DS #: 5097

APN: 139-32-405-006

PROJECT: Wasden Elementary School

SUBMITTAL: 1st

SCANNED BY/DATE:

CHECKED BY/DATE:

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: February 28, 2019
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Wasden Elementary School**			**COPIES TO:** Atkins
Cross Streets:	SEQ of Campbell Drive & Palomino Lane			School Board of Trustees c/o Real Property Management
File Number:	F:\Depot\DSMemos\DS5097A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-32-405-006			
Zoning Action:	SDR-75121; VAR-75119 & VAR-75120			
FEMA Flood Zone	YES	NO **X**		
Proposed Storm Drain	YES **X**	NO		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	2/6/2019	2/20/2019 & 2/28/2019	See Comments Below	$400.00	503000: $400
			TOTAL FEES (LDDRS):	**$400.00**	**----**

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

1. Provide a copy of the zoning/planning conditions associated with this site (**SDR-75121; VAR-75119 & VAR-75120**) with the next submittal to verify compliance with conditions. Flood Control will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the City Council). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be re vised and resubmitted.
2. Provide the McCarran Area Rainfall Map, and all other tables provided by the *Clark County Regional Flood Control District* to confirm all design storm criteria used.
3. Provide the soils survey and curve number calculations used so that the curve number values may be confirmed.
4. Address if there is any emergency overflow path for the proposed courtyard. For example on **Sheet C3.03** on the west side of **East Classroom Building**, a DI at *95.90 TG* appears to have to overcome a 96.40 highpoint at the gate if the DI is totally clogged. This is equal to the proposed finished floor elevation which will cause flooding damage to the building.
5. **Sheet C3.01**: The configuration of the onsite north storm drain system does not match the one shown on the *Master Drainage Plan* or the grading plan (Sheet C3.03). Review and revise accordingly.

6. "**Proposed Onsite Stormwater Facility Plan**" and "**Master Drainage Plan**" both bear the same plan identity: namely **Sheet C3.01?.** Correct in the next submittal.

7. **Sheet C3.02** and **Sheet C3.04**: Identify an existing public drainage easement adjacent to the west of the school site originated from the *Midtown Modern LLC* parcel. Label with recorded document number or final map number on the grading plans.

8. **Sheet C3.03**: The discharge point of the east storm drain system appears to be at the swale along the eastern boundary of the school site. However, per Storm Drain Construction Note #10, Detail 15 on Sheet C6.04, the direction of flow in the storm drains are towards the driveway instead of into the swale, ie, in the opposite direction. Address and resolve in the next submittal.

9. The grading plans show section details such as A/29 or E/28 which indicates that the corresponding details will be found in Sheet 28 or Sheet 29. However, the sheet numbering system doesn't appear to have pure numbers at all. The numbering system is *Sheet Cx.xx* rather than 1, 2, 3 etc. Review and revise accordingly in the next submittal.

10. All grading plans must be wet stamped and signed by the engineer.

11. Provide Finished Floor Elevations for all adjacent properties.

12. For parking lot LID and storm water quality, the engineer must provide calculations (per *Section 1500 of the CCRFCD Hydrologic Criteria and Drainage Design Manual*) to justify that the length, width and depth of the landscape swales are meeting the design guidelines in an effective disconnected impervious areas layout.

13. The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q_{100} depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

TC	FF shown	Min FF
2096.80'	2096.60'	2097.30'

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
WSP/AYS

T/R/S: T20S/R61E/32
AREA M-32

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Wasden Elementary School Date: Feb. 6, 2019

Location of Development: a) Descriptive (Cross Streets) North/South: Campbell Dr.

East/West: Palomino Ln.

b) Section: 32 Township: 20 Range: 61

c) APN: 139-32-405-006

Name of Owner: School Board of Trustees c/o Real Property Management

Telephone No.: (702) 799-5214 Fax No.: E-Mail Address:

Address: 1180 Military Tribute PL, Henderson NV 89074

Contact Person-Name: Janelle Klein **Telephone No.:** (702) 551-0365

*** E-Mail Address:** janelle.klein@atkinsglobal.com **Fax No.:**

Firm: Atkins

Address: 2270 Corporate Circle Suite 200, Henderson NV 89074

Type of Land Development/Land Disturbance Process:

	Rezoning		Subdivision Map		Clearing and Grading Only
	Parcel Map		Planned Unit Development		Other (Please specify below)
	Large Parcel Map	✓	Building Permit		

1. Total Owned Land Area: At Site: 9.09ac Being Developed/Disturbed: 9.09ac
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ☒ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ **Yes**** ☒ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Civic District (School)
5. Approximate upstream land area which drains to the subject site: ±44 acres
6. Has the site drainage been evaluated in the past? ☐ **YES** ☒ **NO** If yes, please identify documentation:
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Palomino Ln
8. Briefly describe your proposed schedule for the subject project: ASAP

PROFESSIONAL ENGINEER - STATE OF NEVADA
JANELLE L. KLEIN
EXP. 6/30/19
CIVIL
No. 17313

Engineer's Seal 2/4/19

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

****Review and concurrence of the Clark County Regional Flood Control District is required.**

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: Wasden Elementary School	Map ID: 139-32-405-006
Firm Name: Atkins	Engineer: Janelle Klein
Address: 2270 Corporate Circle #200	
City: Henderson	State: NV Zip: 89074
Phone Number: (702) 551-0365	Fax Number:
Property Owner: School Board of Trustees % Real Property Managment	
Address: 1180 Military Tribute PL	
City: Henderson	State: NV Zip: 89074

Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes	No	
✓		Design Manual **Standard Form 1** with the engineer's seal and signature.
✓		Design Manual **Standard Form 4**.
✓		2 copies of the 24" x 36" Drainage Plan.
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

Yes	No	
✓		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
✓		A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
✓		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
✓		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
✓		Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
✓		Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
✓		Minimum scale: 1" = 60'.
✓		Project name.
✓		Vicinity Map with local and major cross streets.
✓		Revision box.
✓		North arrow and bar scale.
✓		Engineer's/consultant's address and phone number.
✓		Elevation datum and benchmark.
✓		Legend for symbols and abbreviations.
✓		Cut/fill scarps, where applicable.
✓		Street names, grades, widths.
✓		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
✓		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
✓		Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
✓		Proposed typical street sections.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
____	N/A	Streets with off-set crowns.
✓	____	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
✓	____	Property lines.
✓	____	Right-of-way lines and widths, existing and proposed.
✓	____	Existing improvements and their elevations.
✓	____	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
✓	____	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
✓	____	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
✓	____	Location and cross-section of street capacity calculations.
✓	____	Cross-sectional detail for channels, including cutoff wall locations.
✓	____	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
____	N/A	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
____	N/A	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
____	N/A	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
✓	____	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
✓	____	Building and/or lot numbers.
____	N/A	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
✓	____	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
____	N/A	For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
____	N/A	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows.
✓	____	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
✓	____	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
✓	____	Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
✓	____	Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
✓	____	Use of correct precipitation values in and around the McCarran Airport rainfall area.
✓	____	A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
✓	____	A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable.
✓	____	Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
✓	____	On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
✓	____	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
____	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
✓	____	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. Q_{100} d x v $\leq$ 8. Q_{10} d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
✓	____	A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
____	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
____	N/A	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
____	N/A	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
____	N/A	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
✓	____	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
✓	____	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
✓	____	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
✓	____	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
✓		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. JLK by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
✓		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
✓		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
✓		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

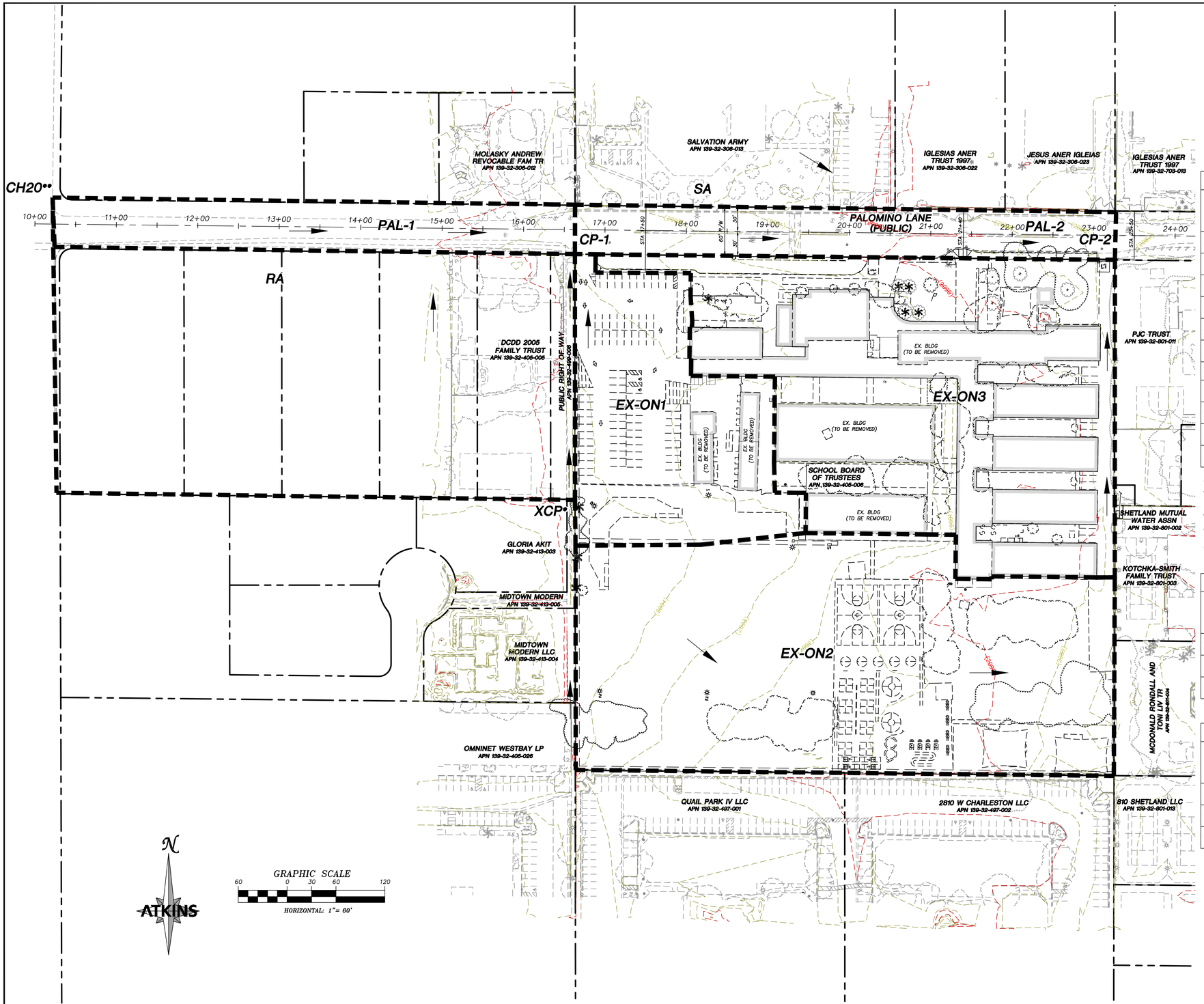
II. GRADING PLAN INFORMATION		
Yes	No	
✓		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
✓		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
✓		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
✓		Back of lot elevations and lot drainage pattern for all lots including common lots.
	N/A	Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
✓		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
✓		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
✓		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
	N/A	Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
	N/A	The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
✓		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
	N/A	Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
	N/A	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.



N

ATKINS

GRAPHIC SCALE

60 0 30 60 120

HORIZONTAL: 1"= 60'

EXISTING CONDITION HYDROLOGY SUMMARY

HEC–1 NODE	AREA (ACRES)	AREA (MI^2)	10–YEAR DISCHARGE (CFS)	100–YEAR DISCHARGE (CFS)
RA	4.36	0.0068	3	8
XCP*	*	*	15*	30*
CH20**	**	**	15**	32**
PAL–1	0.87	0.0014	1	3
EX–ON1	1.62	0.0025	2	4
CP–1	–	–	36^{+}	76^{+}
EX–ON2	4.15	0.0065	2	6
EX–ON3	3.32	0.0052	4	8
SA	2.72	0.0043	4	7
PAL–2	0.91	0.0014	2	3
CP–2	–	–	46^{+}	99^{+}

XCP* REFERENCED FROM THE TECHNICAL DRAINAGE STUDY 750 & 800 WEXLER COURT – UPDATE TO HASTINGS & CAMPBELL.

CH20** REFERENCED FROM THE CITY OF LAS VEGAS CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN.

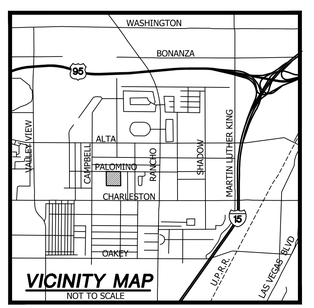
$^{+}$INCLUDES REFERENCED FLOW.

EXISTING CONDITION HYDRAULIC SUMMARY

SECTION	SLOPE	10–YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	36	3.17	0.42	1.33
PAL 21+40	0.758%	36	3.24	0.52	1.68
PAL 23+50	1.224%	46	3.93	0.48	1.89

EXISTING CONDITION HYDRAULIC SUMMARY

SECTION	SLOPE	100–YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	76	3.88	0.55	2.13
PAL 21+40	0.758%	76	4.04	0.65	2.63
PAL 23+50	1.224%	99	5.03	0.64	3.22



