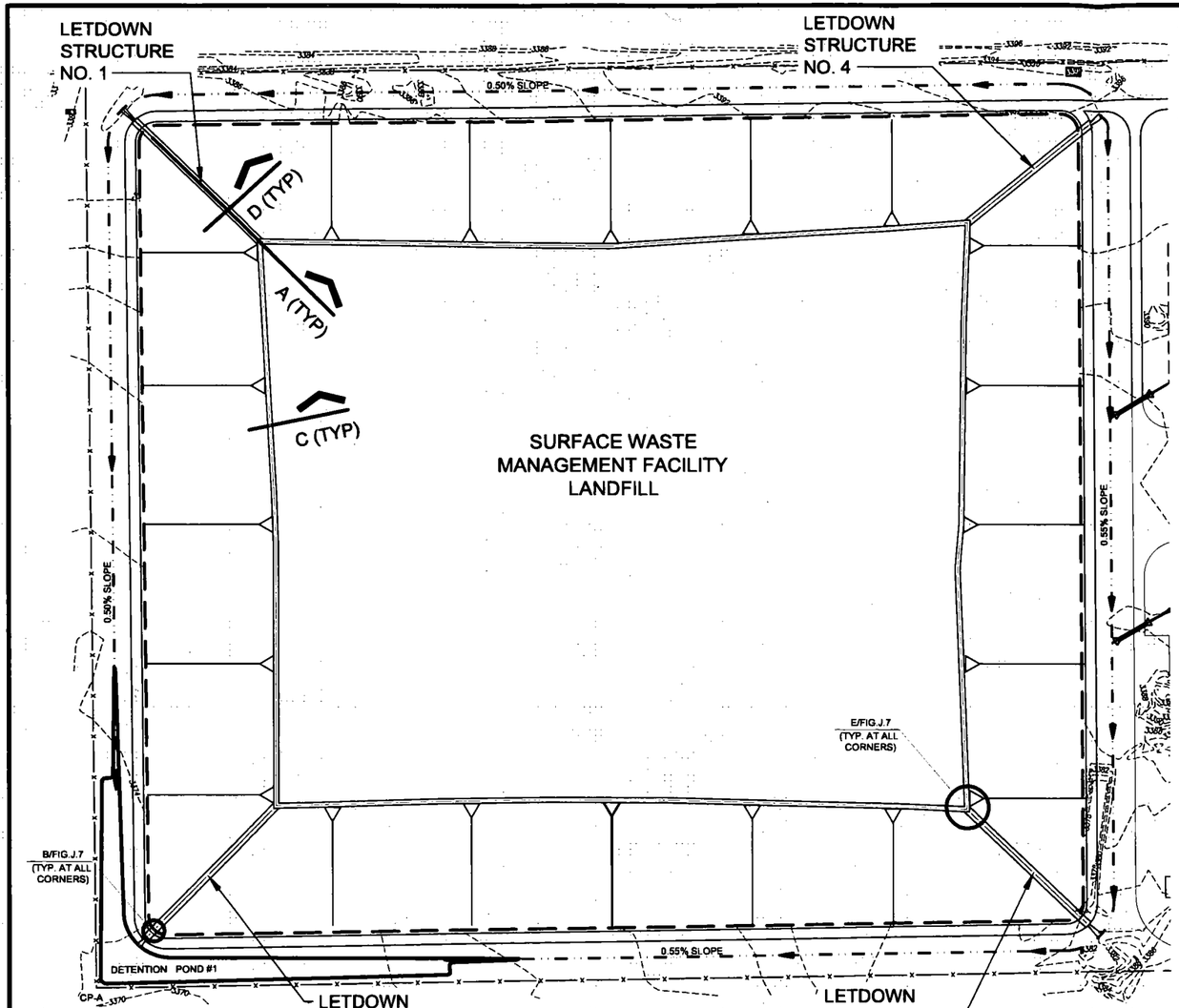
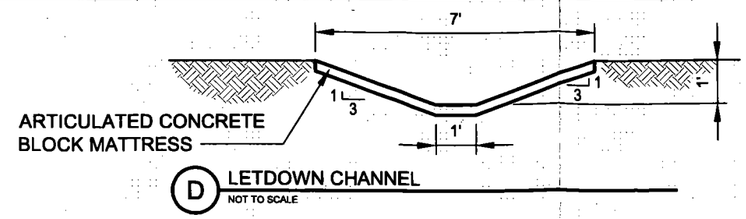
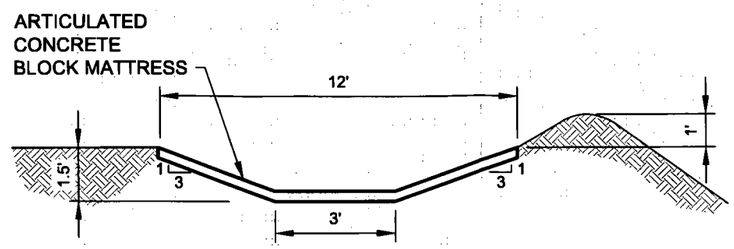
DEVELOPED DRAINAGE STRUCTURES PLAN

