CITY OF ALBUQUERQUE

Hydrology Section Planning Department
David S. Campbell, Director

Timothy M. Keller, Mayor

November 27, 2018

Jonathan Niski, P.E.
Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, NM, 87109

RE: Primrose School
Grading Plan
Engineer's Stamp Date: 11/01/2018
Hydrology File: C13D029

Based upon the information provided in your resubmittal received 11/02/2018, the Grading and Drainage Plan is approved for Building Permit and Grading Permit with the following conditions.

1. Add short piece of curb and gutter across the south edge of the parking lot to prevent drainage from entering the Paseo Del Norte right of way. The shape of the 5047 contour indicates that the curb is there, but the lines for the curb need to be added to the plans.
2. The work order plans need to show the back of sidewalk 1.12' above the flow line of the C&G along Paradise Blvd. with non-erosive landscape material between curb and sidewalk.
3. As a reminder, if the project total area of disturbance (including the staging area and any work within the adjacent Right-of-Way) is 1 acre or more, then an Erosion and Sediment Control (ESC) Plan and Owner's certified Notice of Intent (NOI) is required to be submitted to the Stormwater Quality Engineer (Curtis Cherne, PE, ccherne@cabq.gov, 924-3420) 14 days prior to any earth disturbance.
4. Please provide a Private Facility Drainage Covenant per Chapter 17 of the DPM for BMP pond prior to Certificate of Occupancy. Please submit this on the 4th floor of Plaza de Sol. A $25 fee will be required.

If you have any questions, please contact me at 924-3986 or e-mail jhughes@cabq.gov.

Sincerely,

James D. Hughes, P.E.
Principal Engineer, Planning Dept.
Development and Review Services

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Orig: Drainage File

Primrose

City of Albuquerque Treasury
J-24 Deposit
Date: 11/27/2018 Office: ANNEX
Station ID Cashier: TRSBLB
Batch: 9830 Trans: 10
Fund: 305 Activity ID7547210
Account: 461615 Project ID24_MS4
Dept ID: Bus.Unit: PCDMD
Alloc Amt: $3,759.00
Trans Amt: $3,759.00
Check Tendered : $3,759.00

TREASURY DIVISION DAILY DEPOSIT

Transmittals for:
PROJECTS Only

Payment-in-Lieu for Storm Water Quality Volume Requirement

CASH COUNT	AMOUNT	ACCOUNT NUMBER	FUND NUMBER	BUSINESS UNIT	PROJECT ID	ACTIVITY ID	AMOUNT
TOTAL CHECKS	$ 3759.00	461615	305	PCDMD	24_MS4	7547210	$ 3759.00
TOTAL AMOUNT						TOTAL DEPOSIT	**$3759.00**

Hydrology#: C13D029 Primrose School Name: _____
Payment In-Lieu For Storm Water Quality Volume Requirement

Address/Legal Description: TR A-1 PLAT FOR TR A-1 ALBUQUERUE WEST UNIT 2 (BEING AREPLAT OF TR A UNIT 2 ALBUQUERQUE WEST UNIT ONE & A PORTIONOF LOT 3 BLK 'E' ALBUQUERQUE WEST) CONT 3.4816 AC

DEPARTMENT NAME: Planning Department/Development Review Services, Hydrology

PREPARED BY James D. Hughes PHONE 505-924-3986

BUSINESS DATE 11/08/2018

DUAL VERIFICATION OF DEPOSIT X Renée Brissette
EMPLOYEE SIGNATURE

AND BY X _____
EMPLOYEE SIGNATURE

REMITTER: _____
AMOUNT: _____
BANK: _____
CHECK #: _____ DATE ON CHECK: _____

The Payment-in-Lieu can be paid at the Plaza del Sol Treasury, 600 2nd St. NW. **Bring three copies of this invoice to the Treasury** and provide a copy of the receipt to Hydrology, Suite 201, 600 2nd St. NW, or e-mail with the Hydrology submittal to PLNDRS@cabq.gov.

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 6/2018)

Project Title: Primrose School Building Permit #: _____ Hydrology File #: _____

DRB#: _____ EPC#: _____ Work Order#: _____

Legal Description: Tract A-1 of Tract A, Unit 2, Albuquerque West

City Address: 4550 Paradise Blvd NW Albuquerque, NM 87114

Applicant: Tierra West, LLC Contact: Jonathan Niski

Address: 5571 Midway Park Place NE Albuquerque NM 87109

Phone#: 505-858-3100 Fax#: 505-858-1118 E-mail: jniski@tierrawestllc.com

Other Contact: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

TYPE OF DEVELOPMENT: _____ PLAT (# of lots) _____ RESIDENCE X DRB SITE ___ ADMIN SITE

IS THIS A RESUBMITTAL? X Yes _____ No

DEPARTMENT _____ TRANSPORTATION X HYDROLOGY/DRAINAGE

Check all that Apply:

TYPE OF SUBMITTAL:

____ ENGINEER/ARCHITECT CERTIFICATION
____ PAD CERTIFICATION
____ CONCEPTUAL G & D PLAN
X GRADING PLAN
X DRAINAGE REPORT
____ DRAINAGE MASTER PLAN
____ FLOODPLAIN DEVELOPMENT PERMIT APPLIC
____ ELEVATION CERTIFICATE
____ CLOMR/LOMR
____ TRAFFIC CIRCULATION LAYOUT (TCL)
____ TRAFFIC IMPACT STUDY (TIS)
____ STREET LIGHT LAYOUT
____ OTHER (SPECIFY) _____
____ PRE-DESIGN MEETING?

TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

X BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY

____ PRELIMINARY PLAT APPROVAL
____ SITE PLAN FOR SUB'D APPROVAL
____ SITE PLAN FOR BLDG. PERMIT APPROVAL
____ FINAL PLAT APPROVAL

____ SIA/ RELEASE OF FINANCIAL GUARANTEE
____ FOUNDATION PERMIT APPROVAL
X GRADING PERMIT APPROVAL
____ SO-19 APPROVAL
____ PAVING PERMIT APPROVAL
____ GRADING/ PAD CERTIFICATION
____ WORK ORDER APPROVAL
____ CLOMR/LOMR
____ FLOODPLAIN DEVELOPMENT PERMIT
____ OTHER (SPECIFY) _____

DATE SUBMITTED: 11/2/2018 By: Jonthan Niski

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: _____

FEE PAID: _____

TIERRA WEST, LLC

5571 Midway Park Pl. NE Albuquerque, NM 87109
(505) 858-3100 fax (505) 858-1118 1-800-245-3102
tierrawestllc.com

October 29, 2018

James D. Hughes, P.E.
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

RE: PRIMROSE SCHOOL
GRADING PLAN
ENGINEER'S STAMP DATE: 08/29/2018
HYDROLOGY FILE: C13D029

Dear Mr. Hughes:

Please find the following responses to your comments:

1. All of the site improvements shown on the Amended Site Plan as approved by DRB must be included with the Phase 1 construction. According to the approved Site Plan, the only thing not included with Phase 1 is a possible future building in the undisturbed portion of the site, Phase 2, so move the phase line accordingly. Since nothing specific is planned in Phase 2 the first paragraph of the drainage report should be revised to indicate that phase 2 will be addressed by a separate G&D Plan to be submitted at a later date. The first paragraph should also state how much impervious in Phase 2 has been accounted for in the design of Phase Also add a note to the first flush calculations on the G&D Plan stating how much impervious surface is accounted for in the future building site.
   The Phase II line was moved to include everything shown on the Site Plan. The amount of impervious area for Phase II was added to the report and that a separate drainage report will be submitted when Phase II is developed.

2. Paradise Blvd capacity calculations are not accurate.
   a. Basin B has free discharge.
      Basin B does not have free discharge. The Grading Plans for that development has a number of detention ponds and only 6.66 cfs is released from this basin to the street.

   b. Inlet interception in basins A, B, C, D, E, F, H, and K as discussed on Page 6 is irrelevant since the 18" pipe at section E-E on the G&D Plan only has capacity for 7.45 cfs. Even though the inlets upstream may intercept more flow it can't get thru the pipe so it must be conveyed on the surface.
      Actually the inlet interception is relevant for the inlets at the intersection of Eagle Ranch and Paradise. As stated in the Mark Goodwin drainage report for the Westpark Apartments (C13-D3) that storm sewer intercepts 26.80 cfs

which is just over the amount I've calculated that drains to the inlets of 26.46 cfs. That flow does enter the storm sewer at the intersection. You are correct in that the 18" RCP only has the capacity for 7.45 cfs as we have confirmed. As also stated in the Westpark Apartments Report the western most inlet for the AG Spanos project will overflow and discharge 19.26 cfs into Paradise Boulevard at that location. Our street capacity calculations now account for this overflow discharge.

c. The discussion of inlet interception on page 6 is not support by inlet calculations using the criteria in the DPM where first the actual flow depth is calculated and then the interception is figured using the inlet nomogrpahs in the DPM. Inlet interception does not need to be discussed since the limiting factor is the 18" pipe capacity at section E-E instead of the actual inlet interception.
We concur with this assessment.

d. The basin boundary between basins J and K on Page 3 must be corrected.
The basin boundary was corrected.

e. The pond at the church next door does not have sufficient storage volume to control the 100 year storm. It has a 35' wide 8" deep emergency overflow spillway with capacity for the 100 year peak flow. An AHYMO pond routing may be used to identify the effect of the pond on the 100 year peak discharge from the church site. The orifice equation should be used instead of Manning's to determine the pond discharge through the 8" pipe.
A AHYMO pond routing analysis was completed and does show the pond is not large enough to hold the 100 yr, 24-hr volume. Therefore the 100-yr peak flow of 22.37 cfs was used in the street capacity calculations.

The orifice equation was used to determine the discharge from the 8" pvc pipe as shown on the Pipe Discharge Calculations found in Appendix "C" of the report.

f. Additional columns should be added to the table on page 5 to indicate the contribution of each basin to the surface flow in Paradise Blvd at section E-E.
A column was added to the table identifying the surface flows going down Paradise Boulevard.

3. The Fountain Hills Grading and Drainage Management Plan failed to account for a major offsite basin north of Paradise Blvd that contributes about 59 cfs. Pending further analysis, it should be assumed that about 50 cfs will continue past the diversion into this portion of Paradise Blvd.
We believe this assumption is not accurate based on our review of the information available on the City's website. This statement is based on a preliminary analysis of the existing storm sewer system in Paradise Boulevard west of Eagle Ranch completed by Parametrix which states the existing storm sewer does not have capacity for all of the flows currently shown to enter that system.
Parametrix completed a storm sewer analysis with the existing infrastructure to determine it does not have capacity. They then completed a separate analysis changing one of the pipe sizes from a 36" RCP to a 42" RCP. That pipe was

(Line No. 1) is located after the connection of the Fountain Hills detention pond which is designed to release 55 cfs. That was the only pipe changed in the analysis meaning the 59 cfs eluded to in your comment is not what is surcharging the system but is the 55 cfs from the Fountain Hills detention pond.

As stated in the Parametrix Memorandum there is currently no flooding of that system as the Fountain Hills project is not fully developed and thus the full 55 cfs is not currently being released. As such, the City has the opportunity to force the developers of that project to correct their Drainage Analysis for that project and further limit the amount of flow discharged from the detention pond so that the storm sewer system is not surcharged and overflow into the street.

a. This site should prevent the 100year flow from entering the site by increasing the standard water block on Private Entrance DWG 2426 by 3" (0.87 + 0.25' = 1.12') and increase the elevation at the back of sidewalk by the same amount either by increasing the cross-slope between the sidewalk and the street or by adding a 3" landscape barrier at the back of sidewalk.
The eastern entrance was raised as much as possible given the ADA restrictions for the cross slopes. Based on the Street Capacity analysis found in Appendix "B" of the report the depth of the 100-yr flow in Paradise Boulevard at that location is .777 feet.

b. A typical section of Paradise Blvd should be added showing a 2% paving cross slope to match existing grades, the sidewalk and the landscape strip along Paradise Blvd. It should include horizontal and vertical dimensions, slopes and show the right of way line and specifying an erosion resistant material between the sidewalk and the street such as large cobles.
A typical street section was added to Sheet C3-B with all of the information requested.

c. The grades along Paradise Blvd do not match the existing pavement elevation and must be changed to accommodate the 2% pavement cross slope.
The grades were updated to reflect a 2% cross slope.

d. The grades at the east private entrance should be changed to provide the minimum water block height.
The eastern entrance was raised accordingly.

4. Drainage from this site must be prevented from entering Paseo Del Norte:
   a. Add a curb/wall along the right of way at the location where the Paseo Del Norte sidewalk elevation is about 5046.
   As shown in the cross-sections on Sheet C3-B and per the proposed contours on the Grading Plan, this site is lower than the trail along Paseo Del Norte. Therefore no flows from this site will enter the right of way.

   b. Add a wall/curb on the south side of the cul-de-sac where the back of sidewalk is not 1.12' above the street flow line.
   The sidewalk was raised as previously requested to be 1.12' above the flowline of the street.

c. The wall on the south side of the pond must be high enough to contain the 100 year elevation plus freeboard. The pond first flush and 100 year elevations should be labeled on the plan view of the pond. The higher elevation of the channel normal depth, weir depth or street 100 year depth should be used as the 100 year elevation for the pond and a freeboard should be added to allow for construction tolerance and settlement.
This site may freely discharge to the channel at the end of Paradise Boulevard therefore the pond does not need to contain the 100-yr volume. The pond is a water quality pond designed to contain the First Flush volume and pass the 100-yr flow to the channel.

5. The grade of the existing concrete curb and gutter on the south side of the cul-de-sac should remain in place with the exception of a 6' curb cut where the pond spillway connects. New pavement should end at the west edge of the existing concrete curb and gutter.
The changes we show to the cul-de-sac is to better allow the flows from Paradise Boulevard to enter the existing channel. The curb shown to be constructed is proposed to be 1.5' tall which is above the 1.12' required. We believe having a 1.5' high curb is a better solution to help prevent possible erosion if a wall was placed behind the sidewalk and/or curb at this location.

6. The grade of the Paseo Del Norte trail is about 5031.5 at the east end which is about 4' lower than the required top of wall elevation, but this is not reflected in section DD. An additional section may need to be added to show this, and the wall should be moved to the top of the slope/dam.
Section DD was updated to reflect what is actually happening at this location as shown on the grading plan.