VICINITY MAP

NOT TO SCALE

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT

PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT

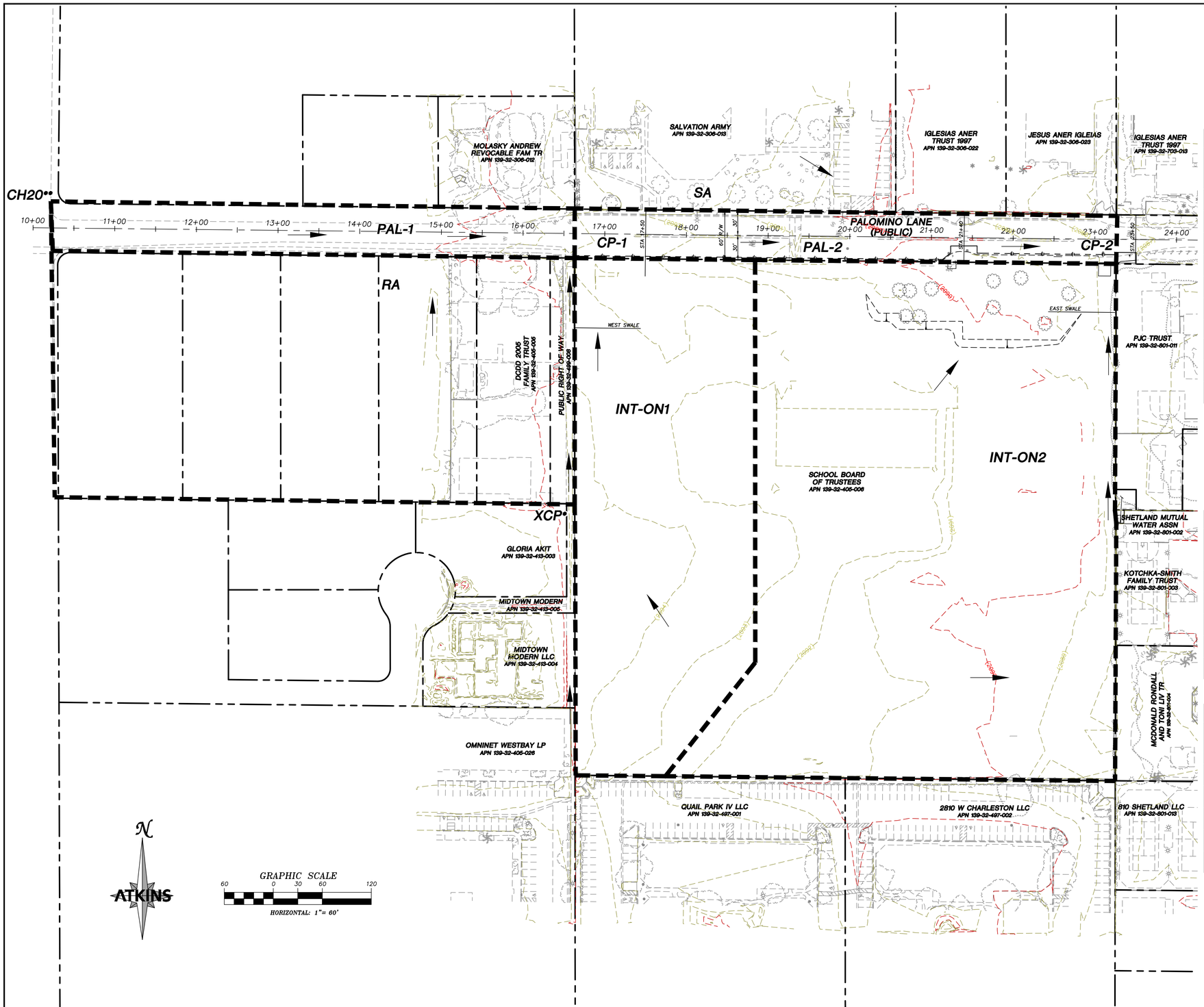
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

EXISTING DRAINAGE BASIN MAP

DESIGNED BY: J. KLEIN
DRAWN BY: J. KLEIN
CHECKED BY: M. ANDERSON
HORIZ.: 1"=60'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 8/30
existing
CLV00-00000-XXX

X:\Projects\Land Development\SH Architecture\100062041 – Wasden Elementary\Drainage\62041-EX DRAINAGE.dwg LAYOUT: existing Feb 04, 2019 – 10:44AM



INTERIM CONDITION HYDROLOGY SUMMARY

HEC–1 NODE	AREA (ACRES)	AREA (MI^2)	10–YEAR DISCHARGE (CFS)	100–YEAR DISCHARGE (CFS)
RA	4.36	0.0068	3	8
XCP*	*	*	15*	30*
CH20**	**	**	15**	32**
PAL–1	0.87	0.0014	1	3
INT–ON1	3.03	0.0047	3	7
CP–1	–	–	37^{+}	80^{+}
INT–ON2	6.06	0.0095	7	14
SA	2.72	0.0043	4	8
PAL–2	0.91	0.0014	2	3
CP–2	–	–	49^{+}	104^{+}

XCP* REFERENCED FROM THE TECHNICAL DRAINAGE STUDY 750 & 800 WEXLER COURT – UPDATE TO HASTINGS & CAMPBELL.

CH20** REFERENCED FROM THE CITY OF LAS VEGAS CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN.

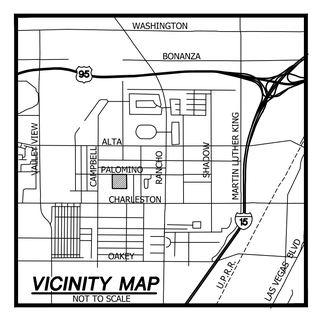
$^{+}$INCLUDES REFERENCED FLOW.

INTERIM CONDITION HYDRAULIC SUMMARY

SECTION	SLOPE	10–YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	37	2.75	0.52	1.43
PAL 21+40	0.758%	37	2.63	0.63	1.66
PAL 23+50	1.224%	49	4.01	0.49	1.96
WEST SWALE	0.40%	3	1.93	0.62	1.20
EAST SWALE	0.42%	7	2.42	0.85	2.06

INTERIM CONDITION HYDRAULIC SUMMARY

SECTION	SLOPE	100–YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	80	3.48	0.66	2.30
PAL 21+40	0.758%	80	3.58	0.76	2.72
PAL 23+50	1.224%	104	5.11	0.65	3.32
WEST SWALE	0.40%	7	2.38	0.86	2.05
EAST SWALE	0.42%	14	2.88	1.10	3.17



REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

INTERIM DRAINAGE BASIN MAP

DESIGNED BY: J. KLEIN
DRAWN BY: J. KLEIN
CHECKED BY: M. ANDERSON
HORIZ.: 1"=60'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 9/30
Interim
CLV 00–00000–XXX

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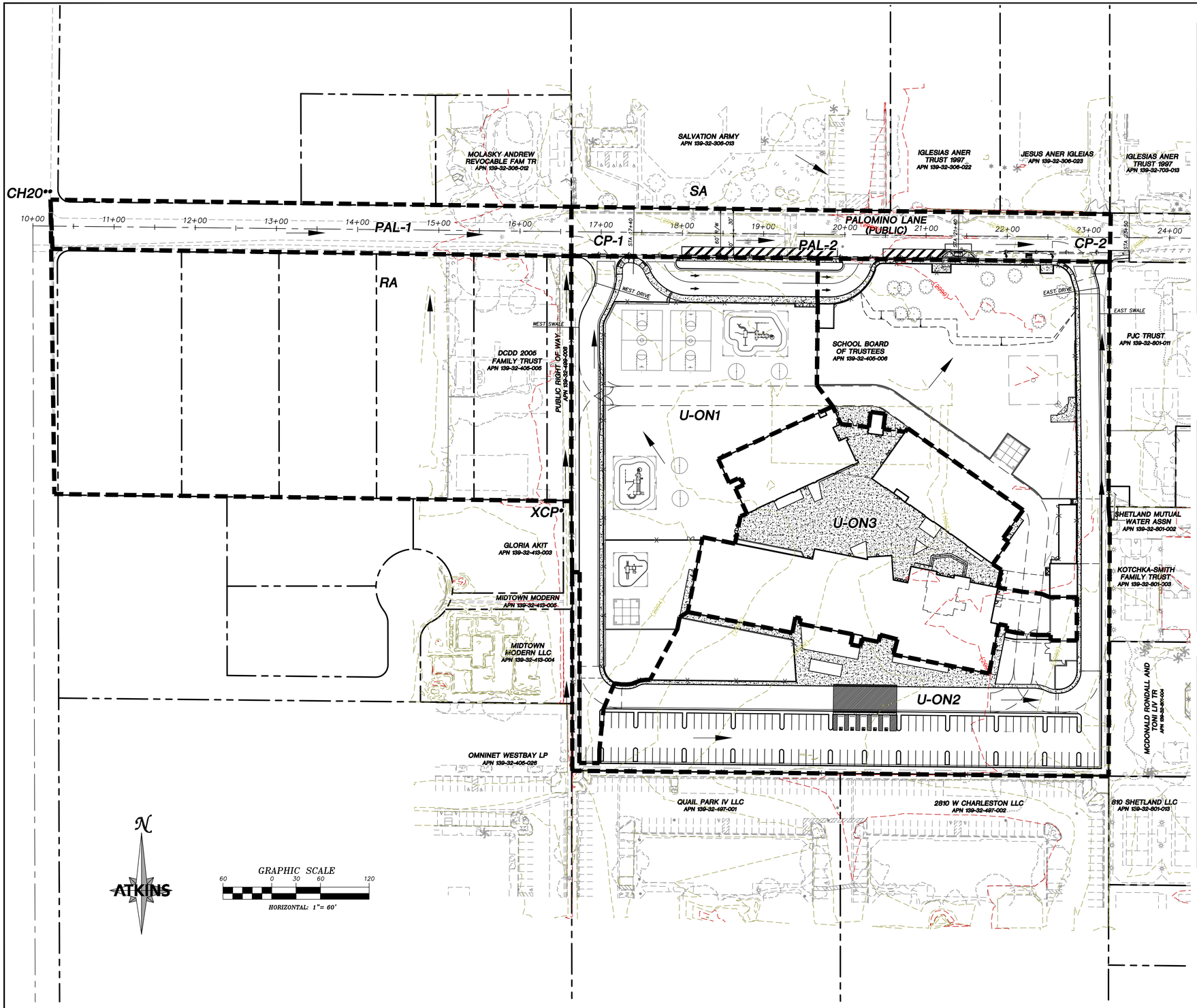


N

ATKINS

GRAPHIC SCALE

60 0 30 60 120

HORIZONTAL: 1"= 60'

ULTIMATE CONDITION HYDROLOGY SUMMARY				
HEC-1 NODE	AREA (ACRES)	AREA (MI^2)	10-YEAR DISCHARGE (CFS)	100-YEAR DISCHARGE (CFS)
RA	4.36	0.0068	3	8
XCP*	*	*	14*	29*
CH20**	**	**	15**	32**
PAL-1	0.87	0.0014	1	3
U-ON1	2.71	0.0042	5	9
CP-1	–	–	38^{+}	80^{+}
U-ON2	4.79	0.0075	4	11
U-ON3	2.12	0.0033	4	7
SA	2.72	0.0043	4	8
PAL-2	0.91	0.0014	2	3
CP-2	–	–	52^{+}	109^{+}

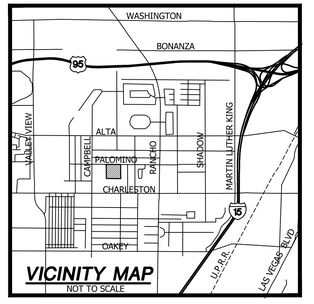
XCP* REFERENCED FROM THE TECHNICAL DRAINAGE STUDY 750 & 800 WEXLER COURT – UPDATE TO HASTINGS & CAMPBELL.

CH20** REFERENCED FROM THE CITY OF LAS VEGAS CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN.

$^{+}$INCLUDES REFERENCED FLOW.

ULTIMATE CONDITION HYDRAULIC SUMMARY					
SECTION	SLOPE	10-YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	38	3.23	0.61	1.97
PAL 21+40	0.758%	38	3.32	0.55	1.83
PAL 23+50	1.224%	52	4.09	0.50	2.05
WEST SWALE	0.40%	0.5	1.23	0.32	0.39
EAST SWALE	0.42%	4	2.11	0.69	1.46
WEST DRIVE	1.19%	5	2.95	0.33	0.97
EAST DRIVE	2.32%	6.3	4.46	0.35	1.56

ULTIMATE CONDITION HYDRAULIC SUMMARY					
SECTION	SLOPE	100-YEAR FLOW (FT^3/SEC)	VELOCITY (FT/SEC)	DEPTH (FT)	DxV
PAL 17+50	0.862%	80	4.34	0.73	3.17
PAL 21+40	0.758%	80	4.10	0.68	2.79
PAL 23+50	1.224%	109	5.19	0.67	3.48
WEST SWALE	0.40%	1	1.46	0.41	0.60
EAST SWALE	0.42%	11	2.71	1.01	2.74
WEST DRIVE	1.19%	9	3.40	0.40	1.36
EAST DRIVE	2.32%	14	5.43	0.46	2.50



VICINITY MAP
NOT TO SCALE

REVISIONS			
REV.	DESCRIPTION	BY	DATE
			APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

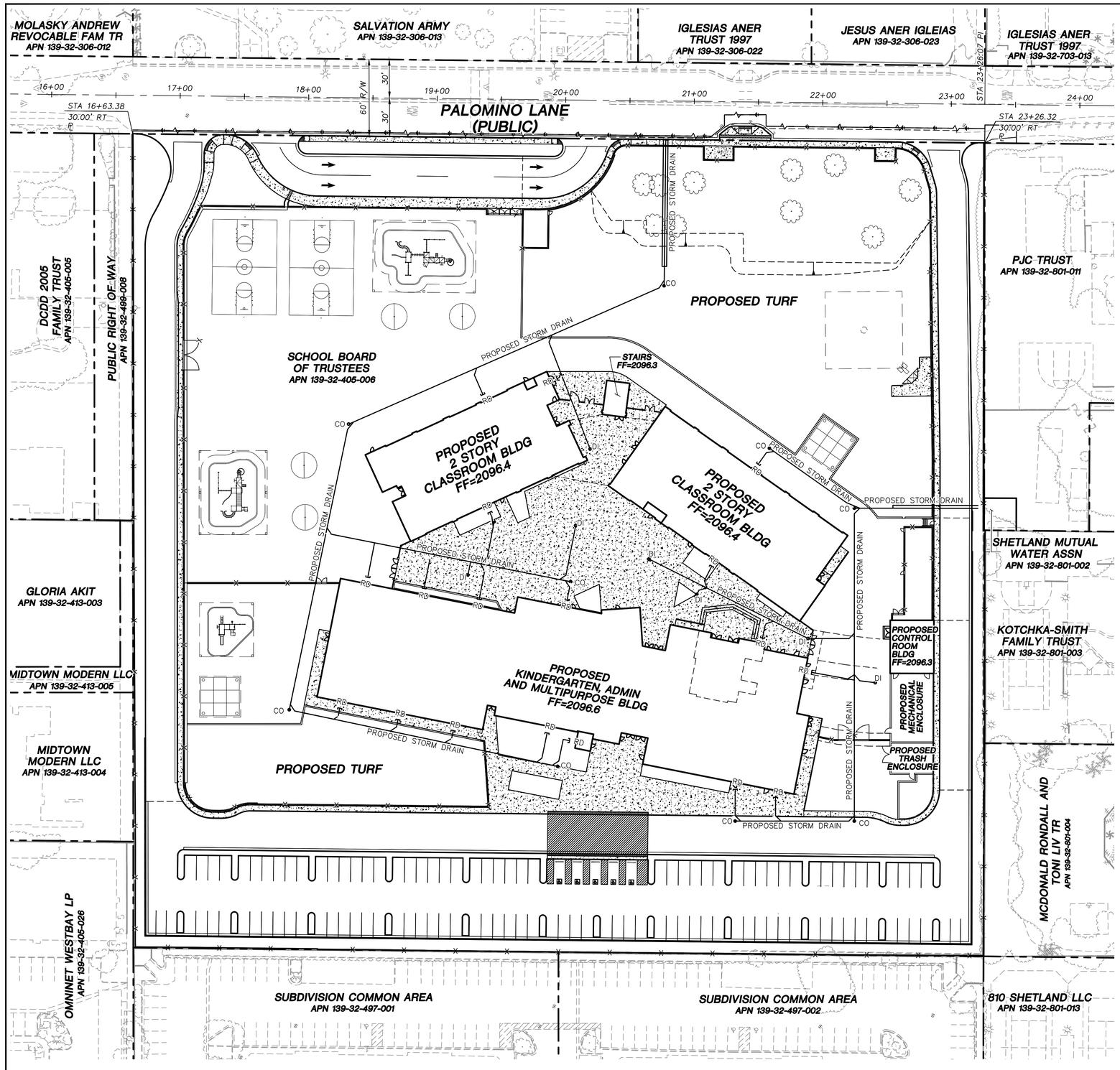
ULTIMATE DRAINAGE BASIN MAP

DESIGNED BY: J. KLEIN
DRAWN BY: J. KLEIN
CHECKED BY: M. ANDERSON
HORZ.: 1"=60'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 10/30
CLV 00-00000-XXX

ultimate

X:\Projects\Land Development\SH Architecture\100062041 – Wasden Elementary\Drainage\62041-ULT DRAINAGE.dwg LAYOUT: ultimate Jan 29, 2019 – 2:30PM



GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

N

ATKINS

SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY	UNIT
DRAINAGE		
4" SDR-35 ROOF DRAIN LATERAL	368	LF
6" SDR-35 STORM DRAIN PIPE	133	LF
8" SDR-35 STORM DRAIN PIPE	300	LF
12" SDR-35 STORM DRAIN PIPE	1,631	LF
STORM DRAIN AREA DRAIN	7	EA
STORM DRAIN CLEAN OUT	9	EA

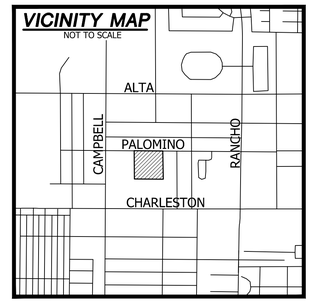
MASTER PLAN NOTE

THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

DRAINAGE NOTES

1. SEE SHEETS C3.02 TO C3.05 FOR CONSTRUCTION NOTES AND INFORMATION RELATED TO STORM DRAIN.
2. ALL STORM DRAIN MATERIAL TO BE PVC SDR-35, UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.