FIG.J.6

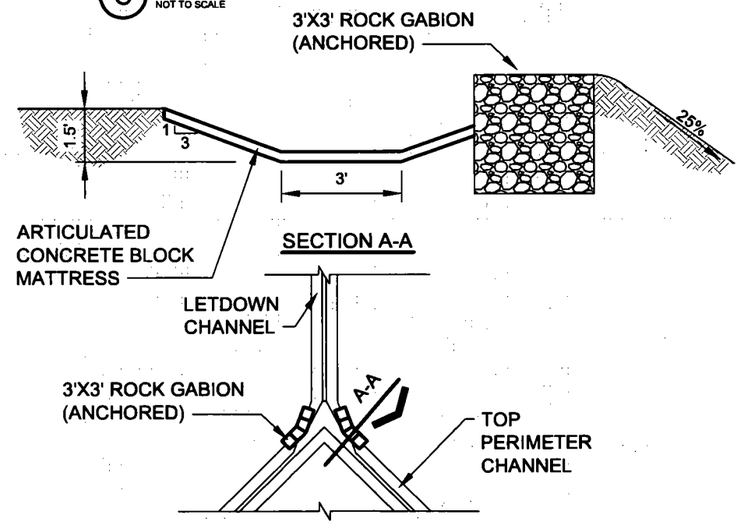




D LETDOWN CHANNEL
NOT TO SCALE

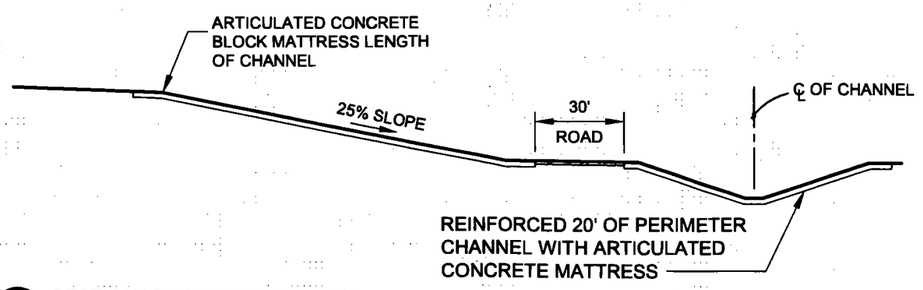


C TYPICAL TOP PERIMETER CHANNEL
NOT TO SCALE

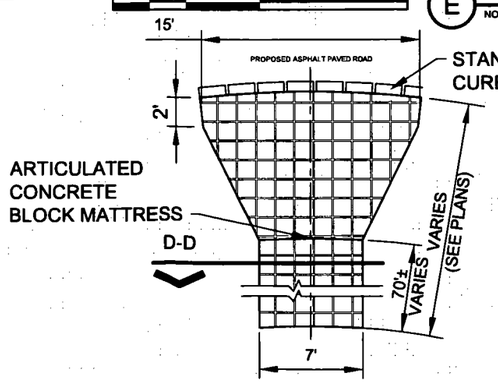


0 400' 800'

E LETDOWN CHANNEL (TYPICAL)
NOT TO SCALE



A SECTION LETDOWN STRUCTURE
NO SCALE:



B OUTFALL SECTION
NO SCALE:

LEGEND

- LANDFILL FOOTPRINT
- CHANNEL CENTERLINE / DIRECTION OF FLOW

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Nicholas N. Ybarra
11/6/2015