7. Extend the wall to contain 1.12' drainage depth 60' east of the site along the south edge of the existing channel and add a typical section there. The wall should be labeled as a concrete floodwall where it is used to contain drainage.
As mentioned previously a curb at the cul-de-sac prior to the channel entrance is being constructed at 1.5' height to contain the flows and direct them to the channel.

8. Show and label all of the existing streetlights and power poles especially where the grade is changing. PNM must approve any grade changes at existing power poles in writing prior to G&D approval by the City.
Labels were added to the existing structures. We do not anticipate any grade changes that will affect any of the dry utility items located along the street.

9. More spot elevations are needed on the channel leading from the parking lot to the pond and on the pond overflow to the cul-de-sac. Weir capacity needs checked at the upstream end of both channels.
Spot elevations were added along the channels. The weir calculations for the channels can be found in Appendix "C".

10. The preferred cross slope on the sidewalk and trail is 1.5%. The maximum slope is 2%. Elevations, slope labels, and cross sections should be corrected.

The cross slope for the trail and sidewalk was changed to 1.5%.

11. Sections C-C and F-F do not agree with the grading shown on the plan. The flat areas at the top of slope and the 20' drivable grass shown on section C-C does not agree with the contours. The fence is missing from section F-F, the fence is shown 20' off the property line in the plan view, and the fence is 10' off the property line in section C-C. Consider relocating the fence to the top of slope.
The cross-sections were changed to reflect what is actually happening at those locations.

12. Slope stabilization must be specified on the plan and in the sections and should meet the specifications of Section 1012 Native Grass Seeding with gravel mulch or material of equivalent erosion resistance as specified by the owner.
Notes were added to the plans calling out gravel mulch with native seeding on all slope areas.

13. More detail is needed on the Paradise Blvd transition west of the site. The C&G along the edge of the asphalt taper appears to channel drainage to behind the curb since significant drainage is expected from the west in the ditch on the south side of the existing Paradise Blvd paving. So the curb should be deleted along the taper. Significant flows may spread as far as 20' south of the northwest comer of the property. A cutoff wall should tie from the end of the new curb constructed with this project to the existing timber "rail road ties" west of the site. A ramp may be needed at the west end of the sidewalk so the cutoff wall does not impede pedestrian traffic.
This area was changed to include the flood wall requested. We originally had a wheelchair ramp at the end of the sidewalk but transportation asked that it be removed.

If you have any questions or need additional information regarding this matter, please do not hesitate to contact me.

Sincerely,

Ronald R. Bohannan, PE

JN: 2017042
RRB/kw

DRAINAGE REPORT
FOR

Primrose School
City of Albuquerque, New Mexico

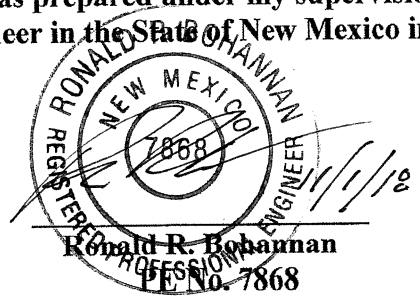
Prepared by:

Tierra West, LLC
5571 Midway Park Place
Albuquerque, New Mexico 87109

Prepared for:
Recoil Real Estate, LLC
11024 Montgomery NE, Suite 240
Albuquerque, NM 87111

November, 2018

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.



Ronald R. Bohannan
PE No. 7868

Job No: 2017092

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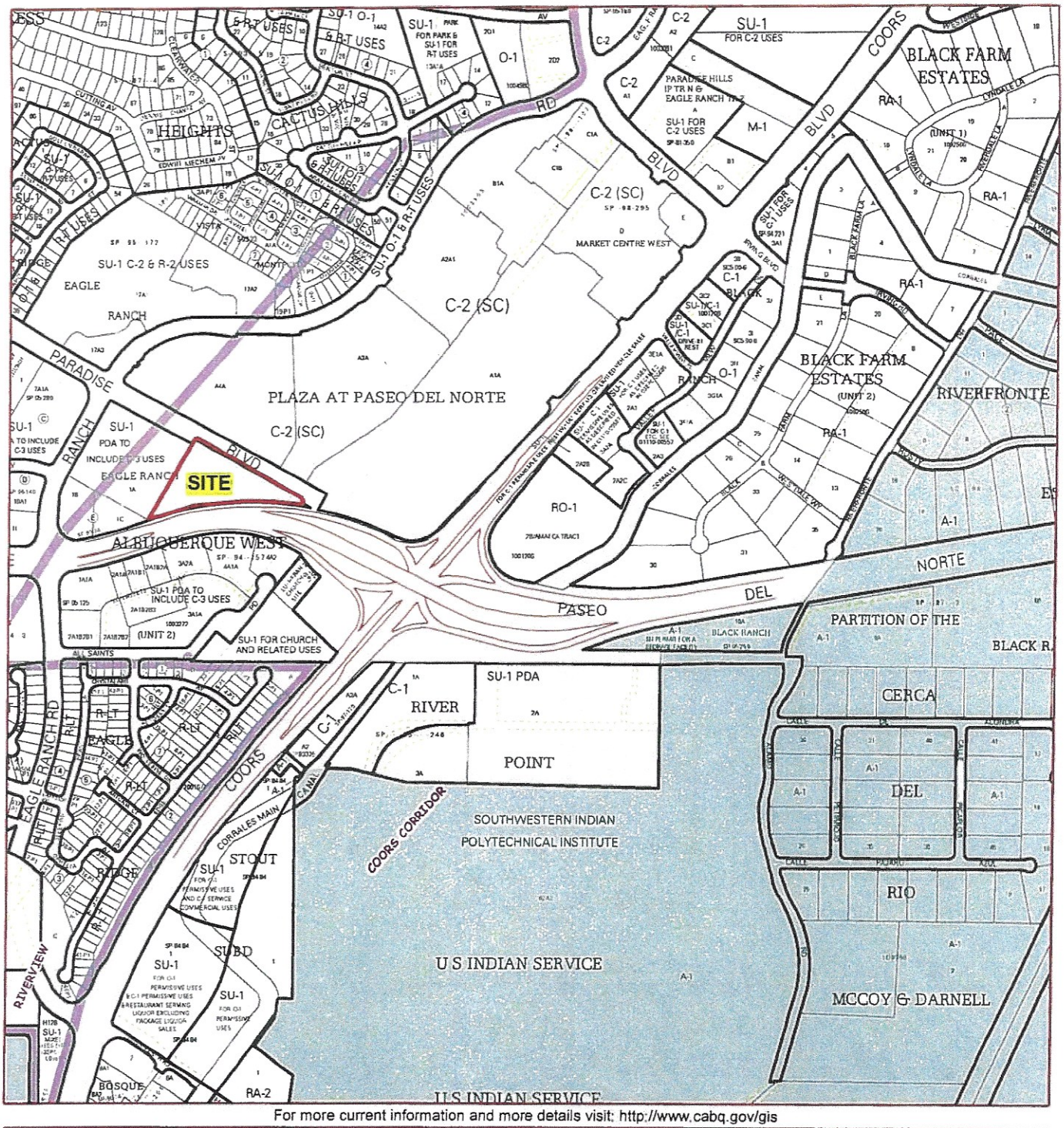
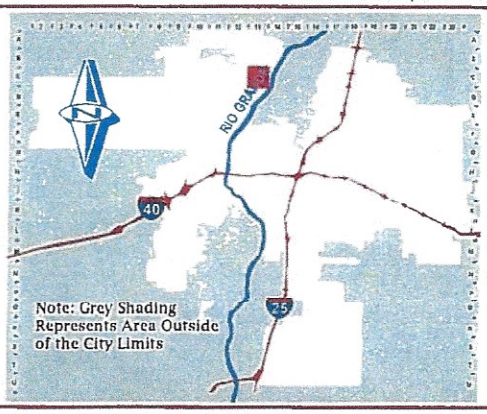
MAP POCKET



For more current information and more details visit: http://www.cabq.gov/gis

Albuquerque Geographic information System

Map amended through: 1/24/2011



Zone Atlas Page:

C-13-Z

Selected Symbols

- SECTOR PLANS
- Design Overlay Zones
- City Historic Zones
- H-1 Buffer Zone
- Petroglyph Mon.
- Escarpment
- 2 Mile Airport Zone
- Airport Noise Contours
- Wall Overlay Zone

0 750 1,500 Feet

Location

The existing parcel is currently vacant and located south of Paradise Boulevard between Eagle Ranch Road and Paseo Del Norte. The site is shown on the attached Zone Atlas Map (C-13). The purpose of this report is to establish a Master Drainage Plan for Phase I and future Phase II that will address the off-site flows from the west as well as the developed flows from the proposed development.

Existing Drainage Condition

The property lays within the AMFACA Detention Pond Master Drainage Area which identifies the storm water that will end up in the existing detention ponds located to the east of the site. This site is bounded on the north by Paradise Boulevard, on the west by an existing commercial building, and on the south and east by Paseo Del Norte. The site is currently undeveloped and contains 3.48 acres and currently drains from west to east into the Paseo Del Norte right-of-way and to an existing drop inlet. The only offsite flows that enter the site are confined within Paradise Boulevard and an existing 20-foot public drainage easement along Paradise Boulevard.

Based on the AMAFCA Drainage Report this site was to freely discharge developed flows into Paradise Boulevard where the flows would be conveyed to an existing 12-foot drainage channel at the end of Paradise Boulevard at the properties eastern most edge. Those flows would continue to an AMAFCA Detention Pond that is sized to contain the 100-yr, 24-hour developed flows from the site.

The AMAFCA Drainage Report identified the upland Basin as #305.A and calculated a 100yr, 24-hour flow of 71.91 cfs being discharged from that Basin. The project area falls within Basin #305.B and that was calculated to generate a 100yr, 24-hour flow of 13.35 cfs. Both basins were calculated using a 90% impervious area.

Since the time of that study a number of properties in Basin #305.A developed and have drainage reports and plan on file with the City. At the request of the City Hydrologist Tierra West reestablished and reanalyzed the upland basins. Those basins are shown on the Overall Basin Map on the next two pages. The flows calculated are shown on the page after that. The flow amounts shown on the Overall Basin Map are the surface flows for each Basin.

City of Albuquerque

Overall Off-site Basin Map

Legend

- Contour 2ft - 2010
- Bernalillo County Parcels
- World Street Map

Notes

400 0 200 400 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

7/24/2018

1: 2,400

Weighted E Method

Off-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	100-Year Weighted E (in)	100-Year Volume (ac-ft)	100-Year Flow cfs	10-Year Weighted E (in)	10-Year Volume (ac-ft)	10-Year Flow cfs	Surface Flow to Paradise (cfs)
A	30,000	0.69	0%	0	0%	0.00	10%	0.07	90%	0.62	1.872	0.107	2.91	1.160	0.067	1.89	
B	230,400	5.29	0%	0	10%	0.53	10%	0.53	80%	4.23	1.742	0.768	21.08	1.058	0.466	13.42	
C	174,194	4.00	0%	0	9%	0.35	0%	0.00	91%	3.65	1.856	0.619	16.66	1.151	0.383	10.81	11.08
D	58,575	1.34	0%	0	0%	0.00	10%	0.13	90%	1.21	1.872	0.210	5.67	1.160	0.130	3.70	
E	22,050	0.51	0%	0	0%	0.00	10%	0.05	90%	0.46	1.872	0.079	2.14	1.160	0.049	1.39	
F	47,500	1.09	0%	0	0%	0.00	10%	0.11	90%	0.98	1.872	0.170	4.60	1.160	0.105	3.00	
G	47,500	1.09	0%	0	0%	0.00	10%	0.11	90%	0.98	1.872	0.170	4.60	1.160	0.105	3.00	4.60
H	34,560	0.79	0%	0	0%	0.00	10%	0.08	90%	0.71	1.872	0.124	3.35	1.160	0.077	2.18	3.35
I	240,100	5.51	0%	0	20%	1.10	0%	0.00	80%	4.41	1.710	0.785	21.51	1.036	0.476	13.58	22.37
J	23,005	0.53	0%	0	10%	0.05	10%	0.05	80%	0.42	1.742	0.077	2.11	1.058	0.047	1.34	2.11
K	35,690	0.82	0%	0	20%	0.16	0%	0.00	80%	0.66	1.710	0.117	3.20	1.036	0.071	2.02	3.20
L	32,164	0.74	0%	0	20%	0.15	0%	0.00	80%	0.59	1.710	0.105	2.88	1.036	0.064	1.82	2.88
M	12,040	0.28	0%	0	20%	0.06	0%	0.00	80%	0.22	1.710	0.039	1.08	1.036	0.024	0.68	20.34
N	6,708	0.15	0%	0	20%	0.03	0%	0.00	80%	0.12	1.710	0.022	0.60	1.036	0.013	0.38	0.60
		22.83								19.27		**3.392**	**92.38**				**70.53**

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Basins retaining storm water
Basins captured by drop inlets

Basin B only surface discharges 6.66 cfs to the street, the rest is retained on site or discharged to a storm sewer.
Basin C surface discharges 11.08 cfs to the street, the rest is retained on site or discharged to a storm sewer.
Basin I only surface discharges 3.63 cfs to Paradise Blvd. thru a detention pond that limits the discharge. However the pond is undersized so it will overflow at a peak discharge of 22.37 cfs
Basin M has a drop inlet that will over flow 19.26 cfs into the street from the storm sewer and will not collect any flows

The flows upland basins and flows were verified by reviewing the approved Grading and Drainage plans and reports for the developed parcels and a site visit to identify basins based on existing conditions. Excerpts of those reports can be found in Appendix "A".

Basins A, B and F will surface drain down Eagle Ranch Road to a single "A" drop inlet. The total flow entering the inlet is 14.17 cfs, however a single "A" drop inlet only has a capacity for 13.72 cfs as shown in the calculations provided in Appendix "C". Therefore 0.45 cfs will bypass the inlet and continue east down Paradise Boulevard.

Basins C and D will discharge 10.72 cfs to a single "A" inlet in Paradise Boulevard just west of the intersection with Eagle Ranch Road. All of that flow should be intercepted by the inlet as it has capacity. The drainage report for the storage units completed by Mark Goodwin and Associates states that 11.084 cfs will also flow down Paradise Boulevard. We are unable to verify that amount so we have included it in our calculations in our downstream analysis.

Basin E will discharge 2.14 cfs to a single "A" inlet at the northwest corner of Paradise Boulevard and Eagle Ranch Road.