VICINITY MAP
NOT TO SCALE



REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

PROPOSED ONSITE STORMWATER FACILITY PLAN

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: M. ANDERSON
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 11/30
C3.01
CLV00-00000-XXX

X:\Projects\Land Development\SH Architecture\100062041 - Wasden Elementary\Drainage\62041-STORM DRAIN.dwg LAYOUT: C3.01 Jan 29, 2019 - 2:06PM

Appendix A

Drainage Study Appendix

- Appendix A-1: Existing Condition Hydrologic Parameters
- Appendix A-2: Existing Condition Hydrologic Model
- Appendix A-3: Interim Condition Hydrologic Parameters
- Appendix A-4: Interim Condition Hydrologic Model
- Appendix A-5: Ultimate Condition Hydrologic Parameters
- Appendix A-6: Ultimate Condition Hydrologic Model
- Appendix A-7: Normal Depth Calculations
- Appendix A-8: Ultimate Condition Hydraulic Model

Appendix A-1

Existing Condition Hydrologic Parameters

Wasden Elementary School
Existing Condition

Atkins Job #

Calculated by: JLK
Checked by: MMA

Subbasin Data						Initial Overland Time (t_i)			Travel Time (t_t)					t_c check (Urbanized basins)				Remarks
Subbasin	Dev. or Ex.	CN	K	Area (Acres)	Area (mi^2)	Length (ft)	Slope (%)	time (min)	Length (ft)	Slope (%)	V_1 (fps)	V_2 (fps)	Travel Time	t_c (calc)	Max t_c	Min t_c	Lag Time (hr)	
RA	D	84	0.719	4.36	0.0068	120	1.00	7.52	301	1.00	2.02	3.06	5.02	12.53	13.90	5.00	0.125	
PAL-1	D	93	0.838	0.87	0.0014	30	2.00	2.05	630	1.00	2.02	3.06	4.10	6.15	16.11	5.00	0.062	
EX-ON1	D	93.5	0.845	1.62	0.0025	140	0.50	6.86	350	0.50	1.43	2.16	11.67	18.52	14.54	5.00	0.145	
EX-ON2	D	80.7	0.675	4.15	0.0065	275	0.55	15.48	660	0.80	1.81	2.74	4.57	20.05	18.66	5.00	0.187	
EX-ON3	D	91.0	0.811	3.32	0.0052	195	0.50	9.16	390	0.50	1.43	2.16	13.00	22.16	15.42	5.00	0.154	
SA	D	95	0.864	2.72	0.0043	394	1.00	8.43	302	1.00	2.02	3.06	5.03	13.47	16.44	5.00	0.135	
PAL-2	D	98	0.904	0.91	0.0014	30	2.00	1.54	663	1.00	2.02	3.06	4.10	5.63	16.42	5.00	0.056	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

STANDARD FORM 4

Appendix A-2

Existing Condition Hydrologic Model

```
1****************************************
****************************************
 *                                      *
*                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*                                       *
 *              JUN   1998              *
*                                       *
 *            VERSION 4.1               *
*                                       *
 *                                      *
*                                       *
 *  RUN DATE   06NOV18  TIME  09:18:52  *
*                                       *
 *                                      *
*                                       *
 ****************************************
****************************************
```


U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104


```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X              X
XXXXXXX  XXXX    X        XXXXX X
X     X  X       X              X
X     X  X       X     X        X
X     X  XXXXXXX  XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

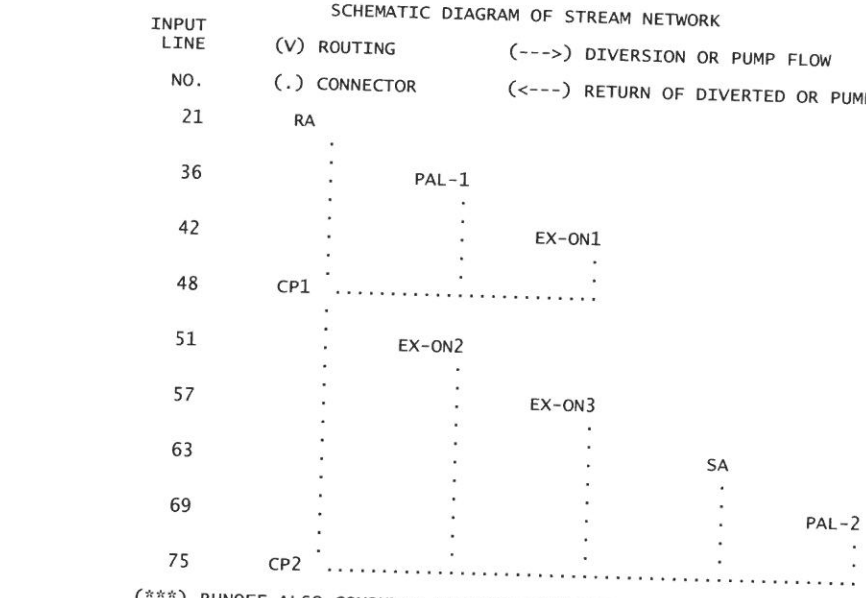
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID   ********************************************************************
    2         ID   * .................................................................. *
    3         ID   * :                                                                : *
    4         ID   * :                                                                : *
    5         ID   * :              WASDEN ELEMENTARY SCHOOL                          : *
    6         ID   * :              DRAINAGE STUDY                                    : *
    7         ID   * :              EXISTING CONDITIONS                               : *
    8         ID   * :................................................................: *
    9         ID   * :              RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR            : *
   10         ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3                   : *
   11         ID   * :              PROJECT NO_ _ _ _ _ 100062041                     : *
   12         ID   * :              FILENAME_ _ _ _ _ _ EXISTING.H1                   : *
   13         ID   * :              DATE MODELED_ _ _ _ 11/06/18                      : *
   14         ID   * :              MODELED BY_ _ _ _ _ JLK                           : *
   15         ID   * :................................................................: *
   16         ID   ********************************************************************
   17         ID
   18         IT       5       0       0     300
   19         IO       5
   20         IN       5       0       0
   21         JR    PREC     .57       1
              *
   22         KK    RA
   23         KM    EXISTING UPSTREAM RESIDENTIAL SUBBASIN RA
   24         KM             AREA    4.36 AC
   25         PB    2.77
   26         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   27         PC    .130    .130    .133    .140    .142    .148    .158    .172    .181
   28         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   29         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   30         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   31         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   32         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   33         PC    .998    .999    1.00
   34         BA   .0068
   35         LS       0    84.0
   36         UD    .125
              *
   37         KK   PAL-1
   38         KM   EXISTING UPSREAM PALOMINO LANE SUBBASIN PAL-1
   39         KM             AREA    0.87 AC
   40         BA   .0014
   41         LS       0    93.0
   42         UD    .062
              *
   43         KK  EX-ON1
   44         KM   EXISTING ONSITE PARKING LOT SUBBASIN EX-ON1
   45         KM             AREA    1.62 AC
   46         BA   .0025
   47         LS       0    93.5
```

```
 47          UD    .145
             *
1                                        HEC-1 INPUT                                                    PAGE  2
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 48          KK   CP1
 49          KM   COMBINES FLOWS FROM RA, PAL-1 AND EX-ON1
 50          HC      3
             *

 51          KK  EX-ON2
 52          KM   EXISTING ONSITE PLAYGROUND SUBBASIN EX-ON2
 53          KM            AREA    4.15 AC
 54          BA   .0065
 55          LS      0    80.7
 56          UD    .187
             *

 57          KK  EX-ON3
 58          KM   EXISTING ONSITE BUILDINGS SUBBASIN EX-ON3
 59          KM            AREA    3.32 AC
 60          BA   .0052
 61          LS      0    91.0
 62          UD    .154
             *

 63          KK      SA
 64          KM   EXISTING ADJACENT SUBBASIN SA
 65          KM            AREA    2.72 AC
 66          BA   .0043
 67          LS      0    95.0
 68          UD    .135
             *

 69          KK   PAL-2
 70          KM   EXISTING ADJACENT PALOMINO LANE SUBBASIN PAL-2
 71          KM            AREA    0.91 AC
 72          BA   .0014
 73          LS      0    98.0
 74          UD    .056
             *

 75          KK   CP2
 76          KM   COMBINES FLOWS FROM CP1, EX-ON2, EX-ON3, SA AND PAL-2
 77          HC      5
             *
 78          ZZ
1
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*****************************************
 *                                       *
*                                        *                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*                                        *                                        *   U.S. ARMY CORPS OF ENGINEERS
 *              JUN   1998               *
*                                        *                                        *   HYDROLOGIC ENGINEERING CENTER
 *           VERSION 4.1                 *
*                                        *                                        *        609 SECOND STREET
 *                                       *
*                                        *                                        *      DAVIS, CALIFORNIA 95616
 *  RUN DATE   06NOV18  TIME  09:18:52   *
*                                        *                                        *        (916) 756-1104
 *                                       *
*                                        *                                        *
 *****************************************
```

```
WASDEN ELEMENTARY SCHOOL
DRAINAGE STUDY
EXISTING CONDITIONS

RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR
DISTRIBUTION_ _ _ _ 6-HOUR SDN3
PROJECT NO_ _ _ _ _ 100062041
FILENAME_ _ _ _ _ _ EXISTING.H1
DATE MODELED_ _ _ _ 11/06/18
MODELED BY_ _ _ _ _ JLK
```

```
 18 IO        OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT         HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1   0  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2   0  ENDING DATE
                  NDTIME       0055  ENDING TIME
                   ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE    24.92 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

    JP        MULTI-PLAN OPTION
                 NPLAN             1  NUMBER OF PLANS

    JR        MULTI-RATIO OPTION
                 RATIOS OF PRECIPITATION
                 .57      1.00
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	RA	.01	1	FLOW	3.	8.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	PAL-1	.00	1	FLOW	1.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	EX-ON1	.00	1	FLOW	2.	4.
				TIME	3.58	3.58
3 COMBINED AT						
+	CP1	.01	1	FLOW	6.	14.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	EX-ON2	.01	1	FLOW	2.	6.
				TIME	3.67	3.58
HYDROGRAPH AT						
+	EX-ON3	.01	1	FLOW	4.	8.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	SA	.00	1	FLOW	4.	7.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	PAL-2	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
5 COMBINED AT						
+	CP2	.03	1	FLOW	16.	37.
				TIME	3.58	3.58

*** NORMAL END OF HEC-1 ***

Appendix A-3

Interim Condition Hydrologic Parameters

Wasden Elementary School
Interim Condition

Atkins Job # 100062041

Calculated by: JLK 1/29/2018
Checked by: MMA

Subbasin Data						Initial Overland Time (t_i)			Travel Time (t_t)					t_c check (Urbanized basins)				Remarks
Subbasin	Dev. or Ex.	CN	K	Area (Acres)	Area (mi^2)	Length (ft)	Slope (%)	time (min)	Length (ft)	Slope (%)	V_1 (fps)	V_2 (fps)	Travel Time	t_c (calc)	Max t_c	Min t_c	Lag Time (hr)	
RA	D	84	0.719	4.36	0.0068	120	1.00	7.52	301	1.00	2.02	3.06	3.04	10.56	13.90	5.00	0.106	
PAL-1	D	93	0.838	0.87	0.0014	30	2.00	2.05	630	0.85	1.86	2.82	5.24	7.30	16.11	5.00	0.073	
IN-ON1	D	91	0.811	3.03	0.0047	100	1.00	5.20	520	0.50	1.43	2.16	5.82	11.02	15.74	5.00	0.110	
IN-ON2	D	91	0.811	6.06	0.0095	300	1.00	9.00	620	0.50	1.43	2.16	5.77	14.78	18.52	5.00	0.148	
SA	D	95	0.864	2.72	0.0043	394	1.00	8.43	302	1.00	2.02	3.06	3.05	11.48	16.44	5.00	0.115	
PAL-2	D	98	0.904	0.91	0.0014	30	2.00	1.54	663	1.00	2.02	3.06	5.01	6.55	16.42	5.00	0.066	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

STANDARD FORM 4

Appendix A-4

Interim Condition Hydrologic Model

```
1*****************************************
*****************************************
 *                                       *
     *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
ENGINEERS     *
 *                JUN   1998             *
CENTER    *
 *             VERSION 4.1               *
     *                                   *
 *                                       *
     *                                   *
 *  RUN DATE   29JAN19  TIME  11:15:35   *
     *
 *                                       *
     *                                   *
 *****************************************
*****************************************
```