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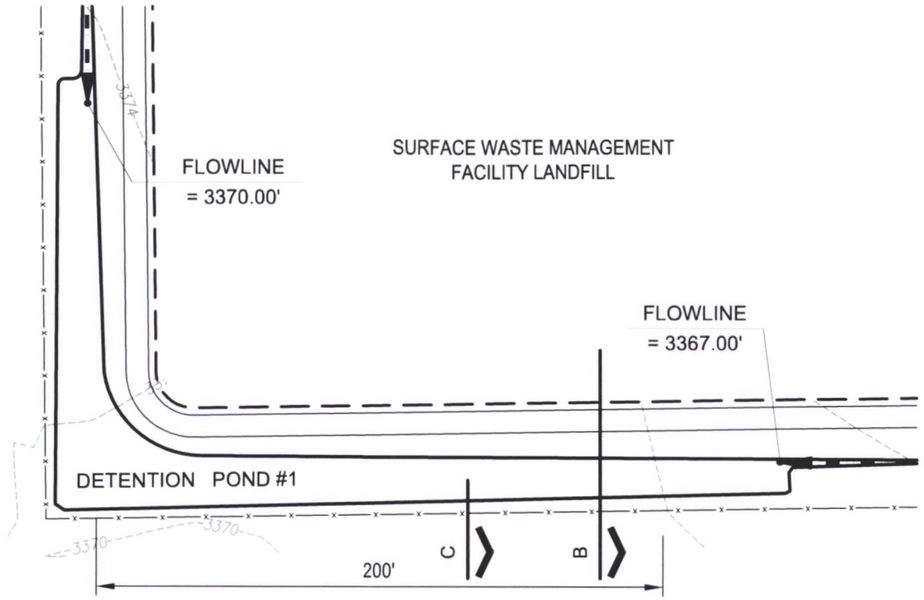
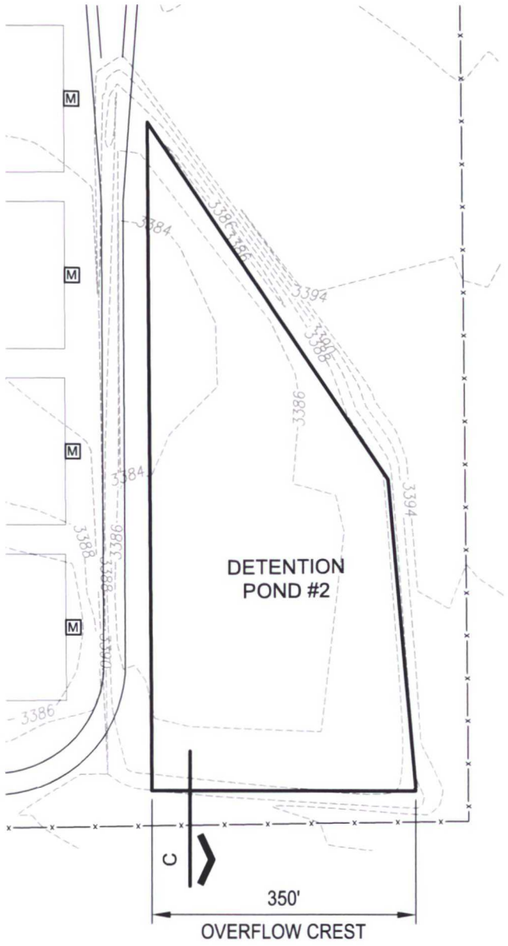
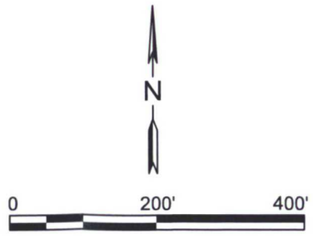
FINAL COVER DRAINAGE STRUCTURE PLAN