Basins H, K and M are designed to discharge to single "A" inlets on the north side of Paradise Boulevard approximately 820 feet west of the intersection with Eagle Ranch Road. However, it was discovered that these will only capture nuisance flows. During a 100-yr event the drop inlets will over flow 19.26 cfs into Paradise Boulevard as identified in the Westpark Apartments drainage analysis. Therefore all of these flows were included in the street and channel analysis for Paradise Boulevard.

Basin N will discharge 0.60 cfs down an access road to the back of the movie theater and enter a concrete rundown located at the southwest corner of the parking lot. That concrete rundown leads to same AMAFCA detention pond and the south half of Paradise Boulevard drains to via a different concrete channel.

Basin I does not have a Drainage Plan or Report on file with the City. A site visit confirmed the site drains to a detention pond located at the northeast corner of the site. That pond is approximately 80 feet by 38 feet and 6 feet deep. There is an 8 inch pvc pipe located on the north end of the pond about one foot above the bottom of the pond. A AHYMO analysis was completed for this Basin and it shows the pond does not have the

capacity to hold the 100-yr, 24-hr event. Therefore, the street analysis for Paradise Boulevard was completed using the peak discharge of 22.37 cfs. If the pond does not overflow then the discharge from the 8" PVC is 3.63 cfs.

Basin G discharges 4.60 cfs down the south side of Paradise Boulevard where it combines with the 2.11 cfs discharged from Basin J and the 22.37 cfs discharged from Basin I.

Basin L is the south side of Paradise Boulevard along the project parcel and discharges 2.88 cfs to the existing concrete channel located at the end of Paradise Boulevard that leads to an AMAFCA detention pond.

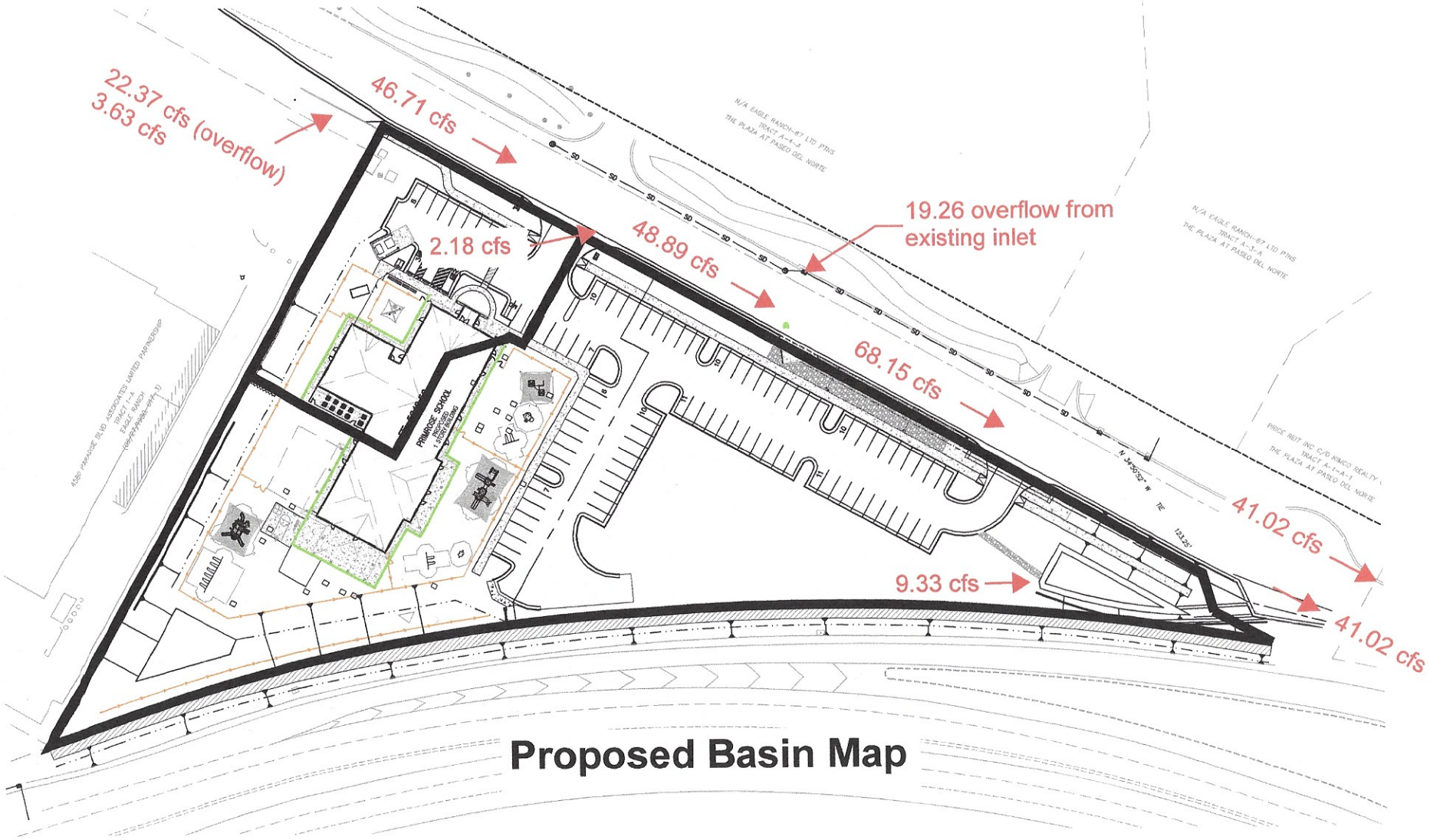
FEMA Map

The site is located on FIRM Map 35001C0116G as shown on the next page. The Map shows that the site does not lie within a flood plain.

Proposed Drainage Condition

The site is divided into two basins for the ultimate build out. Basin 1 consists of the proposed Phase I building and north parking area that will drain a 100yr, 6-hour flow of 2.18 cfs to Paradise Boulevard. Basin 2 consists of the proposed parking lot in Phase I and the future building pad in Phase II and generates a 100-yr, 6-hour flow of 9.33 cfs. Those flows will drain to a proposed First Flush pond located in the eastern corner of the site. The 9.33 cfs is allowed to freely discharge to Paradise Boulevard via a concrete channel from the pond to the cul-de-sac where it will then enter the existing concrete channel to the AMAFCA pond. At the time that Phase II is developed a new Grading and Drainage Plan and Report shall be submitted to address that development and how drainage from the building will be handled.

The off-site flows being conveyed down Paradise Boulevard were quantified to be 46.71 cfs at the west side of this project as discussed previously in this report. This project will contribute another 2.18 cfs to the street flow for a total of 48.89 cfs at the west entrance of the project. That total will increase to 68.15 cfs at the drop inlet located on the north side of the street where the drop inlet will overflow during a 100-yr event.



Proposed Basin Map

These flows will finally combine with the amount being discharged from this project and a total of 82.04 cfs will be split between the existing concrete channel at the end of Paradise Boulevard and the private access road that leads to another access point to the same pond.

A street capacity analysis was completed showing the various flows at the two different street slopes, which can be found in Appendix "B". All flows are contained within the street and will just go over the top of the curb when the street flattens out to 0.50% slope. The EGL of these flows is contained within the public right-of-way.

The flows in Paradise Boulevard will be captured in an existing 12-foot wide concrete channel at the end of the street, which has a capacity to carry 215 cfs. An analysis of the existing concrete channel opening shows it to have a capacity of 36.88 cfs which is just less than the 41.02 cfs expected to enter that channel if the church pond overflows. If the church pond doesn't over flow then the channel has plenty capacity as the flow entering the channel would be 11.14 cfs. Any flows not captured by the channel opening will continue north within the existing private access road. The excess storm water will enter the same pond as intended via a concrete swale located on the south side of the movie theater parking lot.

Summary

This project will be developed in two phases. This drainage report is set up to address the drainage once the project is completely built out. However, when Phase II is built out a new Grading and Drainage Plan and Report shall be submitted for Building Permit.

All of the off-site flows are contained within Paradise Boulevard and will drain to an existing concrete channel at the end of Paradise Boulevard and be conveyed to a series of detention ponds as outlined in the AMAFCA Master Drainage plan for this area.

APPENDIX A

Upland Basin Data from Various Reports

APPENDIX B

Street Capacity Analysis

APPENDIX C

Drainage Calculations

APPENDIX A

Upland Basin Data from Various Reports

AHYMO_97 MODEL SUMMARY TABLE
100-YR. 24-HOUR STORM

FILENAME 6UP100.TXT

```
□(s16.67h8.5v0T□&l8D
   AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) -                    - VERSION:  1997.02c      RUN DATE (MON/DAY/YR) =03/25/2009
   INPUT FILE = Q:\SEOCVM-P\2DUZ2I~6\1Y3UOH~8\AUZIUP~B\ahymo\6up100.txt                  USER NO.= AHYMO-S-9702c01SEC01A-AH

                                FROM  TO                    PEAK          RUNOFF              TIME TO    CFS       PAGE =   1
                     HYDROGRAPH   ID   ID         AREA      DISCHARGE     VOLUME      RUNOFF     PEAK      PER
   COMMAND       IDENTIFICATION  NO.  NO.       (SQ MI)     (CFS)       (AC-FT)    (INCHES)   (HOURS)   ACRE      NOTATION

                                                                                                          TIME=        .00
   START
   *S
   *S FINAL DESIGN HYDROLOGIC MODEL FOR THE AMAFCA TRACT 2-B POND
   *S LOCATED AT THE NE CORNER OF PASEO DEL NORTE AND COORS BLVD
   *S ALBUQUERQUE, NM
   *S
   *S FILENAME -  6up100.TXT
   *S            (a copy of update5.txt, which is a copy of update3.txt
   *S              and update3.txt is a copy of update2.txt
   *S            that is a copy of the original DMP model update1.txt
   *S            dated 11-20-96 developed for the following DMP
   *S
   *S                 ********************************************
   *S                 *   DESIGN MEMORANDUM FOR THE REVISION TO  *
   *S                 *   NORTH COORS DRAINAGE MANAGEMENT PLAN   *
   *S                 *   MIDDLE AREA (La Orilla to Calabacillas)*
   *S                 *   HYDROLOGY (FULLY DEVELOPED CONDITIONS) *
   *S                 *   HYDRAULICS SEDIMENT CONTROL.           *
   *S                 *   FEBRUARY 1997. SMITH ENGINEERING COMPANY*
   *S                 *   SEC Proj. No. 195104
   *S                 *   100 YEAR STORM - 24 HOUR DURATION      *
   *S                 *   IMPROVED CORRALES MAIN CANAL           *
   *S                 *            MIDDLE AREA                   *
   *S                 *   CALABACILLAS ARROYO TO LA ORILLA OUTLET*
   *S                 *   UPDATED FOR 1996 DRAINAGE CRITERIA     *
   *S                 ********************************************
   *S
   *S
   *S DESCRIPTION - This model 6up100.txt (prepared 3-10-09)
   *S 6up100.txt contains the following revisions to 5up100.txt as follows:
   *S
   *S Modified basins and previously divided hydrographs near Paseo Del Norte West
```

```
ROUTE MCUNGE          303.02    8    2     .05920     34.00     6.394    2.02513   1.750     .897 CCODE =     .1
ROUTE MCUNGE          OLF.32   12   16     .00590     35.52      .625    1.98638   1.900    9.407 CCODE =     .1
*S INCLUDES AREA FROM PARADISE BLVD - COMMERCIAL
COMPUTE NM HYD        304.00    -    1     .03490     78.86     3.770    2.02538   1.500    3.531 PER IMP=   90.00
ADD HYD               304.10  1& 4   7     .03920     83.69     4.235    2.02566   1.500    3.336
ADD HYD               304.20  7&16   5     .04510     83.69     4.860    2.02050   1.500    2.899
*S DIVIDE AT MH# S-702
DIVIDE HYD               CB1    5    4     .02637     20.00     2.842    2.02050   1.350    1.185
                      304.13  and    7     .01873     63.69     2.018    2.02050   1.500    5.313
*S
*S HYD CB1 WILL DRAIN INTO THE EAGLE RANCH STORM DRAIN SYSTEM
*S
*S HYD 304.13 WAS TO BE THE EXCESS STREET FLOW, BUT NOW BY PROPOSED
*S     DRAINAG MANAGEMENT BY AMAFCA AND COA, THIS FLOW WILL NOT BE ALLOWED
*S     TO DRAIN INTO PARADISE BLVD.
*S
*S  *     *     *     *     *     *     *     *     *
*S
*S NOTE -HYD 304.13 IS ACTUALLY LOST FROM THIS MODEL AS HDYR 402.20 HAS
*S      HAS BEEN COMMENTED OUT (SEE BELOW)
*S  *     *     *     *     *     *     *     *     *
*S
ADD HYD                CB1.1  2& 4   5     .08557     54.00     9.236    2.02370   1.750     .986
ADD HYD                CB1.2  5& 6   2     .14017     94.11    13.196    1.76510   1.800    1.049
*S  HYD CB1.2 WILL DRAIN INTO THE EAGLE RANCH STORM DRAIN SYSTEM
*S
*S DOES NOT INCLUDE AREA FROM PARADISE BLVD - COMMERCIAL
*S UPDATE 6 -  HYD BASIN 305 AND SPLIT INTO BASINS 305.A AND 305.B AND ASSUME
*S ALL FLOW FROM BASIN 305 IS COLLECTED AND DRAINS INTO THE
*S APARTMENT POND AND MOVIE POND
*S
*S
*S UPDATE 6  - NEW BASIN 305.A
*S                                        Area mi^2  Peak Dischrg 90%  volume   10% captured by storm sewer
COMPUTE NM HYD        305.A     -   17     .03180     71.91     3.435    2.02538   1.500    3.534 PER IMP=   90.00
*S CACTUS RIDGE
COMPUTE NM HYD        401.00    -    1     .02360     42.48     1.795    1.42644   1.500    2.812 PER IMP=   52.70
ADD HYD               401.10  1&11   3     .02360     42.48     1.795    1.42643   1.500    2.812
*S DIVIDE HYD 401.1 BY MAXIMUM INFLOW OF CATCH BASINS, WEST OF
*S SUB-BASIN 401,ALONG PARADISE ROAD (7 CB AT 10 CFS EACH)
DIVIDE HYD               CB2    3    4     .02360     42.48     1.795    1.42643   1.500    2.812
                      401.13  and    5     .00000       .00      .000     .00000   -.050     .000
*S SUB-BASIN 402 IS PART OF WEST PARK APARTMENTS
COMPUTE NM HYD        402.00    -    1     .00880     15.71      .621    1.32294   1.500    2.789 PER IMP=   42.70
ADD HYD               402.10  5& 1   6     .00880     15.71      .621    1.32290   1.500    2.789
*S
*S  UPDATE3.txt  proposed drainage management change
*S
*S          commented out HYD 402.2 in update3.txt to remove all flow
*S          IN EXCESS OF STORM DRAIN CAPACITY
*S          from basins 302, 303 and 304 from reaching the detention
*S          pond in Basin 504 that outfalls to the proposed Tract 2-B Pond
```

```
*S SUB-BASIN 414 IS WEST OF EAGLE RANCH COMMMERCIAL*
COMPUTE NM HYD       414.00   -    10        .00297        6.73        .321      2.02538   1.500   3.539 PER IMP=  90.00
ADD HYD              CB6.53  3&10   5        .01857       42.01       2.006      2.02535   1.500   3.535
ADD HYD              CB6.63  5& 9  11        .63673      185.72      36.988      1.08920   1.950    .456
*S SUB-BASIN 415 IS WEST OF EAGLE RANCH - COMMERCIAL *
COMPUTE NM HYD       415.00   -     1        .01190       28.92       1.285      2.02538   1.500   3.535 PER IMP=  90.00
ADD HYD               OUT.2  1&11  98        .64863      192.76      38.274      1.10638   1.950    .464
ADD HYD               OUT.3 98&99  99        .89553      380.77      60.025      1.25677   1.650    .664
*S   **************************************************************************
*S
*S HYDROGRAPH OUT.3 LEAVES MODEL IN A STORM DRAIN THAT OUTFALLS TO THE
*S
*S CALABACILLAS ARROYO
*S
*S   **************************************************************************
*S EAGLE RANCH ROAD
*S 86 FT ROW
COMPUTE NM HYD       501.00   -     1        .01000       14.84       1.080      2.02538   1.700   2.318 PER IMP=  90.00
*S
*S UPDATE3.TXT REVISION - HYD. 501.1 IS THE FLOW ON IRVING BLVD. THAT WILL
*S                        REACH THE WEST SIDE OF INTERSECTION OF COORS BLVD.
*S                        (DOES NOT YET INCLUDE BASINS 505 AND 505A
*S
ADD HYD              501.10 14& 1   3        .01679       24.78       1.808      2.01935   1.600   2.306
*S ROUTE OLF 501.1 THRU 505 IN IRVING BLVD **
ROUTE MCUNGE         501.12    3    7        .01679       24.56       1.809      2.01998   1.600   2.286 CCODE =    .2
*S COMMERCIAL
COMPUTE NM HYD       502.00   -     1        .04350       98.29       4.699      2.02538   1.500   3.531 PER IMP=  90.00
*S DIVIDE HYD 305.1 IN PARADISE BLVD BY ASSUMED 18" CAPACITY *
DIVIDE HYD           402.24   19    2        .03507       20.00       3.219      1.72074   1.350    .891
                     402.25  and    3        .02373       57.87       2.177      1.72074   1.500   3.811
ADD HYD              502.10  2& 1   5        .07857      118.29       7.918      1.88939   1.500   2.352
*S HYD 502.10 IS THE INFLOW HYD TO THE APARTMENT POND
*S
*S EXISTING DETENTION BASIN IN SUB-BASIN 502
*S ROUTING RESERVOIR WITH 24" RCP AND 6'2" HIGH 18" STANDPIPE
*S
*S APARTMENT POND RES. ROUTE DATA COMPUTED BY SEC MARCH 2009
*S
ROUTE RESERVOIR     502.RES    5    8        .07857      104.70       7.726      1.84365   1.550   2.082 AC-FT=    1.671
*S
*S APARTMENT POND  -  OUTFLOW HYDROGRAPH IS 502.RES
*S
*S COMMERCIAL
COMPUTE NM HYD       503.00   -.    1        .01880       33.05       2.031      2.02538   1.600   2.747 PER IMP=  90.00
ADD HYD              503.10  1& 3   2        .04253       84.52       4.208      1.85540   1.550   3.106
*S  UPDATE 6 NEW BASIN 305.B
*S                                    Area   Peak Disch.  volume
COMPUTE NM HYD        305.B   -     1        .00590       13.35        .637      2.02538   1.500   3.536 PER IMP=  90.00
ADD HYD              305.B9  2& 1   2        .04843       97.08       4.846      1.87611   1.500   3.132
*S
*S HYD 305.B9 IS THE SURFACE INFLOW HYD TO MOVIE POND, DOESN'T INCLUDE
*S            FLOW FROM APARTMENT POND OUTFLOW JUST ABOVE MOVIEW POND
```