```
*                                       *
*    U.S. ARMY CORPS OF                 *
*    HYDROLOGIC ENGINEERING             *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT


```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

          *DIAGRAM
    1     ID   ********************************************************************
    2     ID   * .............................................................. *
    3     ID   * :                                                            : *
    4     ID   * :              WASDEN ELEMENTARY SCHOOL                      : *
    5     ID   * :              DRAINAGE STUDY                                : *
    6     ID   * :              INTERIM CONDITIONS                            : *
    7     ID   * :............................................................: *
    8     ID   * :              RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR        : *
    9     ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3               : *
   10     ID   * :              PROJECT NO_ _ _ _ _ 100062041                 : *
   11     ID   * :              FILENAME_ _ _ _ _ _ INTERIM.H1                : *
   12     ID   * :              DATE MODELED_ _ _ _ 01/29/19                  : *
   13     ID   * :              MODELED BY_ _ _ _ _ JLK                       : *
   14     ID   * :............................................................: *
   15     ID   ********************************************************************
   16     ID
   17     IT       5       0       0     300
   18     IO       5
   19     IN       5       0       0
   20     JR    PREC     .57       1
          *
   21     KK    RA
   22     KM   EXISTING UPSTREAM RESIDENTIAL SUBBASIN RA
   23     KM            AREA    4.36 AC
   24     PB    2.77
   25     PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   26     PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   27     PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   28     PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   29     PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   30     PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   31     PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   32     PC    .998    .999   1.00
   33     BA   .0068
   34     LS       0    84.0
   35     UD    .106
          *
   36     KK   PAL-1
   37     KM   EXISTING UPSREAM PALOMINO LANE SUBBASIN PAL-1
   38     KM            AREA    0.87 AC
   39     BA   .0014
   40     LS       0    93.0
   41     UD    .073
          *
   42     KK  IN-ON1
   43     KM   INTERIM ONSITE SUBBASIN IN-ON1
   44     KM            AREA    3.03 AC
   45     BA   .0047
   46     LS       0    91.0
```

```
 47          UD    .110
             *
1                                        HEC-1 INPUT                                                    PAGE  2
 LINE        ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 48          KK   CP1
 49          KM   COMBINES FLOWS FROM RA, PAL-1 AND IN-ON1
 50          HC       3
             *

 51          KK  IN-ON2
 52          KM   INTERIM ONSITE SUBBASIN IN-ON2
 53          KM             AREA    6.06 AC
 54          BA   .0095
 55          LS       0    91.0
 56          UD    .148
             *

 57          KK      SA
 58          KM   EXISTING ADJACENT SUBBASIN SA
 59          KM             AREA    2.72 AC
 60          BA   .0043
 61          LS       0    95.0
 62          UD    .115
             *

 63          KK   PAL-2
 64          KM   EXISTING ADJACENT PALOMINO LANE SUBBASIN PAL-2
 65          KM             AREA    0.91 AC
 66          BA   .0014
 67          LS       0    98.0
 68          UD    .066
             *

 69          KK   CP2
 70          KM   COMBINES FLOWS FROM CP1, IN-ON2, SA AND PAL-2
 71          HC       4
             *
 72          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    21        RA
              .
              .
    36        .       PAL-1
              .         .
              .         .
    42        .         .       IN-ON1
              .         .         .
              .         .         .
    48        CP1 ......................
              .
              .
    51        .       IN-ON2
              .         .
              .         .
    57        .         .           SA
              .         .           .
              .         .           .
    63        .         .           .       PAL-2
              .         .           .         .
              .         .           .         .
    69        CP2 ....................................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
****************************************
 *                                      *                                                    *
 *     *                                *                                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                                    *     U.S. ARMY CORPS OF
ENGINEERS     *
 *                                      *                                                    *     HYDROLOGIC ENGINEERING
CENTER     *
 *           VERSION 4.1                *                                                    *           609 SECOND STREET
 *     *                                *                                                    *
 *                                      *                                                    *        DAVIS, CALIFORNIA 95616
 *     *                                *                                                    *
 *   RUN DATE   29JAN19  TIME  11:15:35 *                                                    *           (916) 756-1104
 *     *                                *                                                    *
 *                                      *                                                    *
 *     *                                *
 ****************************************
****************************************
```

```
*****************************************************************
*  .........................................................    *
*  :                                                       :    *
*  :              WASDEN ELEMENTARY SCHOOL                 :    *
*  :              DRAINAGE STUDY                           :    *
*  :              INTERIM CONDITIONS                       :    *
```

```
RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR
DISTRIBUTION_ _ _ _ 6-HOUR SDN3
PROJECT NO_ _ _ _ _ 100062041
FILENAME_ _ _ _ _ _ INTERIM.H1
DATE MODELED_ _ _ _ 01/29/19
MODELED BY_ _ _ _ _ JLK
```

```
 18 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0055  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL      .08 HOURS
                       TOTAL TIME BASE    24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT

    JP            MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

    JR            MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                     .57      1.00
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	RA	.01	1	FLOW	3.	8.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	PAL-1	.00	1	FLOW	1.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	IN-ON1	.00	1	FLOW	3.	7.
				TIME	3.58	3.50
3 COMBINED AT						
+	CP1	.01	1	FLOW	7.	18.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	IN-ON2	.01	1	FLOW	7.	14.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	SA	.00	1	FLOW	4.	8.
				TIME	3.58	3.50
HYDROGRAPH AT						
+	PAL-2	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
4 COMBINED AT						
+	CP2	.03	1	FLOW	19.	42.
				TIME	3.58	3.50

*** NORMAL END OF HEC-1 ***

Appendix A-5

Ultimate Condition Hydrologic Parameters

Wasden Elementary School
Ultimate Condition

Atkins Job # 100062041

Calculated by: JLK 1/23/2018
Checked by: MMA

Subbasin Data						Initial Overland Time (t_i)			Travel Time (t_t)					t_c check (Urbanized basins)				Remarks
Subbasin	Dev. or Ex.	CN	K	Area (Acres)	Area (mi^2)	Length (ft)	Slope (%)	time (min)	Length (ft)	Slope (%)	V_1 (fps)	V_2 (fps)	Travel Time	t_c (calc)	Max t_c	Min t_c	Lag Time (hr)	
RA	D	84	0.719	4.36	0.0068	120	1.00	7.52	301	1.00	2.02	3.06	3.04	10.56	13.90	5.00	0.106	
PAL-1	D	93	0.838	0.87	0.0014	30	2.00	2.05	630	1.00	2.02	3.06	4.83	6.89	16.11	5.00	0.069	
U-ON1	D	96.5	0.884	2.71	0.0042	24	2.00	1.51	520	0.40	1.28	1.94	6.51	8.02	15.04	5.00	0.080	
U-ON2	D	88.3	0.775	4.79	0.0075	62	1.24	4.29	620	0.46	1.37	2.08	6.01	10.30	16.31	5.00	0.103	
U-ON3	D	97.7	0.900	2.12	0.0033	50	0.50	3.21	100	0.50	1.43	2.16	3.33	6.55	11.39	6.00	0.065	
SA	D	95	0.864	2.72	0.0043	394	1.00	8.43	302	1.00	2.02	3.06	3.05	11.48	16.44	5.00	0.115	
PAL-2	D	98	0.904	0.91	0.0014	30	2.00	1.54	663	1.00	2.02	3.06	5.01	6.55	16.42	5.00	0.066	

Tc = Ti + Tt Tlag = 0.6 Tc

Ti = 1.8 (1.1 - K) L^1/2 / S^1/3

K = 0.0132 (CN) - 0.39

Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Existing V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2

Existing V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

STANDARD FORM 4

Appendix A-6

Ultimate Condition Hydrologic Model

```
1*****************************************
*****************************************
 *                                       *
*                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*                                        *
 *              JUN   1998               *
*                                        *
 *           VERSION 4.1                 *
*                                        *
 *                                       *
*                                        *
 *  RUN DATE   23JAN19  TIME  13:33:28   *
*                                        *
 *                                       *
*                                        *
 *****************************************
*****************************************
```

```
*                                        *
*    U.S. ARMY CORPS OF ENGINEERS        *
*    HYDROLOGIC ENGINEERING CENTER       *
*          609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104                *
*                                        *
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1

HEC-1 INPUT


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID   ********************************************************************
    2         ID   * ..................................................................  *
    3         ID   * :                                                                :  *
    4         ID   * :                WASDEN ELEMENTARY SCHOOL                        :  *
    5         ID   * :                DRAINAGE STUDY                                  :  *
    6         ID   * :                ULTIMATE CONDITIONS                             :  *
    7         ID   * :................................................................:  *
    8         ID   * :                RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR          :  *
    9         ID   * :                DISTRIBUTION_ _ _ _ 6-HOUR SDN3                 :  *
   10         ID   * :                PROJECT NO_ _ _ _ _ 100062041                   :  *
   11         ID   * :                FILENAME_ _ _ _ _ _ ULTIMATE.H1                 :  *
   12         ID   * :                DATE MODELED_ _ _ _ 01/23/19                    :  *
   13         ID   * :                MODELED BY_ _ _ _ _ JLK                         :  *
   14         ID   * :................................................................:  *
   15         ID   ********************************************************************
   16         ID
   17         IT       5       0       0     300
   18         IO       5
   19         IN       5       0       0
   20         JR    PREC     .57       1
              *
   21         KK    RA
   22         KM    EXISTING UPSTREAM RESIDENTIAL SUBBASIN RA
   23         KM             AREA    4.36 AC
   24         PB    2.77
   25         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   26         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   27         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   28         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   29         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   30         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   31         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   32         PC    .998    .999   1.00
   33         BA   .0068
   34         LS       0    84.0
   35         UD    .106
              *
   36         KK    PAL-1
   37         KM    EXISTING UPSREAM PALOMINO LANE SUBBASIN PAL-1
   38         KM             AREA    0.87 AC
   39         BA   .0014
   40         LS       0    93.0
   41         UD     .069
              *
   42         KK    U-ON1
   43         KM    ULTIMATE ONSITE SUBBASIN U-ON1
   44         KM             AREA    2.71 AC
   45         BA    .0042
   46         LS       0    96.5
```

```
     47          UD    .080
                 *
1                                        HEC-1 INPUT                                                    PAGE  2
LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     48          KK   CP1
     49          KM   COMBINES FLOWS FROM RA, PAL-1 AND U-ON1
     50          HC      3
                 *

     51          KK   U-ON2
     52          KM   ULTIMATE ONSITE SUBBASIN U-ON2
     53          KM            AREA    4.79 AC
     54          BA   .0075
     55          LS      0    88.3
     56          UD    .103
                 *

     57          KK   U-ON3
     58          KM   ULTIMATE ONSITE STORMDRAIN SUBBASIN U-ON3
     59          KM            AREA    2.12 AC
     60          BA   .0033
     61          LS      0    97.7
     62          UD    .065
                 *

     63          KK      SA
     64          KM   EXISTING ADJACENT SUBBASIN SA
     65          KM            AREA    2.72 AC
     66          BA   .0043
     67          LS      0    95.0
     68          UD    .115
                 *

     69          KK   PAL-2
     70          KM   EXISTING ADJACENT PALOMINO LANE SUBBASIN PAL-2
     71          KM            AREA    0.91 AC
     72          BA   .0014
     73          LS      0    98.0
     74          UD    .066
                 *

     75          KK   CP2
     76          KM   COMBINES FLOWS FROM CP1, U-ON2, U-ON3, SA AND PAL-2
     77          HC      5
                 *
     78          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE       (V) ROUTING           (--->) DIVERSION OR PUMP FLOW
   NO.       (.) CONNECTOR         (<---) RETURN OF DIVERTED OR PUMPED FLOW

    21          RA
                 .
                 .
    36           .        PAL-1
                 .          .
                 .          .
    42           .          .        U-ON1
                 .          .          .
                 .          .          .
    48        CP1 ..........................
                 .
                 .
    51           .        U-ON2
                 .          .
                 .          .
    57           .          .        U-ON3
                 .          .          .
                 .          .          .
    63           .          .          .          SA
                 .          .          .          .
                 .          .          .          .
    69           .          .          .          .        PAL-2
                 .          .          .          .          .
                 .          .          .          .          .
    75        CP2 ..........................................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****************************************
*****************************************
 *                                       *
*                                         *                                  *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                  *    U.S. ARMY CORPS OF ENGINEERS
*                                         *                                  *
 *              JUN   1998               *                                  *    HYDROLOGIC ENGINEERING CENTER
*                                         *                                  *
 *           VERSION 4.1                 *                                  *         609 SECOND STREET
*                                         *                                  *
 *                                       *                                  *       DAVIS, CALIFORNIA 95616
*                                         *                                  *
 *  RUN DATE   23JAN19  TIME  13:33:28   *                                  *         (916) 756-1104
*                                         *                                  *
 *                                       *
*                                         *
 *****************************************
```

```
**********************************************************************
*  .............................................................     *
*  :                                                           :     *
*  :            WASDEN ELEMENTARY SCHOOL                       :     *
*  :            DRAINAGE STUDY                                 :     *
*  :            ULTIMATE CONDITIONS                            :     *
*  :...........................................................:     *
*  :            RETURN PERIOD_ _ _ _100-YEAR & 10-YEAR         :     *
*  :            DISTRIBUTION_ _ _ _ 6-HOUR SDN3                :     *
*  :            PROJECT NO_ _ _ _ _ 100062041                  :     *
*  :            FILENAME_ _ _ _ _ _ ULTIMATE.H1                :     *
*  :            DATE MODELED_ _ _ _ 01/23/19                   :     *
*  :            MODELED BY_ _ _ _ _ JLK                        :     *
*  :...........................................................:     *
**********************************************************************
```

```
 18 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT           HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME         0000  STARTING TIME
                        NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2   0  ENDING DATE
                    NDTIME         0055  ENDING TIME
                     ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                       TOTAL TIME BASE    24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

    JP           MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

    JR           MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                     .57      1.00
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .57	RATIO 2 1.00
HYDROGRAPH AT						
+	RA	.01	1	FLOW	3.	8.
				TIME	3.58	3.58
HYDROGRAPH AT						
+	PAL-1	.00	1	FLOW	1.	3.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	U-ON1	.00	1	FLOW	5.	9.
				TIME	3.50	3.50
3 COMBINED AT						
+	CP1	.01	1	FLOW	9.	19.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	U-ON2	.01	1	FLOW	4.	11.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	U-ON3	.00	1	FLOW	4.	7.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	SA	.00	1	FLOW	4.	8.
				TIME	3.58	3.50
HYDROGRAPH AT						
+	PAL-2	.00	1	FLOW	2.	3.
				TIME	3.50	3.50
5 COMBINED AT						
+	CP2	.03	1	FLOW	23.	48.
				TIME	3.50	3.50

*** NORMAL END OF HEC-1 ***

Appendix A-7

Normal Depth Calculations

Cross Section for EX. Palomino Ln Sta 17+50 - 10 year

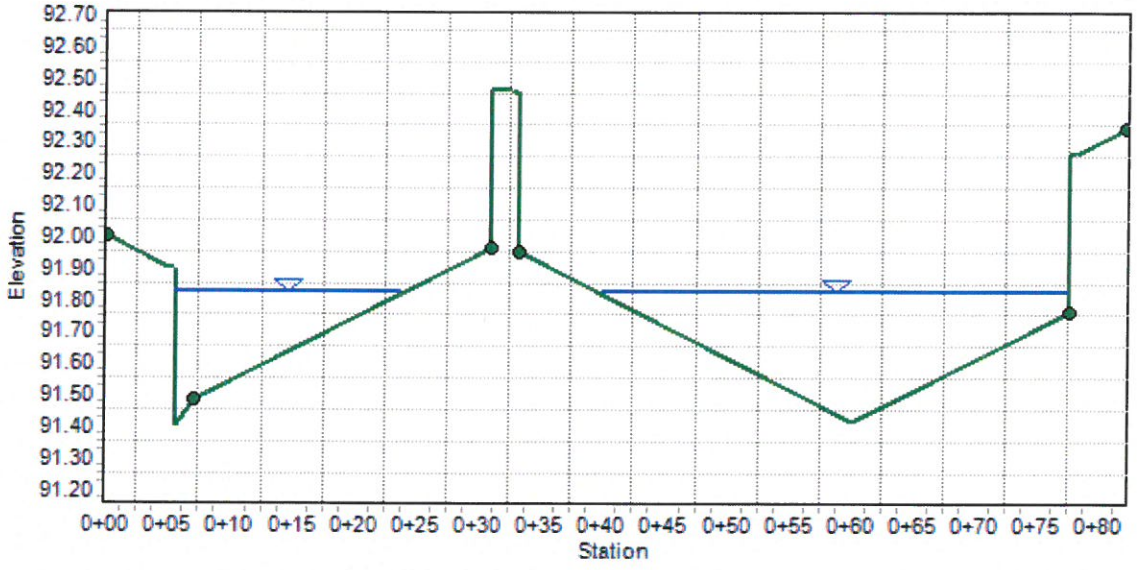
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.42	ft
Discharge	36.00	ft^3/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 17+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	36.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+60.00	91.41
0+77.50	91.76
0+77.50	92.26
0+78.00	92.26
0+82.00	92.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+77.50, 91.76)	0.015
(0+77.50, 91.76)	(0+82.00, 92.34)	0.013