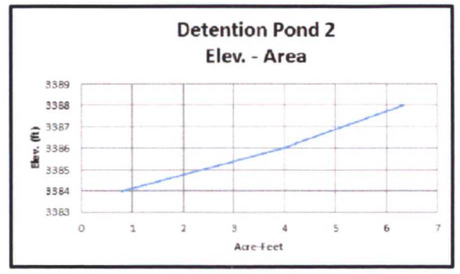
FIG.J.7

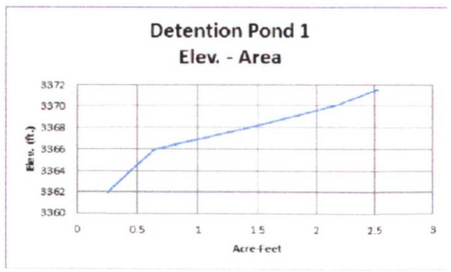
FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMIT\ATT-J\FIG.J.7 - FINAL COVER DRAINAGE STRUCTURE PLAN .dwg LAYOUT NAME: FIG.J.7 PRINTED: Thursday, November 05, 2015 - 7:48pm USER: TKrueger











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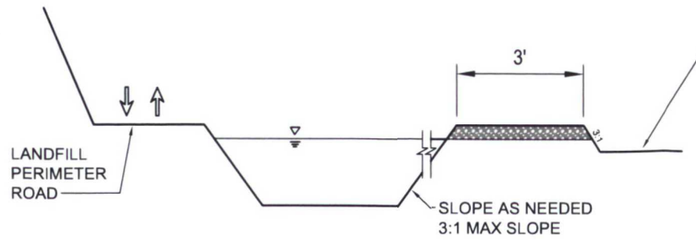
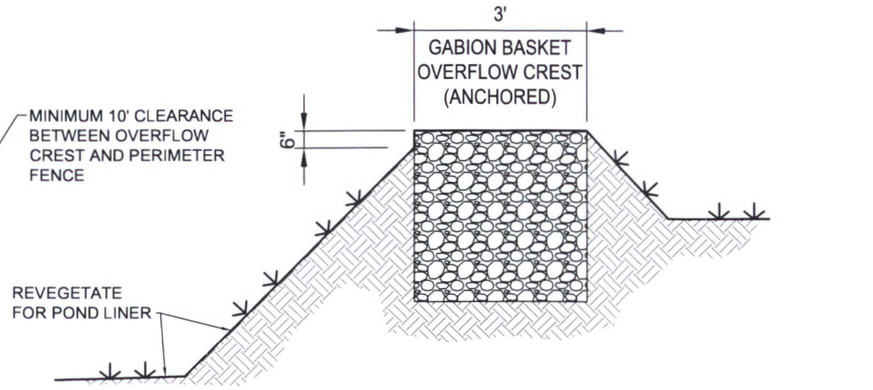
11/6/2015



B SECTION
NO SCALE



C SECTION
NO SCALE

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FACILITY

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DETENTION POND
& DETAILS

FIG.J.8

FILE NAME: \\Data1\Projects\2015\0580.15\BIM_CAD\09_PERMITATT-J\FIG.J.8 - DETENTION POND DETAILS.dwg LAYOUT NAME: FIG.J.8 PRINTED: Thursday, November 05, 2015 - 7:49pm USER: TKrueger

APPENDIX D

SELECTED PGS. – REFERENCE MATERIAL

LEA COUNTY FLOODPLAIN MANAGEMENT

Lorenzo Velasquez CFM Director
Cassie Corley CFM Coordinator
1923 N. Dal Paso Suite A
Hobbs, NM 88240

Phone (575) 391-2983
Phone (575) 391-2976
Fax (575) 397-7413
lvelasquez@leacounty.net
ccorley@leacounty.net

FLOODPLAIN DETERMINATION

Date: August 7, 2015

Owner/Agent: Parkhill Smith & Cooper Phone: 806-473-3675

Property Address: 286 Andrews Hwy, Eunice, NM 88231

Mailing Address: 4222 85th Street, Lubbock, TX 79423

- ■ **NON-SFHA**
- ☐ **PROPERTY IN SFHA**
- ☐ **PROPERTY PARTIAL SFHA AREA-STRUCTURE NON SFHA**

ZONE: D BFE: N/A

FIRM PANEL: 1700D DATED: 12/16/08

COMMUNITY NFIP NUMBER: 35025

☐ **SITE BUILT** ☐ **MOBILE HOME** ☐ **COMMERCIAL** ☐ **RESIDENTIAL** ☐ **MOD**
☐ **ADDITION** ☐ **INSURANCE** ☐ **ADDRESSING** ☐ **BANK** ☐ **OWNER**
☐ **REAL ESTATE**

COMMENTS: NOT APPROVED TO BUILD UNTIL BUILDING APPLICATION IS SUBMITTED.