EXHIBIT 2 STORM DRAIN LAYOUT

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	161.4	36	Cir	100.000	5077.29	5080.29	3.000	5082.75*	5088.61*	n/a	5102.88 i	End	Manhole
2	2	88.40	36	Cir	158.910	5080.29	5100.03	12.422	5102.88*	5105.67*	n/a	5107.86 i	1	Manhole
3	3	7.65	24	Cir	45.760	5100.03	5100.96	2.033	5107.86*	5107.91*	0.05	5107.95	2	Curb-Horiz
4	4	5.10	18	Cir	39.490	5100.96	5102.02	2.684	5107.95*	5108.05*	0.06	5108.11	3	Curb-Horiz
5	5	2.55	18	Cir	55.000	5102.02	5103.07	1.909	5108.11*	5108.14*	0.03	5108.18	4	Curb-Horiz
6	6	73.10	36	Cir	259.120	5100.30	5109.67	3.616	5107.86	5112.37	n/a	5115.84 i	2	Manhole
7	7	56.50	36	Cir	70.000	5109.67	5111.18	2.158	5115.84*	5116.35*	0.99	5117.34	6	Manhole
8	8	6.00	18	Cir	44.300	5111.18	5117.83	15.011	5117.34	5118.78	n/a	5119.36 i	7	Curb-Horiz
9	9	38.50	36	Cir	64.000	5111.18	5111.50	0.500	5117.34*	5117.55*	0.46	5118.01	7	DropGrate
10	10	16.60	24	Cir	10.850	5109.67	5115.33	52.167	5115.84	5116.80	n/a	5117.89 i	6	Curb-Horiz
11	11	8.30	18	Cir	20.000	5115.33	5116.71	6.899	5117.89	5117.86	n/a	5118.60 i	10	Curb-Horiz
12	12	7.65	24	Cir	103.080	5100.03	5103.07	2.949	5107.86*	5107.97*	0.09	5108.07	2	Curb-Horiz
13	13	55.00	30	Cir	445.000	5080.29	5087.25	1.564	5102.88*	5110.88*	1.95	5112.84	1	DropGrate
14	14	12.00	18	Cir	109.090	5111.18	5124.60	12.302	5117.34	5125.91	n/a	5127.42 i	7	Curb-Horiz
15	15	18.00	18	Cir	15.000	5080.29	5081.86	10.465	5102.88*	5103.32*	1.82	5105.14	1	Curb-Horiz
16	16	12.00	18	Cir	20.000	5081.86	5091.40	47.700	5105.14*	5105.40*	0.36	5105.76	15	Curb-Horiz
17	17	6.00	18	Cir	20.000	5091.40	5092.76	6.799	5105.76*	5105.83*	0.18	5106.01	16	Curb-Horiz

Paradise Blvd | Number of lines: 17 | Run Date: 2/24/2016

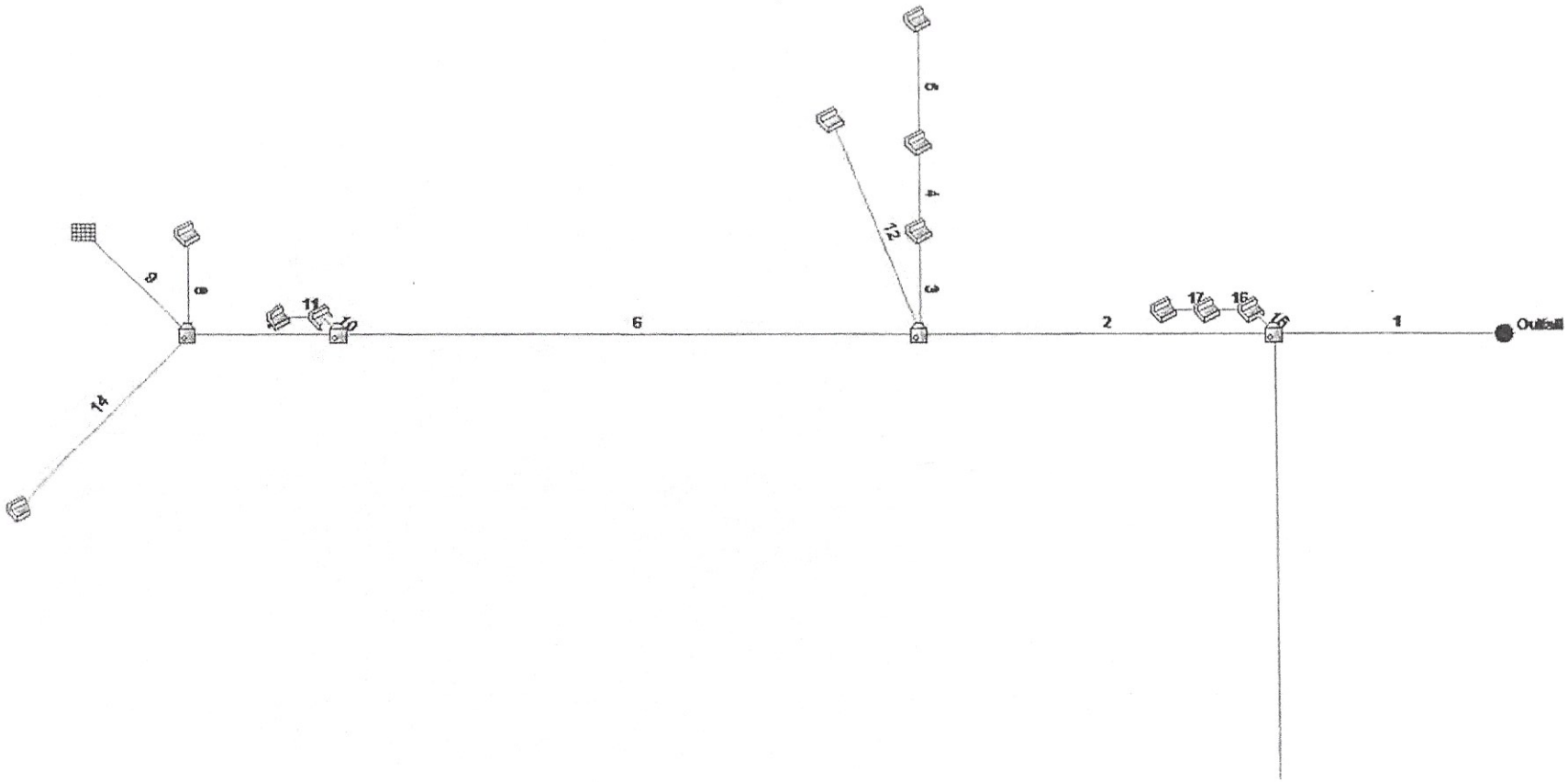
NOTES: Known Qs only ; *Surcharged (HGL above crown). ; i - Inlet control.

MyReport

Line No.	Flow Rate (cfs)	Line Size (in)	Line Length (ft)	Line Slope (%)	Line Type	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	Gnd/Rim El Up (ft)	DnStm Ln No	Junct Type
1	161.40	42	100.000	3.00	Cir	5077.29	5080.29	5082.75	5085.33	5094.29	Outfall	MH
2	88.40	36	158.910	12.42	Cir	5080.29	5100.03	5093.42	5102.87	5106.45	1	MH
3	7.65	24	45.760	2.03	Cir	5100.03	5100.96	5108.05	5108.11	5106.96	2	Curb
4	5.10	18	39.490	2.68	Cir	5100.96	5102.02	5108.15	5108.25	5107.67	3	Curb
5	2.55	18	55.000	1.91	Cir	5102.02	5103.07	5108.31	5108.34	5108.53	4	Curb
6	73.10	36	259.120	3.62	Cir	5100.30	5109.67	5108.05	5112.37	5120.70	2	MH
7	56.50	36	70.000	2.16	Cir	5109.67	5111.18	5115.84	5116.35	5123.00	6	MH
8	6.00	18	44.300	15.01	Cir	5111.18	5117.83	5117.34	5118.78 j	5124.03	7	Curb
9	38.50	36	64.000	0.50	Cir	5111.18	5111.50	5117.34	5117.55	5125.50	7	Dp-Grate
10	16.60	24	10.850	52.17	Cir	5109.67	5115.33	5115.84	5116.80	5121.33	6	Curb
11	8.30	18	20.000	6.90	Cir	5115.33	5116.71	5117.89	5117.86	5122.71	10	Curb
12	7.65	24	103.080	2.95	Cir	5100.03	5103.07	5108.05	5108.17	5109.07	2	Curb
13	55.00	30	445.000	2.00	Cir	5080.29	5089.19	5093.42	5101.43	5092.00	1	Dp-Grate
14	12.00	18	109.090	12.30	Cir	5111.18	5124.60	5117.34	5125.91 j	5131.00	7	Curb
15	18.00	18	15.000	10.47	Cir	5080.29	5081.86	5093.42	5093.86	5096.08	1	Curb
16	12.00	18	20.000	47.70	Cir	5081.86	5091.40	5095.69	5095.95	5097.40	15	Curb
17	6.00	18	20.000	6.80	Cir	5091.40	5092.76	5096.31	5096.37	5098.76	16	Curb

Paradise Blvd | Number of lines: 17 | Date: 2/24/2016

NOTES: j Inlet control; ** Critical depth


5
8
11
10
6
12
4
3
2
17
16
15
1
Outfall
14

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT WEST PARK APTS
SUBJECT DRAINAGE CALCS
BY GJK DATE 7-19-95
CHECKED ____ DATE ____
SHEET 25 OF ____

- DESIGN PARADISE STORM DRAIN (PER GLENN JURGENSON, FRED AGUIRRE JOHN CURTIN & GREG KREUTZ)
  - FLOW WILL BE IN 18" RCP TO THE WESTERN MOST AG SPANOS INLET IN PARADISE.
  - FLOW ALLOWABLE FROM INLET IN 18" RCP @ 0.5% IS 7.5 CFS.