Worksheet for EX. Palomino Ln Sta 17+50 - 10 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.42	ft
Elevation Range	91.40 to 92.46 ft		
Flow Area		11.34	ft²
Wetted Perimeter		56.25	ft
Hydraulic Radius		0.20	ft
Top Width		55.84	ft
Normal Depth		0.42	ft
Critical Depth		0.45	ft
Critical Slope		0.00540	ft/ft
Velocity		3.17	ft/s
Velocity Head		0.16	ft
Specific Energy		0.57	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.45	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00540	ft/ft

Cross Section for EX. Palomino Ln Sta 17+50 - 100 year

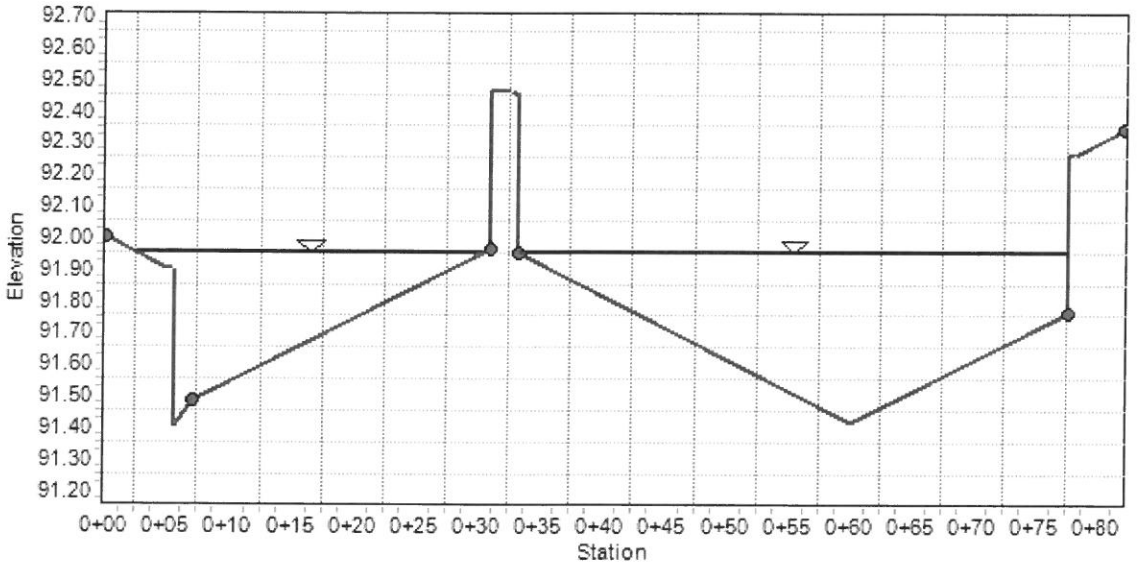
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.55	ft
Discharge	76.00	ft^3/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 17+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	76.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+60.00	91.41
0+77.50	91.76
0+77.50	92.26
0+78.00	92.26
0+82.00	92.34

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+77.50, 91.76)	0.015
(0+77.50, 91.76)	(0+82.00, 92.34)	0.013

Worksheet for EX. Palomino Ln Sta 17+50 - 100 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.55	ft
Elevation Range	91.40 to 92.46 ft		
Flow Area		19.59	ft²
Wetted Perimeter		72.48	ft
Hydraulic Radius		0.27	ft
Top Width		71.85	ft
Normal Depth		0.55	ft
Critical Depth		0.60	ft
Critical Slope		0.00479	ft/ft
Velocity		3.88	ft/s
Velocity Head		0.23	ft
Specific Energy		0.78	ft
Froude Number		1.31	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.60	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00479	ft/ft

Cross Section for EX. Palomino Ln Sta 21+40 - 10 year

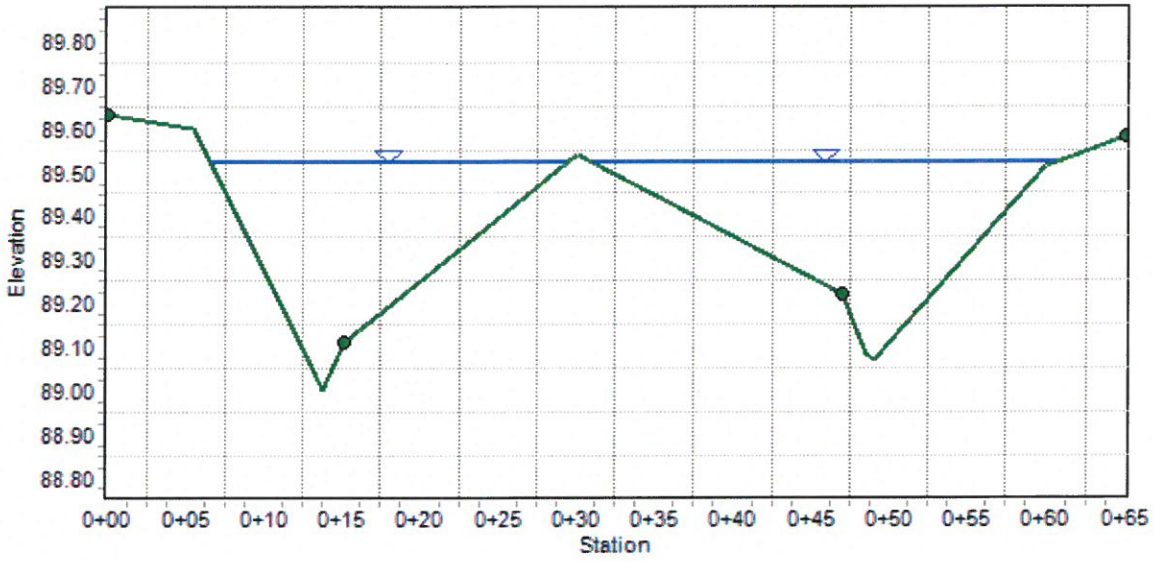
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.52	ft
Discharge	36.00	ft³/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 21+40 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	36.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+47.00	89.22
0+48.50	89.08
0+49.00	89.07
0+60.00	89.51
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+47.00, 89.22)	0.015
(0+47.00, 89.22)	(0+65.00, 89.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for EX. Palomino Ln Sta 21+40 - 10 year

Results

Normal Depth		0.52	ft
Elevation Range	89.00 to 89.63 ft		
Flow Area		11.11	ft²
Wetted Perimeter		52.46	ft
Hydraulic Radius		0.21	ft
Top Width		52.41	ft
Normal Depth		0.52	ft
Critical Depth		0.56	ft
Critical Slope		0.00479	ft/ft
Velocity		3.24	ft/s
Velocity Head		0.16	ft
Specific Energy		0.69	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.56	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00479	ft/ft

Cross Section for EX. Palomino Ln Sta 21+40 - 100 year

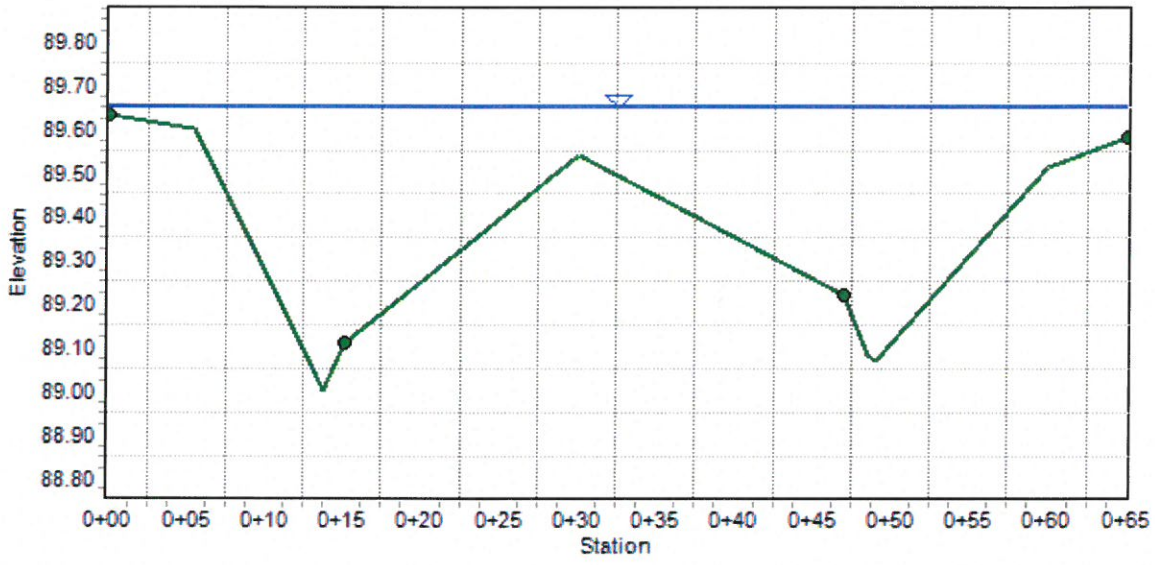
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.65	ft
Discharge	76.00	ft^3/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 21+40 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	76.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+47.00	89.22
0+48.50	89.08
0+49.00	89.07
0+60.00	89.51
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+47.00, 89.22)	0.015
(0+47.00, 89.22)	(0+65.00, 89.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for EX. Palomino Ln Sta 21+40 - 100 year

Results

Normal Depth		0.65	ft
Elevation Range	89.00 to 89.63 ft		
Flow Area		18.83	ft²
Wetted Perimeter		65.14	ft
Hydraulic Radius		0.29	ft
Top Width		65.00	ft
Normal Depth		0.65	ft
Critical Depth		0.71	ft
Critical Slope		0.00409	ft/ft
Velocity		4.04	ft/s
Velocity Head		0.25	ft
Specific Energy		0.91	ft
Froude Number		1.32	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.71	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00409	ft/ft

Cross Section for EX. Palomino Ln Sta 23+50 - 10 year

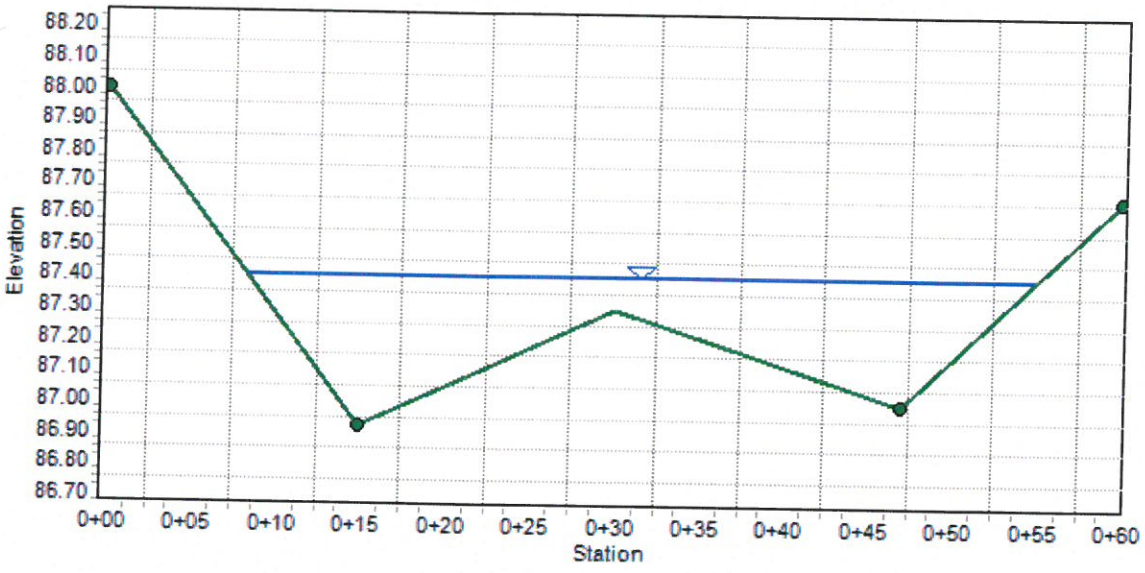
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.48	ft
Discharge	46.00	ft^3/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 23+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	46.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.48	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	11.72	ft²
Wetted Perimeter	46.54	ft
Hydraulic Radius	0.25	ft
Top Width	46.50	ft

Worksheet for EX. Palomino Ln Sta 23+50 - 10 year

Results

Normal Depth	0.48	ft
Critical Depth	0.54	ft
Critical Slope	0.00607	ft/ft
Velocity	3.93	ft/s
Velocity Head	0.24	ft
Specific Energy	0.72	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.48	ft
Critical Depth	0.54	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00607	ft/ft

Cross Section for EX. Palomino Ln Sta 23+50 - 100 year

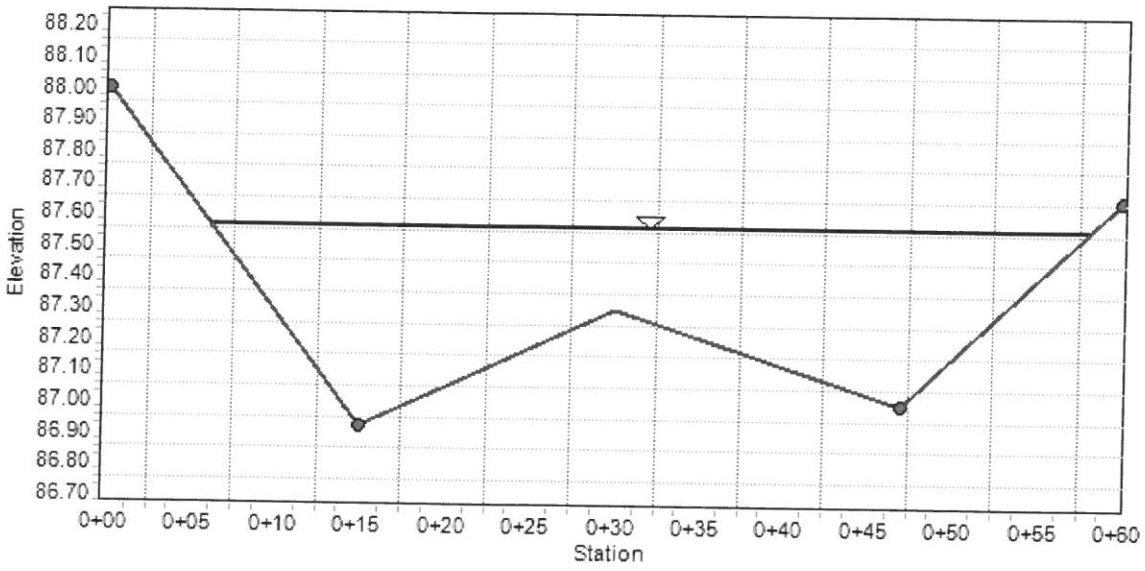
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.64	ft
Discharge	99.00	ft^3/s