ZONE D IS NOT DEFINED AS BEING IN THE SPECIAL FLOOD HAZARD AREA. HOWEVER, THE PROPERTY MAY STILL BE SUBJECT TO LOCAL FLOODING OR OTHER UNMAPPED FLOOD HAZARDS.

NOTE: This information is based on the FIRM for this community. This letter does not imply that the referenced property will or will not be free from flooding or damage. A property not in a Special Flood Hazard Area may be damaged by a flood greater than that predicted on the FIRM. This letter does not create liability on the part of the City, or any officer or employee thereof, for any damage that results from reliance on this information.

County Floodplain Manager Cassie Corley CFM Date 8-7-15

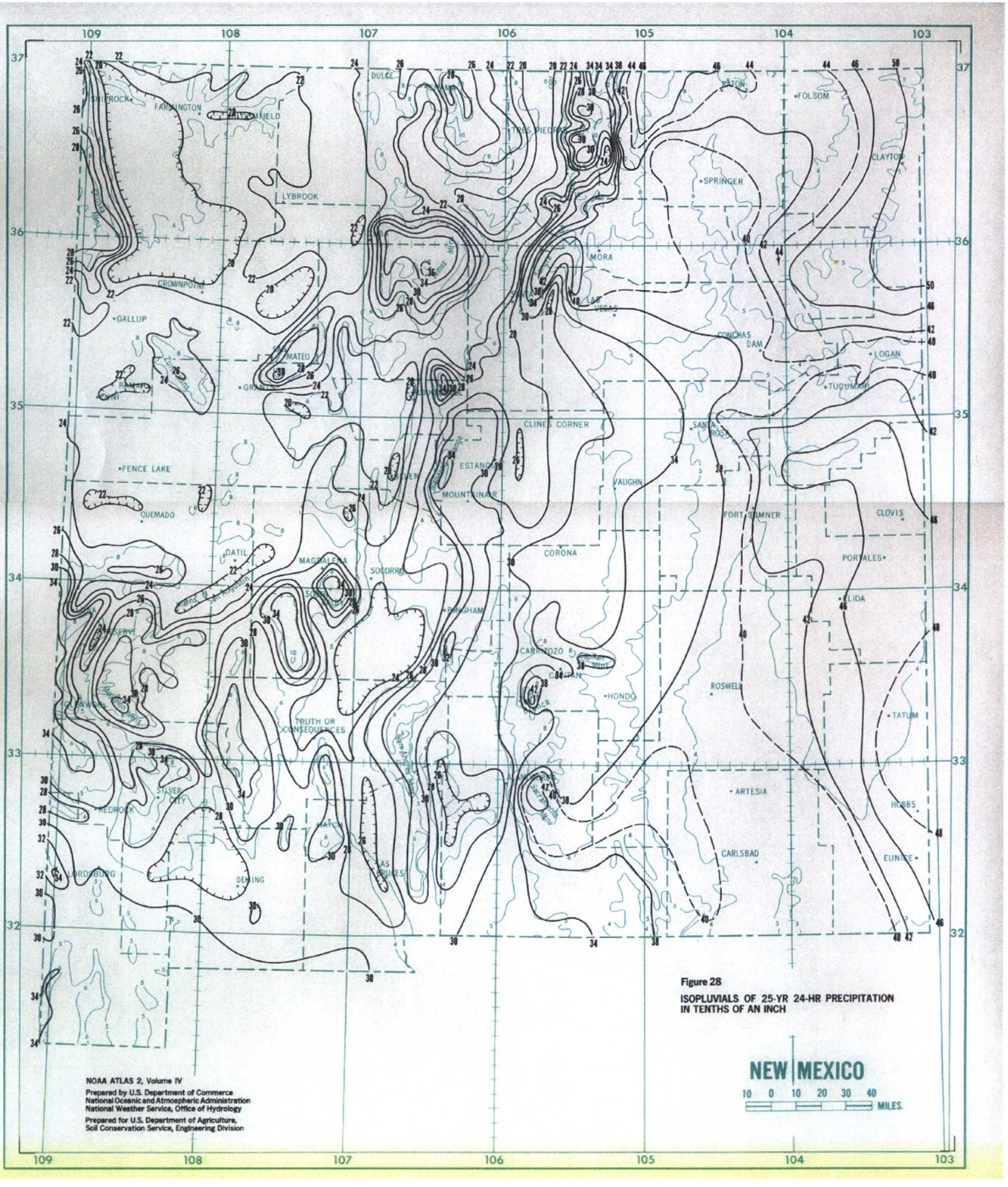

Figure 28

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IV

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

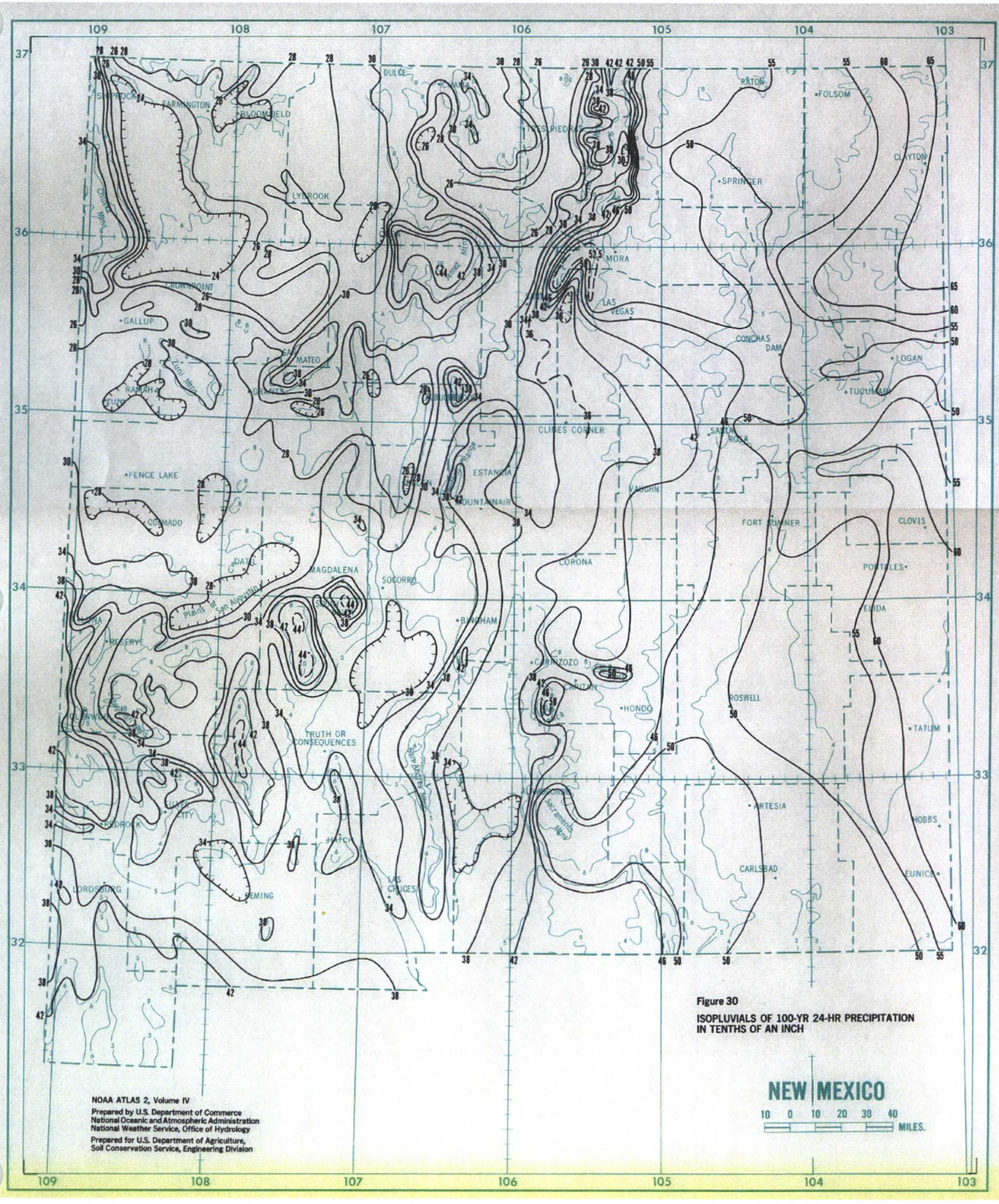

Figure 30

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NEW MEXICO

10 0 10 20 30 40 MILES.

NOAA ATLAS 2, Volume IV

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division