    TOTAL FLOW UNDERGROUND
    = 16.15 + 10.61
    = 26.76 CFS

    TOTAL FLOW TO COME OUT OF INLET
    = 26.76 - 7.5
    = 19.26 CFS
  - CAPACITY OF NORTH SIDE OF PARADISE BLVD.

    S = 0.5%

    .125 + .02(22) = .565

    d = 0.565
    WP = 24.565
    A = 5.845
    V = 2.3734 F/S
    Q = 13.873 CFS
  - AMOUNT THAT SPILLS OVER TO SOUTH HALF

    = 19.26 - 13.873 + 1.45 + 4.16 ← COMBINED SURFACE FLOW IN PARADISE BLVD
    = 10.997 CFS

    Additional ASPHALT AND ASPHALT CURB WILL BE REQUIRED TO DIRECT FLOW TO THE SOUTH END OF THE CUL DE SAC AND INTO THE STATE INLET. (See APPENDIX C -HEDGES REPORT)
  - FIND AMOUNT THAT GOES INTO NEXT SINGLE "A"

    FROM SHEET 26
    Q = 6.1

    AMOUNT THAT GOES BY INLET

    13.873 - 6.1 = 7.773 CFS

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT WESTPARK APTS
SUBJECT DRAINAGE CALCS
BY GSK DATE 7-19-95
CHECKED ____ DATE ____
SHEET 27 OF ____

FIND NEW d FOR LAST SINGLE "A" INLET

$S = 0.5\%$

d = 0.47
WP = 19.72
A = 3.79
V = 2.06 F/S
Q = 7.803 cms = 7.773 cfs OK

Q inlet from slot 26
4.2 cfs

FLOW THAT GOES BY INLET THROUGH CUL-DE-SAC

7.773 − 4.2 = 3.573 cfs

THIS FLOW WILL ENTER THE LOWER DETENTION POND PER THE AG SPANOS DRAINAGE REPORT (APPENDIX B)

- TOTAL FLOW OF PARADISE BLVD BOTH SURFACE AND UNDERGROUND TO ENTER UPPER POND.

7.5 + 6.1 + 4.2 = 17.8 cfs

- TOTAL FLOW PER AG SPANOS

16.8 cfs

- THE ADDED 1 CFS TO THE UPPER POND WILL NOT OVERFLOW THE POND. THERE IS 2 FT OF FREEBOARD NOW AND THIS WILL HAVE MINIMAL IMPACT.

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT WESTPARK APTS
SUBJECT STORM SEWER-
BY RM DATE 28 JUN 95
CHECKED DATE
SHEET 24 OF

* HODGES MINI STORAGE

- Q IN STORM SEWER: PARADISE BLVD.

OFFSITE FLOWS

NUNZIO AVE + WEST ½ EAGLE RANCH + PARADISE BLVD SOUTH ½
2.19cfs + 7.95 cfs + 2.19cfs
Q_T = 12.33 cfs $\forall$ = 0.4508 ACRE-FEET
FROM AMENDED DRAINAGE REPORT 14 MAR 95

ONSITE FLOWS

POND DISCHARGE
Q = 3.819 cfs $\forall$ = 0.1523 ACRE-FEET FROM ORIGINAL REPORT 3-15-95

TOTAL FLOW FROM HODGES SITE

Q = 16.15cfs $\forall$ = 0.6031 ACRE-FEET

(SEE APPENDIX C)

* WEST PARK APARTMENTS

OFF SITE FLOWS

PARADISE BLVD NORTH ½ & EAGLE RANCH WEST ½. STORM INLETS ARE FOR NUISANCE FLOWS ONLY NO FLOW CONSIDERED.

ON SITE FLOWS

Q = 10.61cfs $\forall$ = 0.1377 ACRE-FEET
POND DISCHARGE INTO STORM SEWER SYSTEM

TOTAL FLOW FROM WEST PARK SITE
Q = 10.61cfs $\forall$ = 0.1377 ACRE-FEET

(SEE SHEET 14)

D. Mark Goodwin & Associates, P.A.
Consulting Engineers and Surveyors

PROJECT HEDGES MINI STORAGE
SUBJECT DRAINAGE CALCULATIONS
BY RM DATE 12 AUG 94
CHECKED _____ DATE _____
SHEET 1 OF ____

• TOTAL Q OFFSITE

Q = TRACT C + LOT 10-A + NUNEZ 10 AVE + EAGLE RANCH RD.

$Q = (1.12 + 2.19 + 0.471 + 3.38)$ cfs

$Q = 7.15$ cfs TOTAL OFFSITE ALLOWABLE DISCHARGE

ON-SITE

TOTAL AREA = 3.99895 ACRES

BLDG/PAVEMENT: 3.6488 ACRES 91.243% TYPE "D"
LANDSCAPING: 0.3502 ACRES 8.757% TYPE "B"

DT = 0.0333 HR $P_1 = 1.90$ in. $P_{24} = 2.65$ in.
TP = 0.1333 HR $P_6 = 2.20$ in.

* FROM HYMO OUTPUT (SHEETS 2-6)

PEAK Q FOR PROPERTY

$Q_{PK} = 9.52$ cfs $V_{PK} = 0.6177$ ACRE-FEET

ALLOWABLE DISCHARGE $Q_{PK} = 3.934$ cfs

TOTAL Q ENTERING BAR DITCH

ON SITE $Q = 3.934$ cfs
OFF SITE $Q = 7.150$ cfs (SEE PG 7&8)
TOTAL 11.084 cfs

APPENDIX B

Street Capacity Analysis

Street Capacity Calculations

Paradise Blvd.

48' F-F Street Section with 8" curb

Slope= 0.0312

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.010	0.00	0.17	0.00	0.00	0.00	0.43	0.00	0.76	0.007	0.013
0.020	0.00	0.34	0.01	0.00	0.00	0.69	0.01	0.86	0.016	0.027
0.040	0.01	0.68	0.02	0.01	0.03	1.09	0.04	0.96	0.038	0.058
0.060	0.03	1.02	0.03	0.04	0.08	1.43	0.09	1.03	0.062	0.092
0.080	0.05	1.36	0.04	0.09	0.18	1.73	0.14	1.08	0.088	0.127
0.100	0.08	1.70	0.05	0.16	0.32	2.01	0.20	1.12	0.116	0.163
0.120	0.12	2.04	0.06	0.26	0.52	2.27	0.27	1.15	0.145	0.200
0.125	0.13	2.13	0.06	0.29	0.58	2.33	0.29	1.16	0.152	0.209

For water depths greater than 0.125 ft but less than 0.565 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.130	0.14	2.38	0.06	0.31	0.62	2.28	0.30	1.12	0.150	0.211
0.180	0.31	4.93	0.06	0.76	1.52	2.44	0.44	1.01	0.184	0.273
0.250	0.77	8.51	0.09	2.37	4.75	3.10	0.78	1.09	0.281	0.399
0.300	1.24	11.06	0.11	4.46	8.91	3.59	1.08	1.16	0.363	0.500
0.384	2.32	15.35	0.15	10.18	20.35	4.38	1.68	1.25	0.512	0.682
0.402	2.60	16.26	0.16	11.82	23.63	4.55	1.83	1.26	0.545	0.723
0.498	4.35	21.15	0.21	23.36	46.72	5.38	2.68	1.34	0.729	0.947
0.560	5.74	24.34	0.24	33.78	67.56	5.89	3.30	1.39	0.854	1.099
0.565	5.85	24.57	0.24	34.65	69.29	5.93	3.35	1.39	0.863	1.111

For water depths greater than 0.565 ft but less than 0.667 ft

Y2= Y - 0.565

A3= A2 + Y2*22

P3= P2 + Y2

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.570	5.96	24.58	0.24	35.73	71.47	6.00	3.42	1.40	0.879	1.129
0.576	6.08	24.58	0.25	37.01	74.03	6.09	3.50	1.41	0.898	1.151
0.594	6.47	24.60	0.26	41.03	82.05	6.34	3.76	1.45	0.956	1.217
0.600	6.62	24.61	0.27	42.54	85.08	6.43	3.86	1.46	0.977	1.242
0.610	6.84	24.62	0.28	44.91	89.83	6.57	4.01	1.48	1.010	1.280
0.619	7.03	24.63	0.29	47.04	94.08	6.69	4.14	1.50	1.039	1.314
0.648	7.68	24.66	0.31	54.48	108.97	7.09	4.60	1.55	1.136	1.430
0.667	8.09	24.68	0.33	59.38	118.76	7.34	4.90	1.58	1.197	1.504

For water depths greater than 0.667 ft but less than 1.047 ft

Y3= Y - 0.667

A4= A3 + 22 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.7	8.84	26.33	0.34	65.97	131.94	7.46	5.22	1.57	1.245	1.564
0.73	9.57	27.83	0.34	72.59	145.17	7.58	5.53	1.56	1.290	1.623
0.75	10.09	28.83	0.35	77.34	154.68	7.67	5.75	1.56	1.322	1.663
0.77	10.62	29.83	0.36	82.38	164.75	7.76	5.97	1.56	1.354	1.704
0.79	11.17	30.83	0.36	87.70	175.40	7.85	6.20	1.56	1.388	1.747
0.82	12.04	32.33	0.37	96.23	192.47	7.99	6.55	1.56	1.440	1.812
0.847	12.86	33.68	0.38	104.50	208.99	8.13	6.88	1.56	1.488	1.872
1.047	20.06	43.68	0.46	184.35	368.70	9.19	9.62	1.58	1.878	2.359

Street Capacity Calculations

Paradise Blvd.

48' F-F Street Section with 8" curb

Slope= 0.005

For water depths less than 0.125 feet

Y= Water depth

Area = 8*Y^2

P= SQRT(257*Y^2) + Y

n= 0.017

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.010	0.00	0.17	0.00	0.00	0.00	0.17	0.00	0.31	0.002	0.010
0.020	0.00	0.34	0.01	0.00	0.00	0.28	0.01	0.34	0.004	0.021
0.040	0.01	0.68	0.02	0.01	0.01	0.44	0.02	0.38	0.010	0.043
0.060	0.03	1.02	0.03	0.02	0.03	0.57	0.03	0.41	0.016	0.065
0.080	0.05	1.36	0.04	0.04	0.07	0.69	0.06	0.43	0.023	0.087
0.100	0.08	1.70	0.05	0.06	0.13	0.80	0.08	0.45	0.031	0.110
0.120	0.12	2.04	0.06	0.10	0.21	0.91	0.11	0.46	0.039	0.133
0.125	0.13	2.13	0.06	0.12	0.23	0.93	0.12	0.47	0.041	0.139

For water depths greater than 0.125 ft but less than 0.565 ft

Y1= Y-0.125

A2= A1 + 2*Y1 + 25*Y1^2

P2= P1 + SQRT(2501*Y1^2)

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.130	0.14	2.38	0.06	0.12	0.25	0.91	0.12	0.45	0.040	0.143
0.180	0.31	4.93	0.06	0.30	0.61	0.98	0.18	0.41	0.047	0.195
0.250	0.77	8.51	0.09	0.95	1.90	1.24	0.31	0.44	0.074	0.274
0.300	1.24	11.06	0.11	1.78	3.57	1.44	0.43	0.46	0.097	0.332
0.384	2.32	15.35	0.15	4.07	8.15	1.75	0.67	0.50	0.140	0.432
0.402	2.60	16.26	0.16	4.73	9.46	1.82	0.73	0.51	0.150	0.454
0.414	2.78	16.85	0.17	5.18	10.37	1.86	0.77	0.51	0.156	0.467
0.560	5.74	24.34	0.24	13.52	27.05	2.36	1.32	0.56	0.241	0.647
0.565	5.85	24.57	0.24	13.87	27.74	2.37	1.34	0.56	0.244	0.652

For water depths greater than 0.565 ft but less than 0.667 ft

Y2= Y - 0.565

A3= A2 + Y2*22

P3= P2 + Y2

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.570	5.96	24.58	0.24	14.31	28.61	2.40	1.37	0.56	0.249	0.660
0.577	6.12	24.59	0.25	14.96	29.92	2.45	1.41	0.57	0.257	0.670
0.594	6.47	24.60	0.26	16.42	32.85	2.54	1.51	0.58	0.274	0.693
0.600	6.62	24.61	0.27	17.03	34.06	2.57	1.54	0.59	0.281	0.703
0.610	6.84	24.62	0.28	17.98	35.96	2.63	1.60	0.59	0.291	0.717
0.619	7.03	24.63	0.29	18.83	37.66	2.68	1.66	0.60	0.300	0.730
0.648	7.68	24.66	0.31	21.81	43.62	2.84	1.84	0.62	0.332	0.774
0.670	8.16	24.68	0.33	24.09	48.19	2.95	1.98	0.64	0.355	0.806

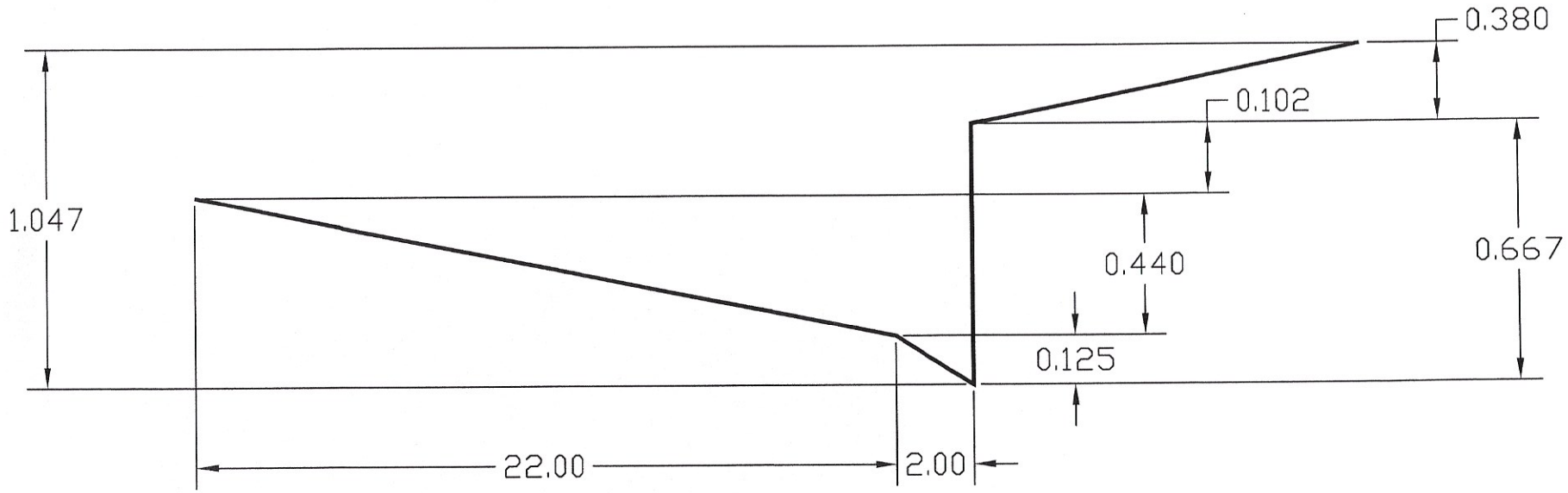
For water depths greater than 0.667 ft but less than 1.047 ft