Cross Section Image



Worksheet for EX. Palomino Ln Sta 23+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	99.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.64	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	19.67	ft²
Wetted Perimeter	51.98	ft
Hydraulic Radius	0.38	ft
Top Width	51.93	ft

Worksheet for EX. Palomino Ln Sta 23+50 - 100 year

Results

Normal Depth		0.64	ft
Critical Depth		0.75	ft
Critical Slope		0.00551	ft/ft
Velocity		5.03	ft/s
Velocity Head		0.39	ft
Specific Energy		1.03	ft
Froude Number		1.44	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.64	ft
Critical Depth	0.75	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00551	ft/ft

Cross Section for INT. Palomino Ln Sta 17+50 - 10 year

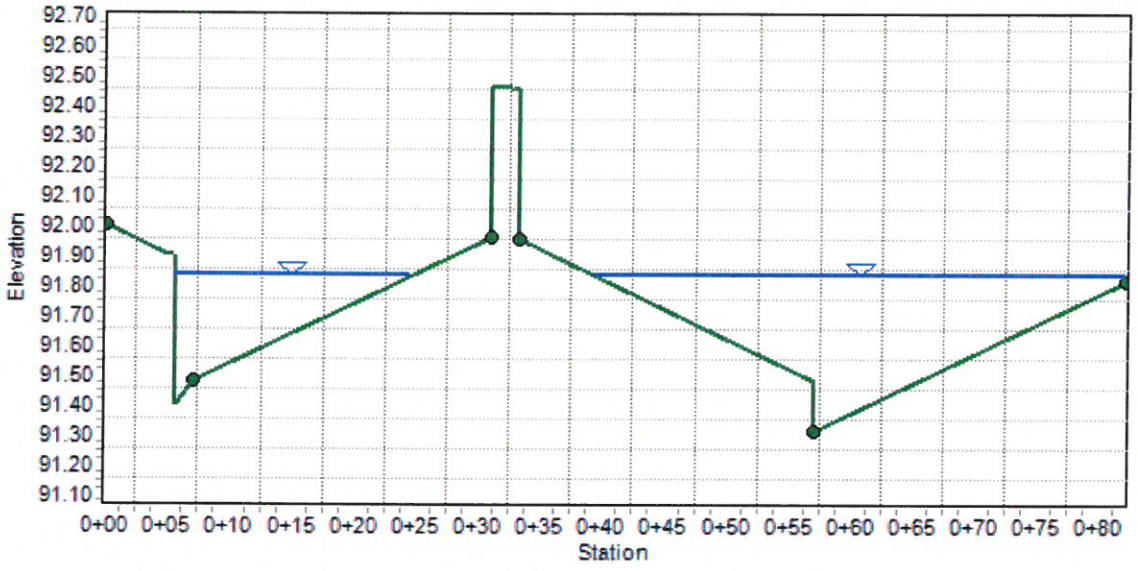
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.52	ft
Discharge	37.00	ft³/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 17+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	37.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+57.00	91.48
0+57.00	91.31
0+82.00	91.81

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+57.00, 91.31)	0.015
(0+57.00, 91.31)	(0+82.00, 91.81)	0.022

Worksheet for INT. Palomino Ln Sta 17+50 - 10 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.52	ft
Elevation Range	91.31 to 92.46 ft		
Flow Area		13.46	ft²
Wetted Perimeter		62.17	ft
Hydraulic Radius		0.22	ft
Top Width		61.59	ft
Normal Depth		0.52	ft
Critical Depth		0.53	ft
Critical Slope		0.00798	ft/ft
Velocity		2.75	ft/s
Velocity Head		0.12	ft
Specific Energy		0.64	ft
Froude Number		1.04	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.53	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00798	ft/ft

Cross Section for INT. Palomino Ln Sta 17+50 - 100 year

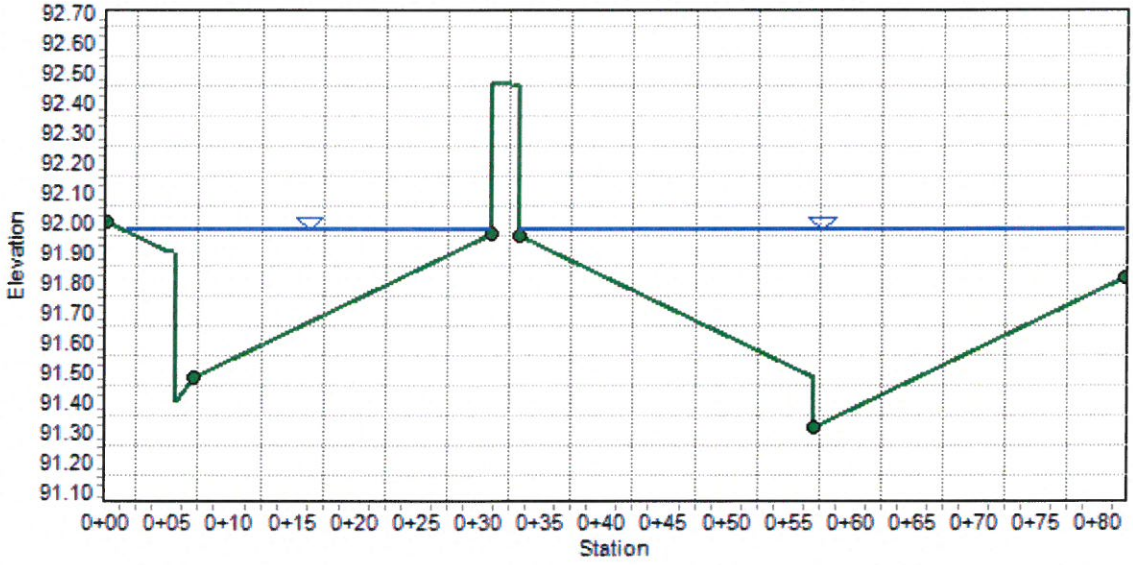
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.66	ft
Discharge	80.00	ft³/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 17+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	80.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+57.00	91.48
0+57.00	91.31
0+82.00	91.81

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+57.00, 91.31)	0.015
(0+57.00, 91.31)	(0+82.00, 91.81)	0.022

Worksheet for INT. Palomino Ln Sta 17+50 - 100 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.66	ft
Elevation Range	91.31 to 92.46 ft		
Flow Area		22.99	ft²
Wetted Perimeter		78.81	ft
Hydraulic Radius		0.29	ft
Top Width		78.02	ft
Normal Depth		0.66	ft
Critical Depth		0.69	ft
Critical Slope		0.00659	ft/ft
Velocity		3.48	ft/s
Velocity Head		0.19	ft
Specific Energy		0.85	ft
Froude Number		1.13	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.69	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00659	ft/ft

Cross Section for INT. Palomino Ln Sta 21+40 - 10 year

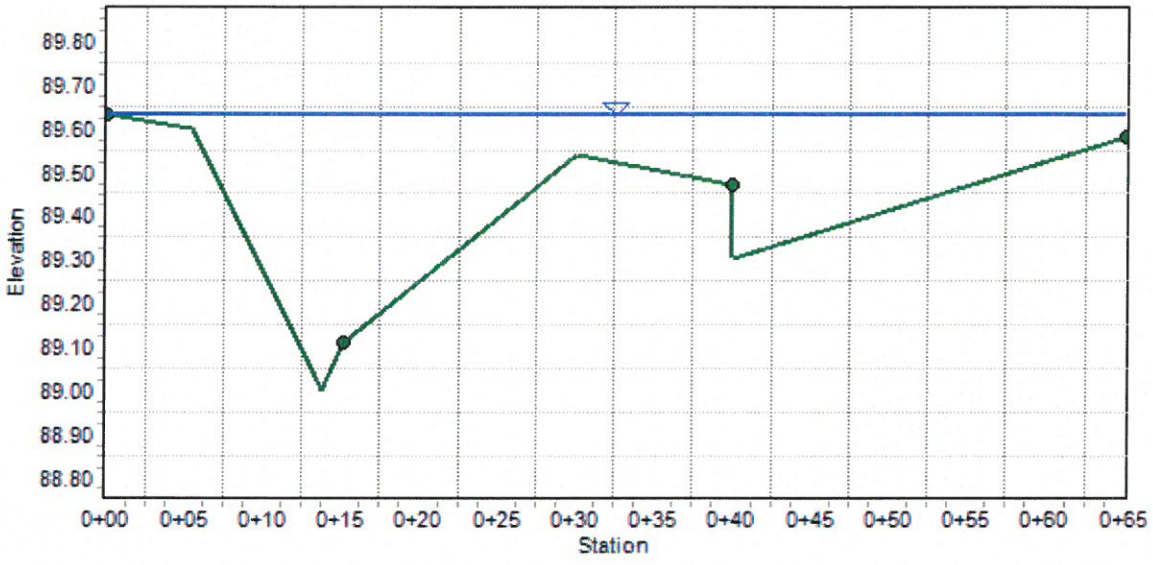
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.63	ft
Discharge	37.00	ft³/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 21+40 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	37.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+40.00	89.47
0+40.00	89.30
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+40.00, 89.47)	0.015
(0+40.00, 89.47)	(0+65.00, 89.58)	0.022

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.63	ft
Elevation Range	89.00 to 89.63 ft	

Worksheet for INT. Palomino Ln Sta 21+40 - 10 year

Results

Flow Area		14.07	ft²
Wetted Perimeter		65.25	ft
Hydraulic Radius		0.22	ft
Top Width		65.00	ft
Normal Depth		0.63	ft
Critical Depth		0.63	ft
Critical Slope		0.00762	ft/ft
Velocity		2.63	ft/s
Velocity Head		0.11	ft
Specific Energy		0.74	ft
Froude Number		1.00	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.63	ft
Critical Depth	0.63	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00762	ft/ft

Cross Section for INT. Palomino Ln Sta 21+40 - 100 year

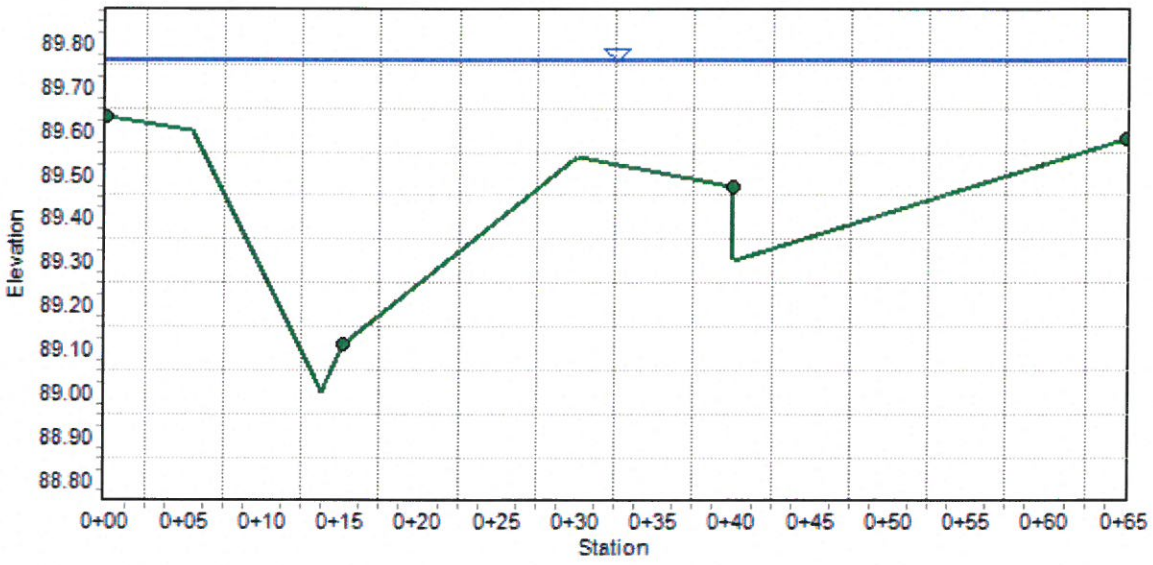
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.76	ft
Discharge	80.00	ft³/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 21+40 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	80.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+40.00	89.47
0+40.00	89.30
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+40.00, 89.47)	0.015
(0+40.00, 89.47)	(0+65.00, 89.58)	0.022

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.76	ft
Elevation Range	89.00 to 89.63 ft	

Worksheet for INT. Palomino Ln Sta 21+40 - 100 year

Results

Flow Area		22.37	ft²
Wetted Perimeter		65.51	ft
Hydraulic Radius		0.34	ft
Top Width		65.00	ft
Normal Depth		0.76	ft
Critical Depth		0.78	ft
Critical Slope		0.00646	ft/ft
Velocity		3.58	ft/s
Velocity Head		0.20	ft
Specific Energy		0.96	ft
Froude Number		1.07	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.76	ft
Critical Depth	0.78	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00646	ft/ft

Cross Section for INT. Palomino Ln Sta 23+50 - 10 year

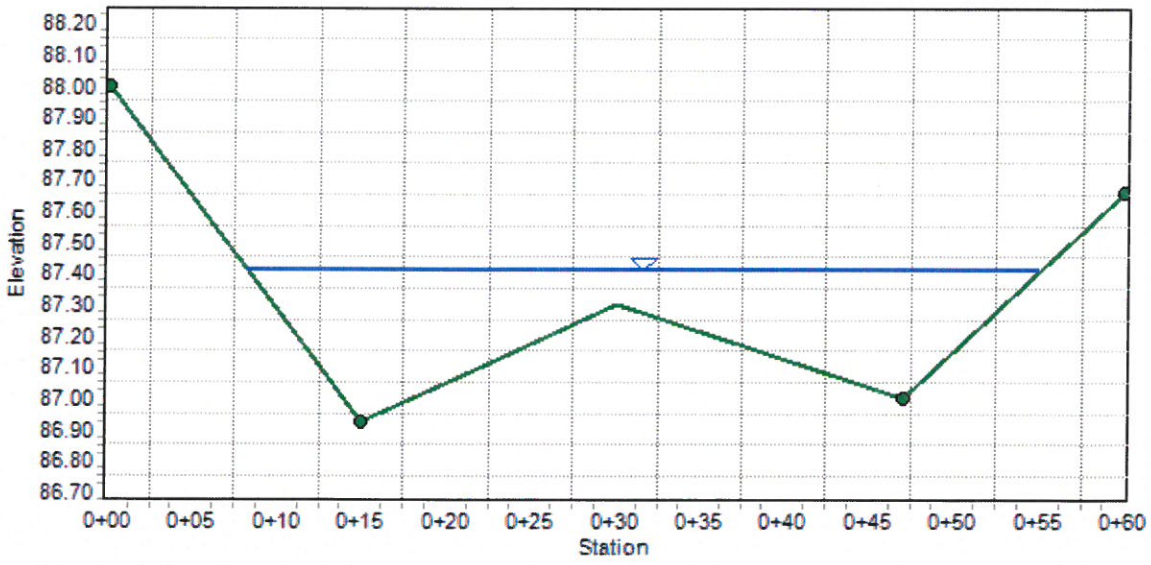
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.49	ft
Discharge	49.00	ft³/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 23+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	49.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.49	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	12.22	ft²
Wetted Perimeter	46.90	ft
Hydraulic Radius	0.26	ft
Top Width	46.87	ft

Worksheet for INT. Palomino Ln Sta 23+50 - 10 year

Results

Normal Depth		0.49	ft
Critical Depth		0.56	ft
Critical Slope		0.00602	ft/ft
Velocity		4.01	ft/s
Velocity Head		0.25	ft
Specific Energy		0.74	ft
Froude Number		1.38	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.49	ft
Critical Depth	0.56	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00602	ft/ft

Cross Section for INT. Palomino Ln Sta 23+50 - 100 year

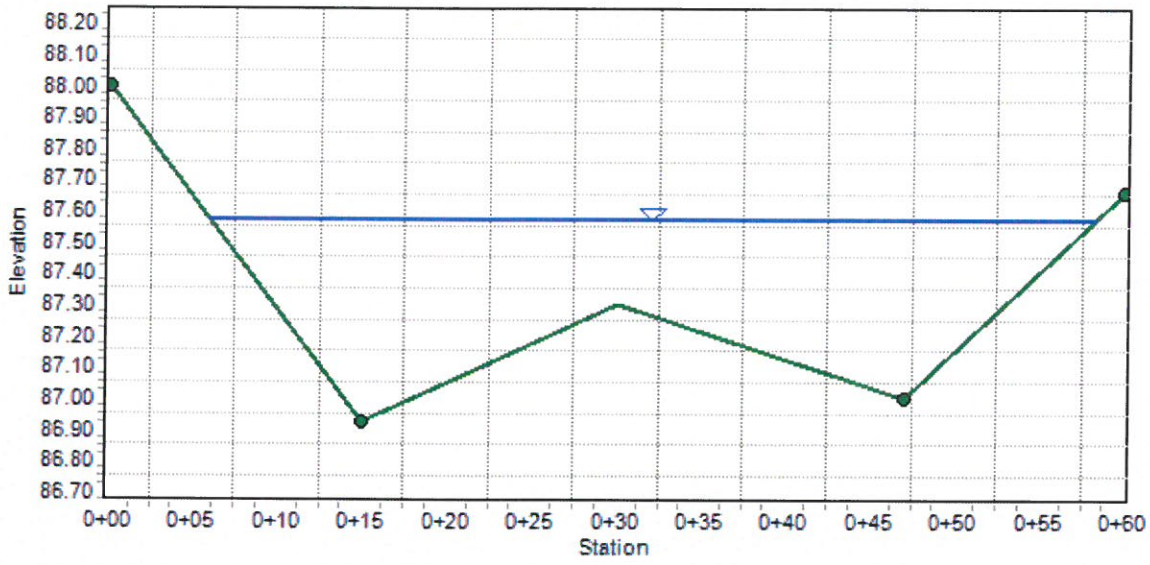
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.65	ft
Discharge	104.00	ft^3/s

Cross Section Image



Worksheet for INT. Palomino Ln Sta 23+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	104.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.65	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	20.35	ft^2
Wetted Perimeter	52.41	ft
Hydraulic Radius	0.39	ft
Top Width	52.37	ft

Worksheet for INT. Palomino Ln Sta 23+50 - 100 year

Results

Normal Depth		0.65	ft
Critical Depth		0.77	ft
Critical Slope		0.00548	ft/ft
Velocity		5.11	ft/s
Velocity Head		0.41	ft
Specific Energy		1.06	ft
Froude Number		1.45	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.77	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00548	ft/ft

Cross Section for INT west swale - 10 year

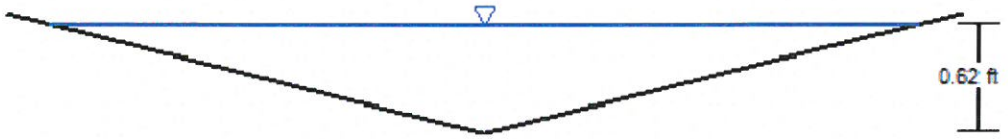
Project Description

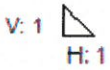
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Normal Depth	0.62	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	3.00	ft³/s

Cross Section Image





Worksheet for INT west swale - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	3.00	ft^3/s

Results

Normal Depth	0.62	ft
Flow Area	1.56	ft^2
Wetted Perimeter	5.15	ft
Hydraulic Radius	0.30	ft
Top Width	4.99	ft
Critical Depth	0.51	ft
Critical Slope	0.01157	ft/ft
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.68	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.51	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01157	ft/ft

Cross Section for INT west swale - 100 year

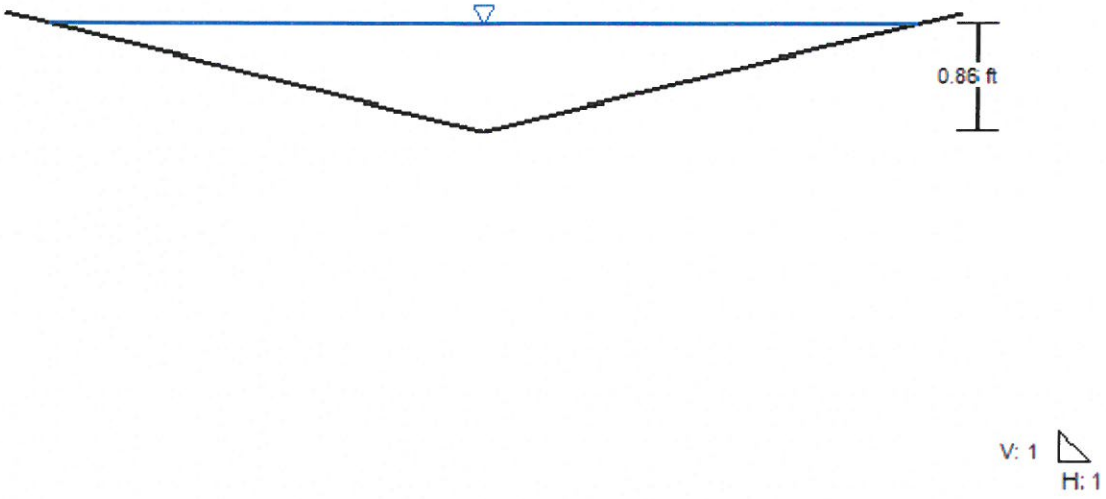
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Normal Depth	0.86	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	7.00	ft³/s

Cross Section Image



Worksheet for INT west swale - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	7.00	ft^3/s

Results

Normal Depth	0.86	ft
Flow Area	2.94	ft^2
Wetted Perimeter	7.07	ft
Hydraulic Radius	0.42	ft
Top Width	6.86	ft
Critical Depth	0.72	ft
Critical Slope	0.01033	ft/ft
Velocity	2.38	ft/s
Velocity Head	0.09	ft
Specific Energy	0.95	ft
Froude Number	0.64	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.86	ft
Critical Depth	0.72	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01033	ft/ft

Cross Section for INT East Swale - 10 year

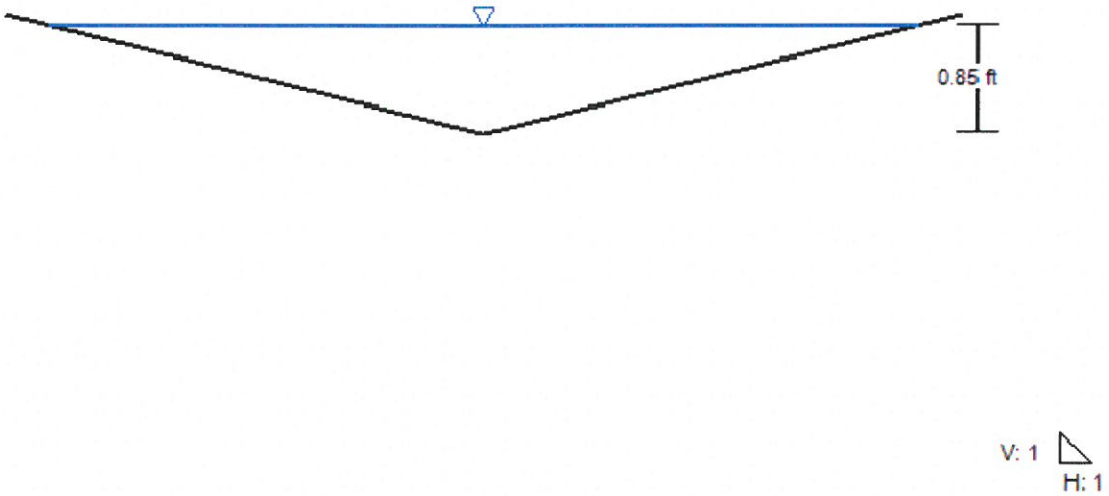
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Normal Depth	0.85	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	7.00	ft³/s

Cross Section Image



Worksheet for INT East Swale - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	7.00	ft^3/s

Results

Normal Depth	0.85	ft
Flow Area	2.89	ft^2
Wetted Perimeter	7.01	ft
Hydraulic Radius	0.41	ft
Top Width	6.80	ft
Critical Depth	0.72	ft
Critical Slope	0.01033	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	0.94	ft
Froude Number	0.66	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.85	ft
Critical Depth	0.72	ft
Channel Slope	0.00420	ft/ft
Critical Slope	0.01033	ft/ft

Cross Section for INT East Swale - 100 year

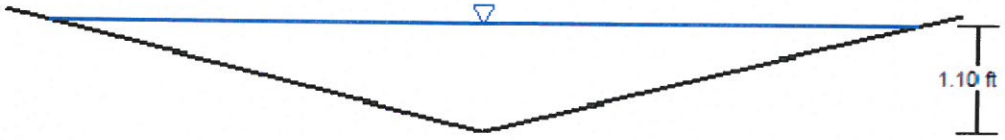
Project Description

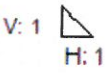
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Normal Depth	1.10	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	14.00	ft^3/s

Cross Section Image





Worksheet for INT East Swale - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	14.00	ft^3/s

Results

Normal Depth	1.10	ft
Flow Area	4.86	ft^2
Wetted Perimeter	9.09	ft
Hydraulic Radius	0.53	ft
Top Width	8.81	ft
Critical Depth	0.95	ft
Critical Slope	0.00942	ft/ft
Velocity	2.88	ft/s
Velocity Head	0.13	ft
Specific Energy	1.23	ft
Froude Number	0.68	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.10	ft
Critical Depth	0.95	ft
Channel Slope	0.00420	ft/ft
Critical Slope	0.00942	ft/ft

Cross Section for ULT. Palomino Ln Sta 17+50 - 10 year

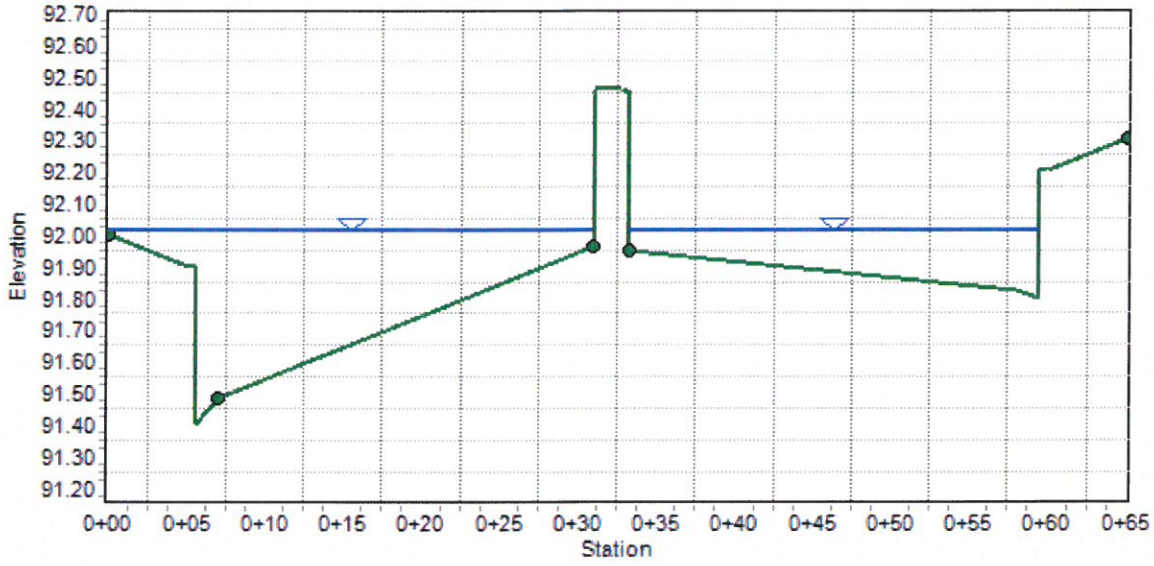
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.61	ft
Discharge	38.00	ft³/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 17+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	38.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+58.00	91.82
0+59.42	91.80
0+59.50	92.20
0+60.00	92.20
0+65.00	92.30

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+65.00, 92.30)	0.015

Worksheet for ULT. Palomino Ln Sta 17+50 - 10 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.61	ft
Elevation Range	91.40 to 92.46 ft		
Flow Area		11.75	ft²
Wetted Perimeter		57.89	ft
Hydraulic Radius		0.20	ft
Top Width		57.16	ft
Normal Depth		0.61	ft
Critical Depth		0.65	ft
Critical Slope		0.00521	ft/ft
Velocity		3.23	ft/s
Velocity Head		0.16	ft
Specific Energy		0.78	ft
Froude Number		1.26	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.65	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00521	ft/ft

Cross Section for ULT. Palomino Ln Sta 17+50 - 100 year

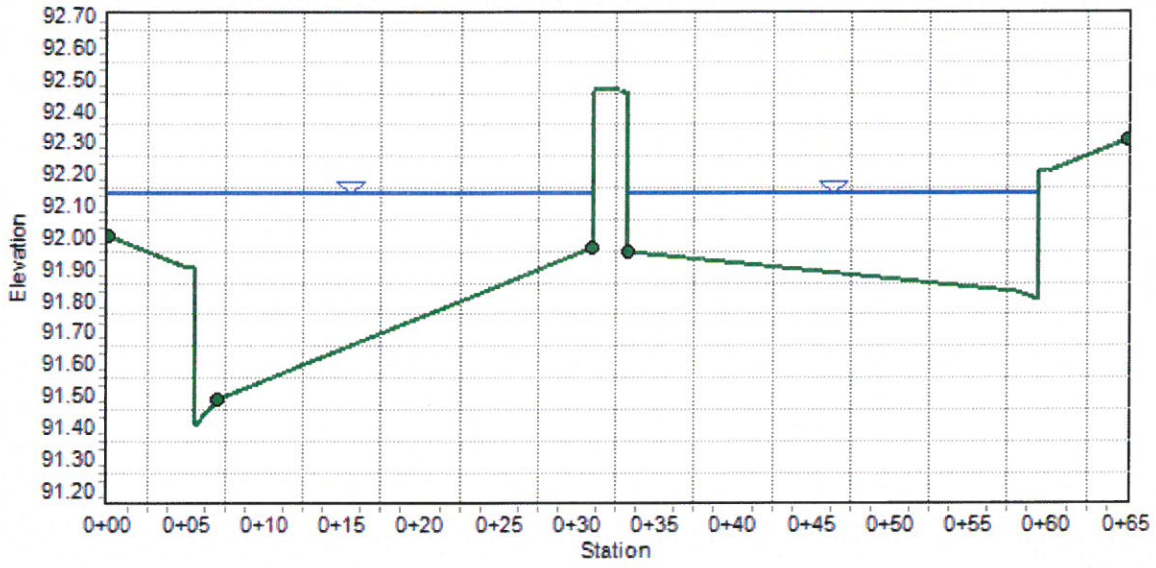
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Normal Depth	0.73	ft
Discharge	80.00	ft³/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 17+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00862	ft/ft
Discharge	80.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	92.00
0+05.00	91.90
0+05.50	91.90
0+05.58	91.40
0+07.00	91.48
0+30.92	91.96
0+31.00	92.46
0+31.50	92.46
0+32.65	92.46
0+33.15	92.45
0+33.23	91.95
0+58.00	91.82
0+59.42	91.80
0+59.50	92.20
0+60.00	92.20
0+65.00	92.30