Y3= Y - 0.667

A4= A3 + 22 * Y3 + 25 * Y3^2

P4= P3 + SQRT(2501 * Y3^2)

Depth (ft)	Area (ft^2	P (ft)	R (A/P)	Q (cfs)	2Q (cfs)	Vel (ft/s)	D*V	Fr	D2 (ft)	EGL (ft)
0.672	8.26	24.91	0.33	24.44	48.89	2.96	1.99	0.64	0.356	0.808
0.730	9.64	27.83	0.35	29.39	58.78	3.05	2.23	0.63	0.380	0.874
0.750	10.15	28.83	0.35	31.30	62.59	3.08	2.31	0.63	0.389	0.898
0.777	10.88	30.19	0.36	34.07	68.14	3.13	2.43	0.63	0.401	0.929
0.790	11.24	30.83	0.36	35.45	70.90	3.15	2.49	0.63	0.408	0.944
0.798	11.47	31.23	0.37	36.35	72.70	3.17	2.53	0.63	0.412	0.954
0.847	12.93	33.68	0.38	42.19	84.38	3.26	2.76	0.63	0.437	1.012
1.047	20.13	43.68	0.46	74.20	148.40	3.69	3.86	0.64	0.553	1.258



48' F-F STREET SECTION W/ 8" CURB

APPENDIX C

Drainage Calculations

Weighted E Method

On-Site Basins

											100-Year			10-Year		
Basin	Area (sf)	Area (acres)	Treatment A		Treatment B		Treatment C		Treatment D		Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs
			%	(acres)	%	(acres)	%	(acres)	%	(acres)						
1	27,711	0.64	0%	0	40%	0.25	0%	0.00	60%	0.38	1.450	0.077	2.18	0.832	0.044	1.30
2	124,063	2.85	0%	0	40%	1.14	10%	0.28	50%	1.42	1.349	0.320	9.33	0.751	0.178	5.39
		3.48								1.81		**0.397**	**11.51**			

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)		
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

Channel Opening and Weir Capacity

Weir Equation:

$$Q = CLH^{3/2}$$

Q= Flow
C = 2.95
L= Length of weir
H = Height of Weir

Basin 2 Curb Opening

$Q=2.95*6.0*0.67^{3/2}$

Q = 9.71 cfs
9.71 cfs > 9.33 cfs
Curb opening has capacity

First Flush Pond Weir

$Q=2.95*6.0*0.67^{3/2}$

Q = 9.71 cfs
9.71 cfs > 9.33 cfs
Weir has capacity

Paradise Blvd. Channel Opening

$Q=2.95*12.5*1.0^{3/2}$

Q = 36.88 cfs
36.88 cfs > 41.02 cfs*
*Channel Opening does not have capacity if Basin"I" pond overflows. This is the worst case scenario. If the pond does not over flow then the flow entering the channel is 11.14 cfs and the channel opening does have capacity.

East Entrance Opening

$Q=2.95*30.0*0.67^{3/2}$

Q = 36.88 cfs
48.54 cfs > 2.18 cfs
Entrance has capacity

Cobble Channel Capacity

	Top Width	Bottom Width	Depth	Area	WP	R	Slope	Q Provided	Q Required	Velocity
	(ft)	(ft)	(ft)	(ft^2)	(ft)		(%)	(cfs)	(cfs)	(ft/s)
Basin 2 Channel	6	0	1	3.00	6.32	0.4743	1	12.36	9.33	3.11

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.022

Concrete Rundown Capacity

	Top Width	Bottom Width	Depth	Area	WP	R	Slope	Q Provided	Q Required	Velocity
	(ft)	(ft)	(ft)	(ft^2)	(ft)		(%)	(cfs)	(cfs)	(ft/s)
First Flush	6	6	0.67	4.02	7.34	0.5477	0.50	12.89	9.33	2.32
Paradise	12.5	12.5	1.44	18.00	15.38	1.1704	2.54	215.77	41.04	2.28

Manning's Equation:

Q = 1.49/n * A * R^(2/3) * S^(1/2)

A = Area
R = D/4
S = Slope
n = 0.013

POND CALCULATIONS

First Flush Pond

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = $Ab * D + 0.5 * C * D^2$
C = (At - Ab) / Dt

Ab = 1,201.00
At = 2,202.00
Dt = 2.00
C = 500.50

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	
5034.00	0.00	0.00	
5034.50	0.50	0.0138	
5034.75	0.75	0.0210	
5035.00	1.00	0.0290	
5035.32	1.32	0.0403	First Flush Volume
5035.50	1.50	0.0471	
5036.00	2.00	0.0681	

PIPE DISCHARGE CALCULATIONS

OF-Basin "I"

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D^2
C = (At - Ab) / Dt

Ab =	3,040.00
At =	3,040.00
Dt =	6.00
C =	0.00

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	Q (CFS)
5057.00	0.00	0.00	0.0000
5058.00	1.00	0.0698	1.3723
5059.00	2.00	0.1396	2.1698
5060.00	3.00	0.2094	2.7446
5061.00	4.00	0.2792	3.2184
5062.00	5.00	0.3489	3.6308
5063.00	6.00	0.4187	4.0010

Orifice Equation
Q = CA SQRT(2gH)

C =	0.6
Diameter (in)	8
Area (ft^2)=	0.349
g =	32.2
H (Ft) =	Depth of water above center of orifice
Q (CFS)=	Flow

Pipe Capacity

Pipe	D	Slope	Area	R	Q Provided	Q Required	Velocity
	(in)	(%)	(ft^2)		(cfs)	(cfs)	(ft/s)
Paradise SD 1	18	0.5	1.77	0.375	7.45	6.55	3.71
Paradise SD 2	24	0.45	3.14	0.500	15.22	7.63	2.43
Paradise SD 3	24	0.6	3.14	0.500	17.57	7.63	2.43
Basin I discharge	8	6.67	0.35	0.167	3.13	2.74	7.85

Manning's Equation:

$Q = 1.49/n * A * R^{(2/3)} * S^{(1/2)}$

A = Area
R = D/4
S = Slope
n = 0.013

Capacity of a Single 'A' Storm Drop Inlet

Capacity of the grate:

L = 40" - 2(2"$_{ends}$) - 7(½" $_{middle\ bars}$)
= 32 1/2"
= 2.7083'

W = 25" - 13(½" $_{middle\ bars}$)
= 18.5"
= 1.54'

Area = 2.7083' x 1.54'
= 4.18 ft^2

Effective Area = 4.18- 4.18 (0.5 $_{clogging\ factor}$)
= 2.09 ft^2 at the grate

Orifice Equation

Q = CA sqrt(2gH)
Q = 0.6*2.09*sqrt(2*32.2*0.67)
Q = 8.24 cfs

Capacity of the Throat:

L = 6.50'

H = 10 ¾" - 4 ½"
= 6 ¼"
= 0.5208'

Area = 6.50' x 0.5208'
= 3.39 ft^2 at the throat

Weir Equation

Q = CLH^(3/2)
Q = 2.95 * 3.39 * 0.67^(3/2)
Q = 5.48 cfs

Total Capacity:

Q = 8.24$_{grate}$ + 5.48$_{throat}$
Q = 13.72 cfs

```
  AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)                          - Ver. S4.01a, Rel:
01a      RUN DATE (MON/DAY/YR) =10/30/2018
    INPUT FILE = C:\Users\Jon\Desktop\hymoprimrose.txt
         USER NO.= AHYMO_Temp_User:20122010

                                    FROM  TO                          PEAK          RUNOFF
          TIME TO    CFS       PAGE =   1
                     HYDROGRAPH   ID   ID          AREA      DISCHARGE       VOLUME
  RUNOFF     PEAK     PER
    COMMAND        IDENTIFICATION   NO.  NO.      (SQ MI)      (CFS)         (AC-FT)
 (INCHES)  (HOURS)    ACRE     NOTATION

    START
                           TIME=      0.00
    RAINFALL  TYPE= 2 NOAA 14
                           RAIN24=   2.660
    COMPUTE NM HYD        100.10   -     1       0.00860        22.37        0.963
  2.10027    1.500    4.065 PER IMP=  80.00
    ROUTE RESERVOIR       200.10    1   55       0.00860         4.75        0.963
  2.10024    1.900    0.864 AC-FT=    0.561
    FINISH
```

```
**********************************************************************
*                          Primrose School                           *
**********************************************************************
* 100-YEAR, 24-HR STORM  (UNDER PROPOSED CONDITIONS) W/ routing *
**********************************************************************
START                TIME=0.0
*
*
RAINFALL             TYPE=2 RAIN QUARTER=0.0 IN
                     RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                     RAIN DAY=2.66 IN DT=0.05 HR
*
*
*BASIN 1
*
COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.00860 SQ MI
                     PER A=0.00 PER B=20.00 PER C=0.0 PER D=80.00
                     TP=-0.1333 HR MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
*ROUTE BASIN 1 THROUGH DETENTION POND
*
*
ROUTE RESERVOIR      ID=55 HYD NO=200.1 INFLOW ID=1 CODE=24
                     OUTFLOW (CFS) STORAGE(AC-FT) ELEVATION(FT)
                     0.00          0.00           5057
                     1.3723        0.0698         5058
                     2.1698        0.1396         5059
                     2.7446        0.2094         5060
                     3.2184        0.2792         5061
                     3.6308        0.3489         5062
                     4.0010        0.4187         5063
*
PRINT HYD            ID=55  CODE=1
*
*
FINISH
```

```
      AHYMO PROGRAM (AHYMO-S4)                        - Version: S4.01a - Rel: 01a
           RUN DATE (MON/DAY/YR) = 10/30/2018
           START TIME (HR:MIN:SEC) = 08:22:24     USER NO.=
AHYMO_Temp_User:20122010
           INPUT FILE = C:\Users\Jon\Desktop\hymoprimrose.txt


    ************************************************************
    *                        Primrose School                   *
    ************************************************************
    * 100-YEAR, 24-HR STORM  (UNDER PROPOSED CONDITIONS) W/ routing *
    ************************************************************
    START               TIME=0.0
    *
    *
    RAINFALL            TYPE=2 RAIN QUARTER=0.0 IN
                        RAIN ONE=1.87 IN RAIN SIX=2.20 IN
                        RAIN DAY=2.66 IN DT=0.05 HR

                  24-HOUR RAINFALL DIST. - BASED ON NOAA ATLAS 14 FOR CONVECTIVE
AREAS (NM & AZ) - D1
                  DT =   0.050000 HOURS       END TIME =    24.000002 HOURS
                    0.0000  0.0022  0.0045  0.0069  0.0096  0.0123  0.0154
                    0.0197  0.0264  0.0336  0.0412  0.0494  0.0578  0.0664
                    0.0753  0.0844  0.0946  0.1052  0.1168  0.1387  0.1657
                    0.2020  0.2430  0.2937  0.3614  0.4375  0.5689  0.7733
                    1.1234  1.3695  1.5635  1.6610  1.7465  1.8079  1.8568
                    1.8994  1.9306  1.9592  1.9828  1.9979  2.0087  2.0183
                    2.0273  2.0352  2.0426  2.0499  2.0568  2.0625  2.0659
                    2.0692  2.0724  2.0754  2.0784  2.0813  2.0842  2.0870
                    2.0896  2.0923  2.0949  2.0974  2.0999  2.1023  2.1046
                    2.1069  2.1092  2.1115  2.1136  2.1158  2.1179  2.1199
                    2.1220  2.1240  2.1260  2.1280  2.1299  2.1318  2.1337
                    2.1356  2.1374  2.1392  2.1411  2.1428  2.1446  2.1463
                    2.1481  2.1498  2.1514  2.1531  2.1548  2.1564  2.1580
                    2.1596  2.1612  2.1628  2.1643  2.1658  2.1674  2.1689
                    2.1704  2.1718  2.1733  2.1747  2.1762  2.1776  2.1790
                    2.1804  2.1818  2.1832  2.1845  2.1859  2.1872  2.1885
                    2.1899  2.1912  2.1925  2.1937  2.1950  2.1963  2.1975
                    2.1988  2.2000  2.2013  2.2026  2.2038  2.2051  2.2064
                    2.2077  2.2089  2.2102  2.2115  2.2128  2.2141  2.2153
                    2.2166  2.2179  2.2192  2.2204  2.2217  2.2230  2.2243
                    2.2256  2.2268  2.2281  2.2294  2.2307  2.2319  2.2332
                    2.2345  2.2358  2.2371  2.2383  2.2396  2.2409  2.2422
                    2.2434  2.2447  2.2460  2.2473  2.2486  2.2498  2.2511
                    2.2524  2.2537  2.2549  2.2562  2.2575  2.2588  2.2601
                    2.2613  2.2626  2.2639  2.2652  2.2664  2.2677  2.2690
```

2.2703	2.2716	2.2728	2.2741	2.2754	2.2767	2.2779
2.2792	2.2805	2.2818	2.2831	2.2843	2.2856	2.2869
2.2882	2.2894	2.2907	2.2920	2.2933	2.2946	2.2958
2.2971	2.2984	2.2997	2.3009	2.3022	2.3035	2.3048
2.3061	2.3073	2.3086	2.3099	2.3112	2.3124	2.3137
2.3150	2.3163	2.3176	2.3188	2.3201	2.3214	2.3227
2.3239	2.3252	2.3265	2.3278	2.3291	2.3303	2.3316
2.3329	2.3342	2.3354	2.3367	2.3380	2.3393	2.3406
2.3418	2.3431	2.3444	2.3457	2.3469	2.3482	2.3495
2.3508	2.3521	2.3533	2.3546	2.3559	2.3572	2.3584
2.3597	2.3610	2.3623	2.3636	2.3648	2.3661	2.3674
2.3687	2.3699	2.3712	2.3725	2.3738	2.3750	2.3763
2.3776	2.3789	2.3802	2.3814	2.3827	2.3840	2.3853
2.3865	2.3878	2.3891	2.3904	2.3917	2.3929	2.3942
2.3955	2.3968	2.3980	2.3993	2.4006	2.4019	2.4032
2.4044	2.4057	2.4070	2.4083	2.4095	2.4108	2.4121
2.4134	2.4147	2.4159	2.4172	2.4185	2.4198	2.4210
2.4223	2.4236	2.4249	2.4262	2.4274	2.4287	2.4300
2.4313	2.4325	2.4338	2.4351	2.4364	2.4377	2.4389
2.4402	2.4415	2.4428	2.4440	2.4453	2.4466	2.4479
2.4492	2.4504	2.4517	2.4530	2.4543	2.4555	2.4568
2.4581	2.4594	2.4607	2.4619	2.4632	2.4645	2.4658
2.4670	2.4683	2.4696	2.4709	2.4722	2.4734	2.4747
2.4760	2.4773	2.4785	2.4798	2.4811	2.4824	2.4837
2.4849	2.4862	2.4875	2.4888	2.4900	2.4913	2.4926
2.4939	2.4952	2.4964	2.4977	2.4990	2.5003	2.5015
2.5028	2.5041	2.5054	2.5067	2.5079	2.5092	2.5105
2.5118	2.5130	2.5143	2.5156	2.5169	2.5182	2.5194
2.5207	2.5220	2.5233	2.5245	2.5258	2.5271	2.5284
2.5297	2.5309	2.5322	2.5335	2.5348	2.5360	2.5373
2.5386	2.5399	2.5412	2.5424	2.5437	2.5450	2.5463
2.5475	2.5488	2.5501	2.5514	2.5527	2.5539	2.5552
2.5565	2.5578	2.5590	2.5603	2.5616	2.5629	2.5642
2.5654	2.5667	2.5680	2.5693	2.5705	2.5718	2.5731
2.5744	2.5757	2.5769	2.5782	2.5795	2.5808	2.5820
2.5833	2.5846	2.5859	2.5872	2.5884	2.5897	2.5910
2.5923	2.5935	2.5948	2.5961	2.5974	2.5987	2.5999
2.6012	2.6025	2.6038	2.6050	2.6063	2.6076	2.6089
2.6102	2.6114	2.6127	2.6140	2.6153	2.6165	2.6178
2.6191	2.6204	2.6217	2.6229	2.6242	2.6255	2.6268
2.6280	2.6293	2.6306	2.6319	2.6332	2.6344	2.6357
2.6370	2.6383	2.6395	2.6408	2.6421	2.6434	2.6447
2.6459	2.6472	2.6485	2.6498	2.6510	2.6523	2.6536
2.6549	2.6562	2.6574	2.6587	2.6600		

*
*
*BASIN 1

```
    *
    COMPUTE NM HYD       ID=1 HYD NO=100.1 AREA=0.00860 SQ MI
                         PER A=0.00 PER B=20.00 PER C=0.0 PER D=80.00
                         TP=-0.1333 HR MASS RAINFALL=-1

         K =  0.072649HR    TP =  0.133300HR    K/TP RATIO =  0.545000     SHAPE
CONSTANT, N =  7.106428
         UNIT PEAK =   27.163    CFS   UNIT VOLUME =   0.9987       B =   526.28
 P60 = 1.8700
         AREA =     0.006880 SQ MI    IA =   0.10000 INCHES    INF =   0.04000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000


         K =  0.130992HR    TP =  0.133300HR    K/TP RATIO =  0.982685     SHAPE
CONSTANT, N =  3.593298
         UNIT PEAK =   4.2204    CFS   UNIT VOLUME =   0.9980       B =   327.08
 P60 = 1.8700
         AREA =     0.001720 SQ MI    IA =   0.50000 INCHES    INF =   1.25000
INCHES PER HOUR
         RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =
0.050000

    PRINT HYD            ID=1 CODE=1

                                       PARTIAL HYDROGRAPH   100.10


        RUNOFF VOLUME =     2.10027 INCHES      =       0.9633 ACRE-FEET
        PEAK DISCHARGE RATE =      22.37 CFS  AT   1.500 HOURS   BASIN AREA =
0.0086 SQ. MI.



    *
    *
    *ROUTE BASIN 1 THROUGH DETENTION POND
    *
    *
    ROUTE RESERVOIR      ID=55 HYD NO=200.1 INFLOW ID=1 CODE=24
                             OUTFLOW (CFS) STORAGE(AC-FT) ELEVATION(FT)
                                     0.00           0.00              5057

                                     1.3723         0.0698            5058

                                     2.1698         0.1396            5059
```

2.7446	0.2094	5060
3.2184	0.2792	5061
3.6308	0.3489	5062
4.0010	0.4187	5063

STORAGE-DISCHARGE TABLE EXCEEDED.

* * * * * * * * * * * * * * * * *

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
0.00	0.00	5057.00	0.000	0.00
1.20	3.10	5057.44	0.030	0.60
2.40	0.77	5062.72	0.399	3.90
3.60	0.04	5058.75	0.122	1.97
4.80	0.06	5057.30	0.021	0.41
6.00	0.11	5057.10	0.007	0.14
7.20	0.11	5057.08	0.006	0.12
8.40	0.11	5057.08	0.006	0.11
9.60	0.11	5057.08	0.006	0.11
10.80	0.11	5057.08	0.006	0.11
12.00	0.11	5057.08	0.006	0.11
13.20	0.11	5057.08	0.006	0.11
14.40	0.11	5057.08	0.006	0.11
15.60	0.11	5057.08	0.006	0.11
16.80	0.11	5057.08	0.006	0.11
18.00	0.11	5057.08	0.006	0.11
19.20	0.11	5057.08	0.006	0.11
20.40	0.11	5057.08	0.006	0.11
21.60	0.11	5057.08	0.006	0.11
22.80	0.11	5057.08	0.006	0.11
24.00	0.11	5057.08	0.006	0.11
25.20	0.00	5057.02	0.001	0.02
26.40	0.00	5057.00	0.000	0.00

WARNING - OUTFLOW EXCEEDS RESERVOIR CAPACITY
PEAK DISCHARGE = 4.753 CFS - PEAK OCCURS AT HOUR 1.90
MAXIMUM WATER SURFACE ELEVATION = 5065.032
MAXIMUM STORAGE = 0.5605 AC-FT INCREMENTAL TIME= 0.050000HRS

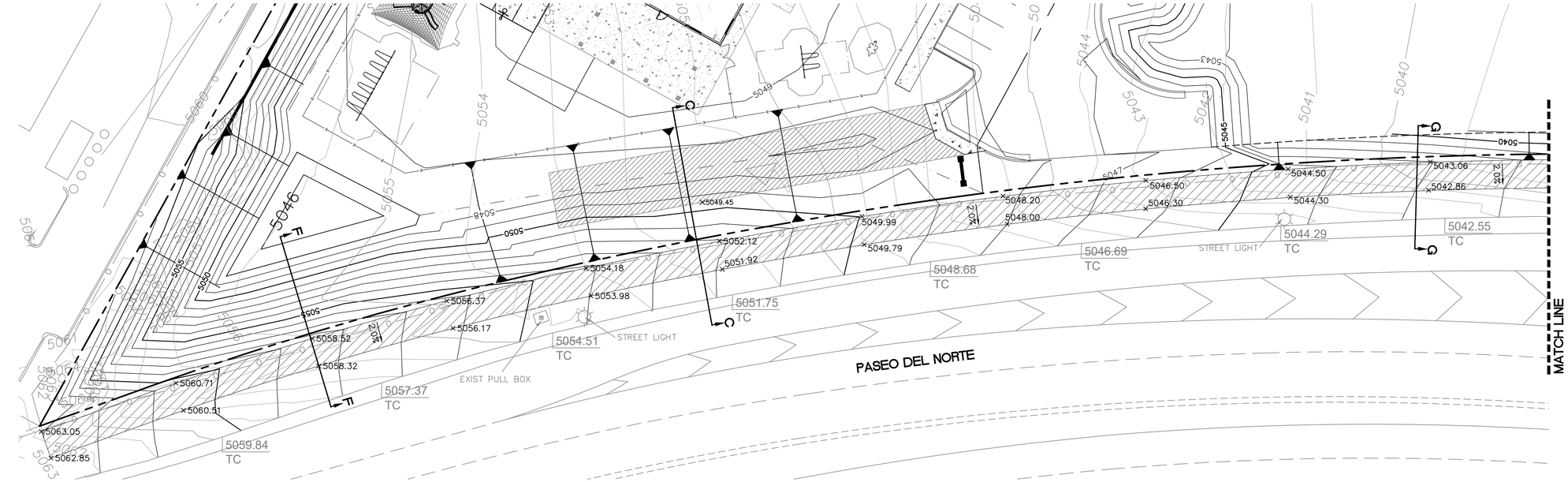
*
PRINT HYD ID=55 CODE=1

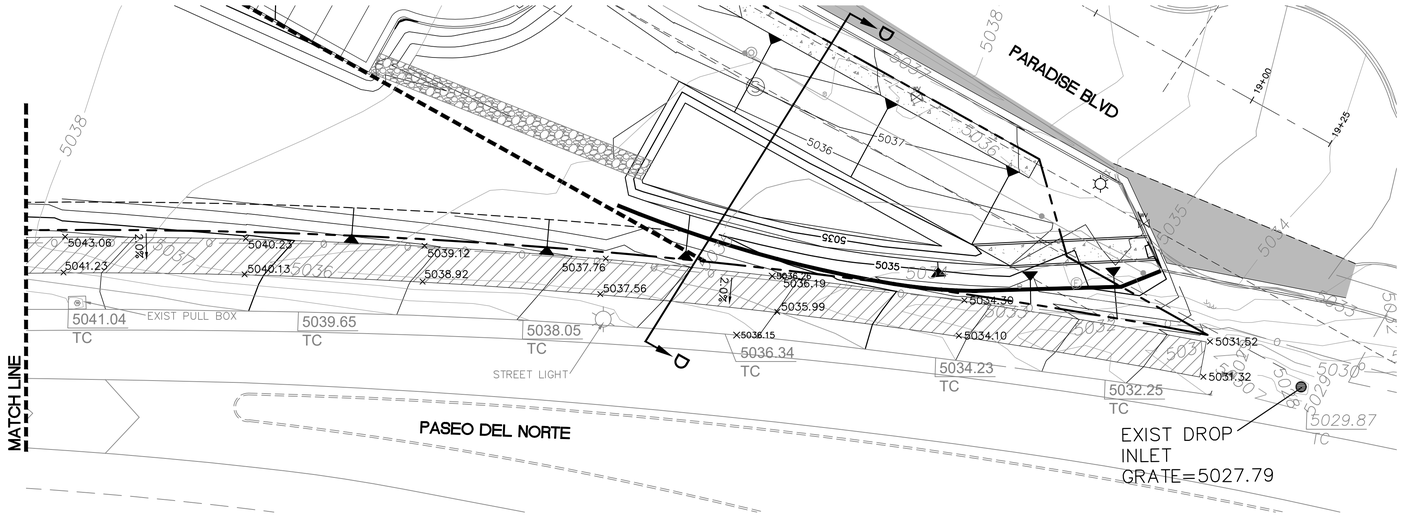
PARTIAL HYDROGRAPH 200.10

```
        RUNOFF VOLUME =     2.10024 INCHES      =        0.9633 ACRE-FEET
        PEAK DISCHARGE RATE =       4.75 CFS  AT    1.900 HOURS    BASIN AREA =
0.0086 SQ. MI.


    *
    *
    FINISH

        NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 08:22:24
```





LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT-OF-WAY
- BUILDING
- SIDEWALK
- RETAINING WALL
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION (FLOWLINE)
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- 5010 EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- EXISTING LIGHT STANDARD

SEE SHEET 3-B FOR SECTIONS

N

GRAPHIC SCALE

20 0 10 20

(IN FEET)

1 inch = 20 ft.

CAUTION:

ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

ENGINEER'S SEAL

RONALD R. BOHANNAN NEW MEXICO 7868 PROFESSIONAL ENGINEER

2/16/2018

RONALD R. BOHANNAN P.E. #7868

PRIMROSE SCHOOL OF NW ALBUQUERQUE

CONCEPTUAL GRADING PLAN-TRAIL DETAIL

TIERRA WEST, LLC
5571 MIDWAY PARK PL NE
ALBUQUERQUE, NEW MEXICO 87109
(505) 858-3100
www.tierrawestllc.com

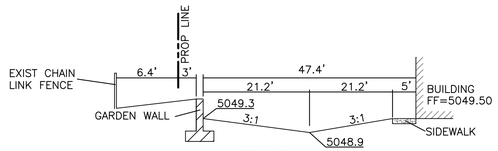
DRAWN BY: pm

DATE: 11-1-18

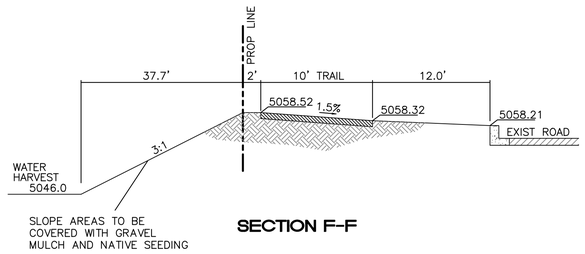
DRAWING

SHEET #: 3-A

JOB #: 2017092



SECTION A-A



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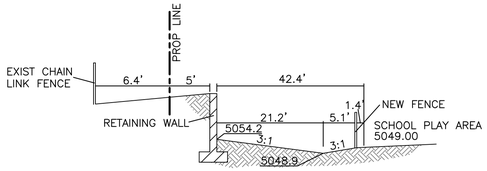

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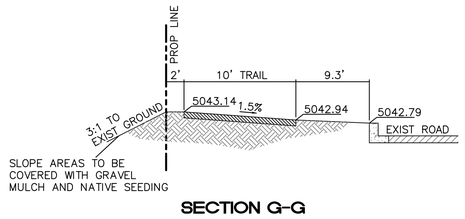
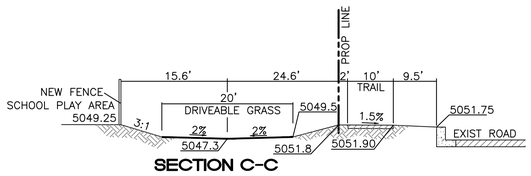


SECTION G-G

NOTE
FACE OF SIDEWALK ALONG PARADISE BLVE TO BE 1.12' MIN ABOVE THE CURB FLOWLINE



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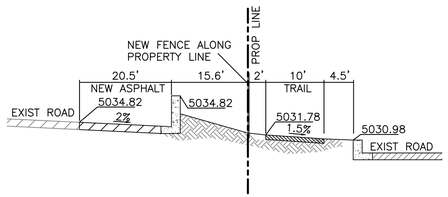
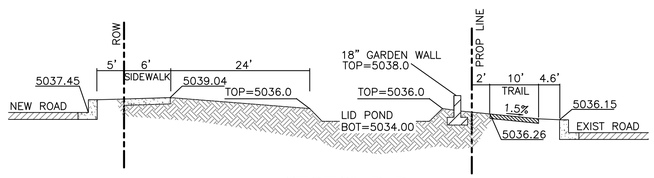
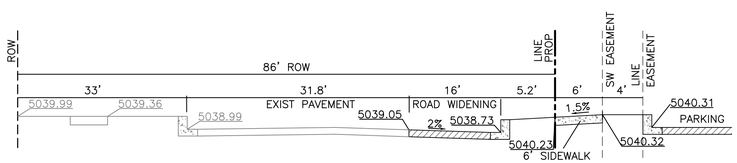


SECTION H-H



SECTION D-D



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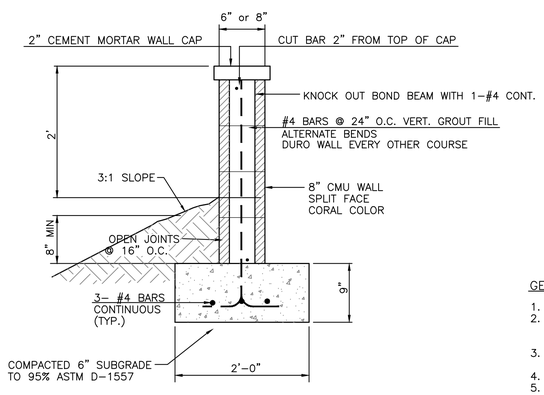
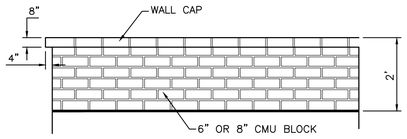


FLOOD WALL SECTION
NTS



FLOOD WALL ELEVATION
NTS

GENERAL NOTES:

1. ALL CONCRETE IS TO BE 3000 PSI @ 28 DAYS.
2. MINIMUM COMPACTION UNDER FOOTINGS IS TO BE 95% PER ASTM. D 1557 FOR A DEPTH OF 12" MOISTURE CONTENT IS TO BE ± 2.0%.
3. BACK FILL AGAINST WALLS IS TO BE HAND-PLACED AND COMPACTED.
4. ALL BARS ARE TO BE GRADE 60, ASTM 615.
5. TRUSS TYPE DUR-O-WALL EVERY OTHER COURSE.
6. DOWELS SHALL BE AT LEAST EQUAL IN SIZE AND SPACING TO V-BARS, SHALL PROJECT A MINIMUM OF 30 BAR DIA. INTO THE FILLED BLOCK CORES, AND SHALL EXTEND TO THE TOE OF THE FOOTING.
7. USE EITHER EXPANSION JOINTS ON 20' CENTERS OR PILASTERS EVERY 16'.

ENGINEER'S SEAL
RONALD R. BOHANNAN NEW MEXICO 7868 PROFESSIONAL ENGINEER
2/16/2018
RONALD R. BOHANNAN P.E. #7868

PRIMROSE SCHOOL OF NW ALBUQUERQUE

CONCEPTUAL GRADING SECTIONS

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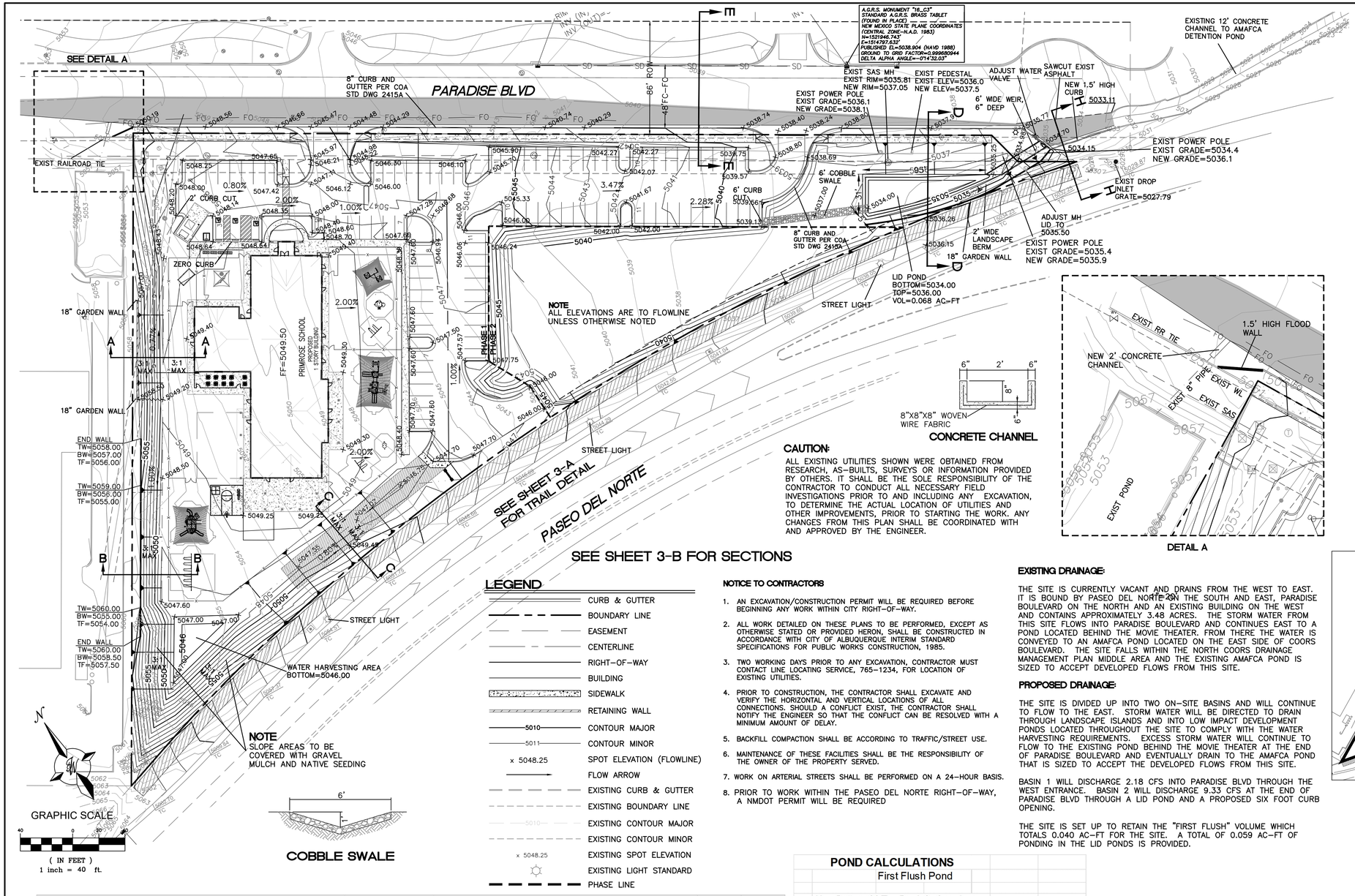
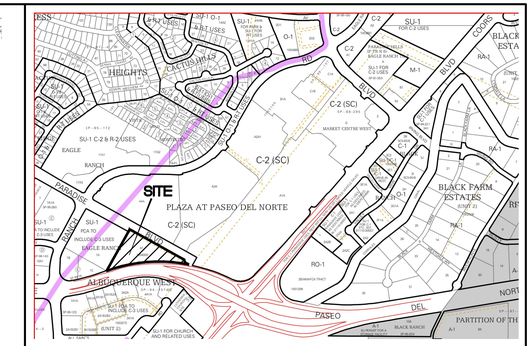
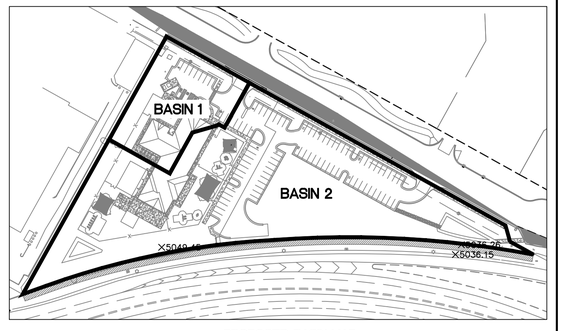
DRAWN BY: pm
DATE: 11-1-18
DRAWING:
SHEET #: 3-B
JOB #: 2017092







PROPOSED BASIN MAP

LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT–OF–WAY
- BUILDING
- SIDEWALK
- RETAINING WALL
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION (FLOWLINE)
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- 5010 EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION
- EXISTING LIGHT STANDARD
- PHASE LINE

NOTICE TO CONTRACTORS

1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT–OF–WAY.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HERON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765–1234, FOR LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONNECTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACKFILL COMPACTION SHALL BE ACCORDING TO TRAFFIC/STREET USE.
6. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
7. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24–HOUR BASIS.
8. PRIOR TO WORK WITHIN THE PASEO DEL NORTE RIGHT–OF–WAY, A NMDOT PERMIT WILL BE REQUIRED

EXISTING DRAINAGE:

THE SITE IS CURRENTLY VACANT AND DRAINS FROM THE WEST TO EAST. IT IS BOUND BY PASEO DEL NORTE ON THE SOUTH AND EAST, PARADISE BOULEVARD ON THE NORTH AND AN EXISTING BUILDING ON THE WEST AND CONTAINS APPROXIMATELY 3.48 ACRES. THE STORM WATER FROM THIS SITE FLOWS INTO PARADISE BOULEVARD AND CONTINUES EAST TO A POND LOCATED BEHIND THE MOVIE THEATER. FROM THERE THE WATER IS CONVEYED TO AN AMAFCA POND LOCATED ON THE EAST SIDE OF COORS BOULEVARD. THE SITE FALLS WITHIN THE NORTH COORS DRAINAGE MANAGEMENT PLAN MIDDLE AREA AND THE EXISTING AMAFCA POND IS SIZED TO ACCEPT DEVELOPED FLOWS FROM THIS SITE.

PROPOSED DRAINAGE:

THE SITE IS DIVIDED UP INTO TWO ON–SITE BASINS AND WILL CONTINUE TO FLOW TO THE EAST. STORM WATER WILL BE DIRECTED TO DRAIN THROUGH LANDSCAPE ISLANDS AND INTO LOW IMPACT DEVELOPMENT PONDS LOCATED THROUGHOUT THE SITE TO COMPLY WITH THE WATER HARVESTING REQUIREMENTS. EXCESS STORM WATER WILL CONTINUE TO FLOW TO THE EXISTING POND BEHIND THE MOVIE THEATER AT THE END OF PARADISE BOULEVARD AND EVENTUALLY DRAIN TO THE AMAFCA POND THAT IS SIZED TO ACCEPT THE DEVELOPED FLOWS FROM THIS SITE.

BASIN 1 WILL DISCHARGE 2.18 CFS INTO PARADISE BLVD THROUGH THE WEST ENTRANCE. BASIN 2 WILL DISCHARGE 9.33 CFS AT THE END OF PARADISE BLVD THROUGH A LID POND AND A PROPOSED SIX FOOT CURB OPENING.

THE SITE IS SET UP TO RETAIN THE "FIRST FLUSH" VOLUME WHICH TOTALS 0.040 AC–FT FOR THE SITE. A TOTAL OF 0.059 AC–FT OF PONDING IN THE LID PONDS IS PROVIDED.

EROSION CONTROL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN–OFF ON SITE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT–OF–WAY.
4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL (CITY) ACCEPTANCE OF ANY PROJECT.

Weighted E Method

On-Site Basins

Basin	Area (sf)	Area (acres)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	100-Year Weighted E (in)	100-Year Volume (ac-ft)	100-Year Flow cfs	10-Year Weighted E (in)	10-Year Volume (ac-ft)	10-Year Flow cfs
1	27,711	0.64	0%	0	40%	0.25	0%	0.00	60%	0.38	1.450	0.077	2.18	0.832	0.044	1.30
2	124,063	2.85	0%	0	40%	1.14	10%	0.28	50%	1.42	1.349	0.320	9.33	0.751	0.178	5.39
		3.48								1.81		**0.397**	**11.51**			

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted D * Total Area

Flow = Qa * Aa + Qb * Ab + Qc * Ac + Qd * Ad

Excess Precipitation, E (inches)			
Zone 1	100-Year	10 - Year
E_a	0.44	0.08
E_b	0.67	0.22
E_c	0.99	0.44
E_d	1.97	1.24

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10 - Year
Q_a	1.29	0.24
Q_b	2.03	0.76
Q_c	2.87	1.49
Q_d	4.37	2.89

POND CALCULATIONS

First Flush Pond

Ab - Bottom Of The Pond Surface Area
At - Top Of The Pond Surface Area
D - Water Depth
Dt - Total Pond Depth
C - Change In Surface Area / Water Depth

Volume = Ab * D + 0.5 * C * D²
C = (At - Ab) / Dt

Ab = 1,201.00
At = 2,202.00
Dt = 2.00
C = 500.50

ACTUAL ELEV.	DEPTH (FT)	VOLUME (AC-FT)	
5034.00	0.00	0.00	
5034.50	0.50	0.0138	
5034.75	0.75	0.0210	
5035.00	1.00	0.0290	
5035.32	1.32	0.0403	First Flush Volume
5035.50	1.50	0.0471	
5036.00	2.00	0.0681	

FIRST FLUSH CALCULATION
BASIN 1: 16552 SF X 0.34"/12"=469 CF
BASIN 2: 61855 SF X 0.34"/12"=1753 CF
BASIN 1 WILL BE COVERED BY A WAIVER FOR 16552 SF

ENGINEER'S SEAL
RONALD R. BOHANNAN NEW MEXICO 7868 PROFESSIONAL ENGINEER
11/16/2018
RONALD R. BOHANNAN P.E. #7868

PRIMROSE SCHOOL OF NW ALBUQUERQUE

GRADING AND DRAINAGE PLAN

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