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 92.00)	(0+07.00, 91.48)	0.013
(0+07.00, 91.48)	(0+30.92, 91.96)	0.015
(0+30.92, 91.96)	(0+33.23, 91.95)	0.013
(0+33.23, 91.95)	(0+65.00, 92.30)	0.015

Worksheet for ULT. Palomino Ln Sta 17+50 - 100 year

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.73	ft
Elevation Range	91.40 to 92.46 ft		
Flow Area		18.44	ft²
Wetted Perimeter		58.36	ft
Hydraulic Radius		0.32	ft
Top Width		57.23	ft
Normal Depth		0.73	ft
Critical Depth		0.80	ft
Critical Slope		0.00448	ft/ft
Velocity		4.34	ft/s
Velocity Head		0.29	ft
Specific Energy		1.02	ft
Froude Number		1.35	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.73	ft
Critical Depth	0.80	ft
Channel Slope	0.00862	ft/ft
Critical Slope	0.00448	ft/ft

Cross Section for ULT. Palomino Ln Sta 21+40 - 10 year

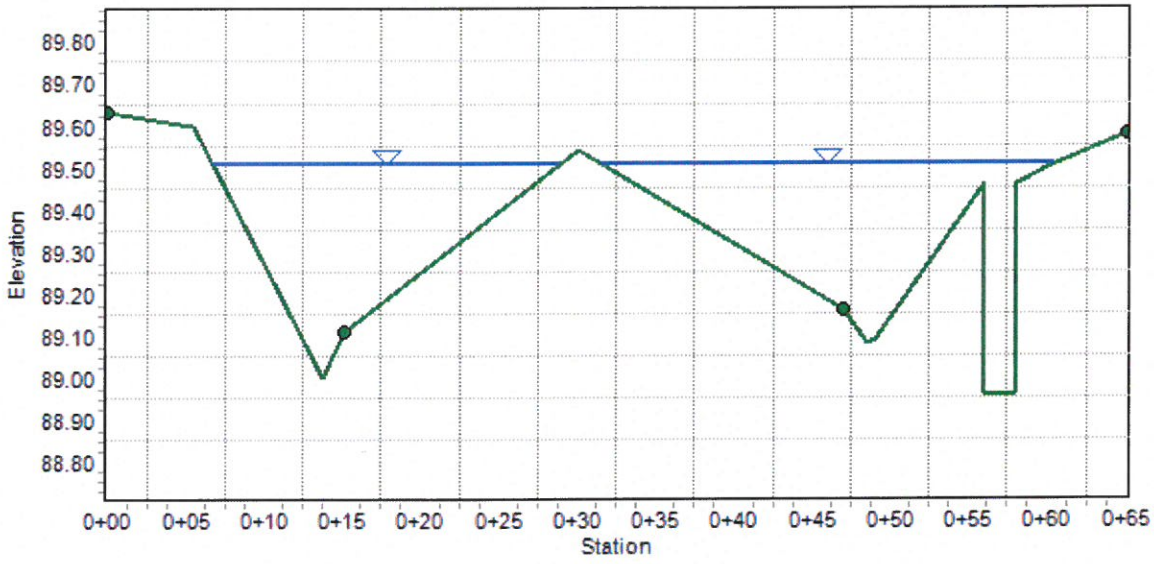
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.55	ft
Discharge	38.00	ft³/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 21+40 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	38.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+47.00	89.16
0+48.50	89.08
0+49.00	89.09
0+56.00	89.46
0+56.00	88.96
0+58.00	88.96
0+58.00	89.46
0+60.00	89.50
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+47.00, 89.16)	0.015
(0+47.00, 89.16)	(0+65.00, 89.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Worksheet for ULT. Palomino Ln Sta 21+40 - 10 year

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.55	ft
Elevation Range	88.96 to 89.63 ft		
Flow Area		11.45	ft²
Wetted Perimeter		52.34	ft
Hydraulic Radius		0.22	ft
Top Width		51.29	ft
Normal Depth		0.55	ft
Critical Depth		0.59	ft
Critical Slope		0.00481	ft/ft
Velocity		3.32	ft/s
Velocity Head		0.17	ft
Specific Energy		0.72	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.59	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00481	ft/ft

Cross Section for ULT. Palomino Ln Sta 21+40 - 100 year

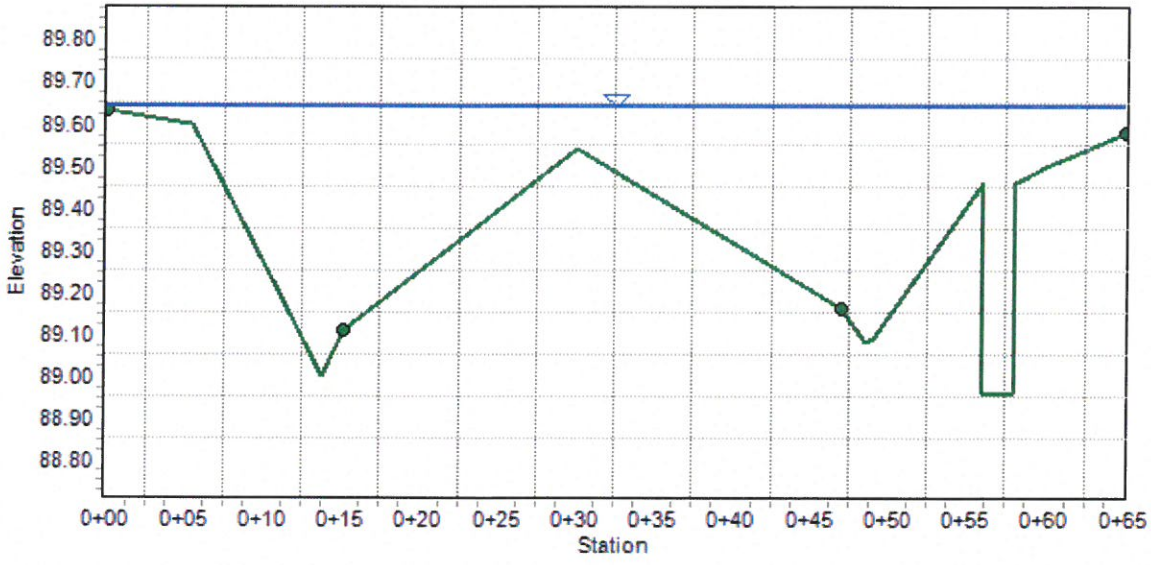
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Normal Depth	0.68	ft
Discharge	80.00	ft³/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 21+40 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00758	ft/ft
Discharge	80.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.63
0+05.45	89.60
0+13.13	89.04
0+13.72	89.00
0+15.13	89.11
0+30.00	89.54
0+47.00	89.16
0+48.50	89.08
0+49.00	89.09
0+56.00	89.46
0+56.00	88.96
0+58.00	88.96
0+58.00	89.46
0+60.00	89.50
0+65.00	89.58

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.63)	(0+15.13, 89.11)	0.013
(0+15.13, 89.11)	(0+47.00, 89.16)	0.015
(0+47.00, 89.16)	(0+65.00, 89.58)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method

Worksheet for ULT. Palomino Ln Sta 21+40 - 100 year

Options

Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth		0.68	ft
Elevation Range	88.96 to 89.63 ft		
Flow Area		19.53	ft²
Wetted Perimeter		66.14	ft
Hydraulic Radius		0.30	ft
Top Width		65.00	ft
Normal Depth		0.68	ft
Critical Depth		0.75	ft
Critical Slope		0.00411	ft/ft
Velocity		4.10	ft/s
Velocity Head		0.26	ft
Specific Energy		0.95	ft
Froude Number		1.32	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.68	ft
Critical Depth	0.75	ft
Channel Slope	0.00758	ft/ft
Critical Slope	0.00411	ft/ft

Cross Section for ULT. Palomino Ln Sta 23+50 - 10 year

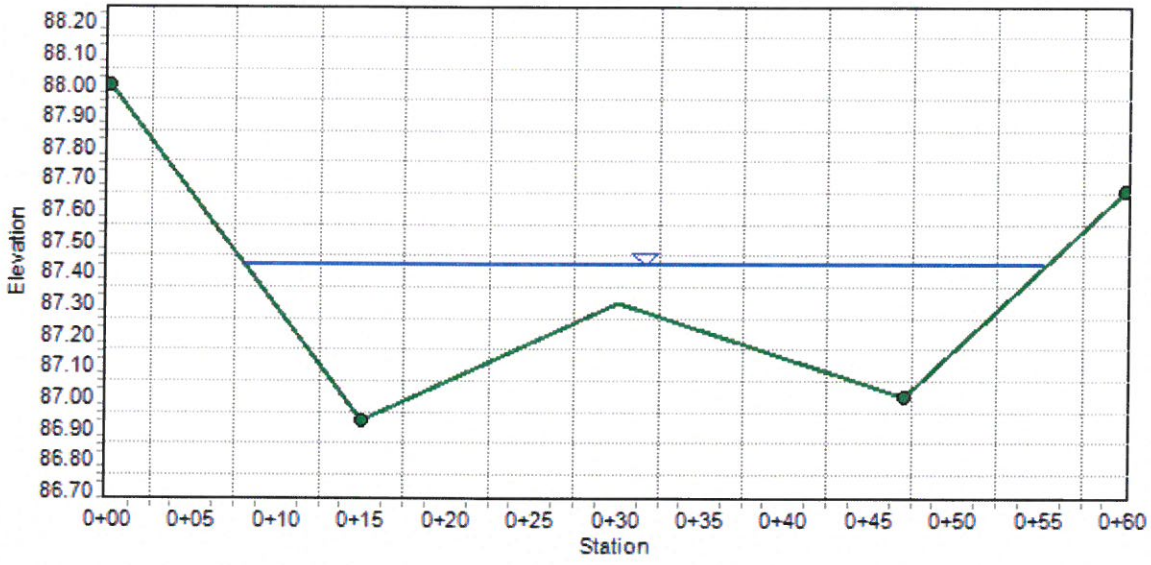
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.50	ft
Discharge	52.00	ft^3/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 23+50 - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	52.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.50	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	12.72	ft^2
Wetted Perimeter	47.26	ft
Hydraulic Radius	0.27	ft
Top Width	47.22	ft

Worksheet for ULT. Palomino Ln Sta 23+50 - 10 year

Results

Normal Depth		0.50	ft
Critical Depth		0.57	ft
Critical Slope		0.00597	ft/ft
Velocity		4.09	ft/s
Velocity Head		0.26	ft
Specific Energy		0.76	ft
Froude Number		1.39	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.57	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00597	ft/ft

Cross Section for ULT. Palomino Ln Sta 23+50 - 100 year

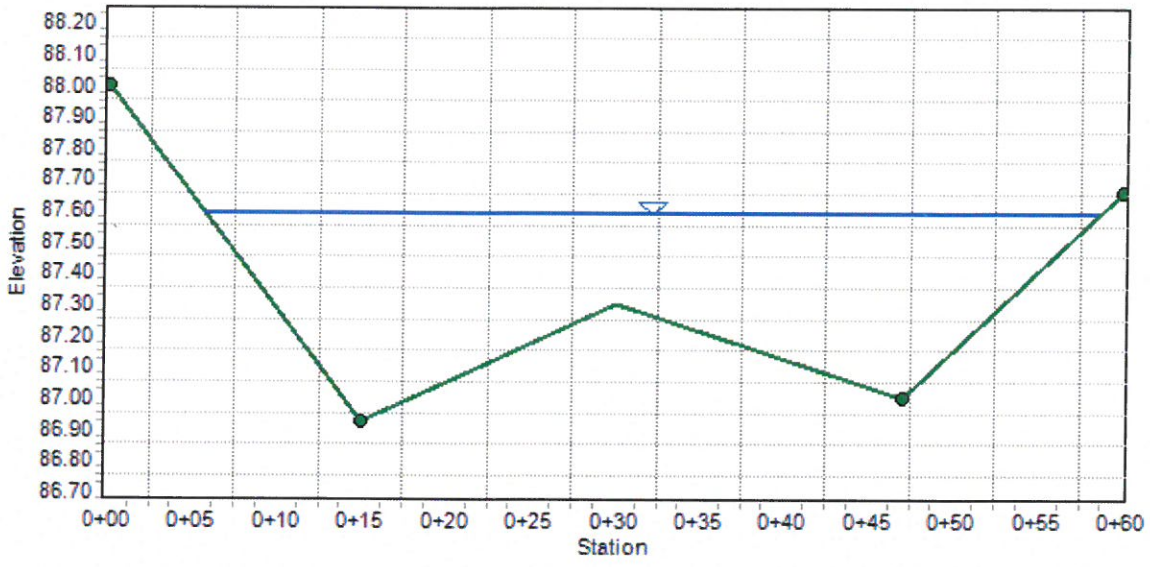
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Normal Depth	0.67	ft
Discharge	109.00	ft³/s

Cross Section Image



Worksheet for ULT. Palomino Ln Sta 23+50 - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01224	ft/ft
Discharge	109.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	88.00
0+15.00	86.92
0+30.00	87.30
0+47.00	87.00
0+60.00	87.66

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 88.00)	(0+15.00, 86.92)	0.020
(0+15.00, 86.92)	(0+47.00, 87.00)	0.015
(0+47.00, 87.00)	(0+60.00, 87.66)	0.020

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.67	ft
Elevation Range	86.92 to 88.00 ft	
Flow Area	21.02	ft²
Wetted Perimeter	52.84	ft
Hydraulic Radius	0.40	ft
Top Width	52.80	ft

Worksheet for ULT. Palomino Ln Sta 23+50 - 100 year

Results

Normal Depth	0.67	ft
Critical Depth	0.78	ft
Critical Slope	0.00544	ft/ft
Velocity	5.19	ft/s
Velocity Head	0.42	ft
Specific Energy	1.08	ft
Froude Number	1.45	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.78	ft
Channel Slope	0.01224	ft/ft
Critical Slope	0.00544	ft/ft

Cross Section for ULT West Swale - 10 year

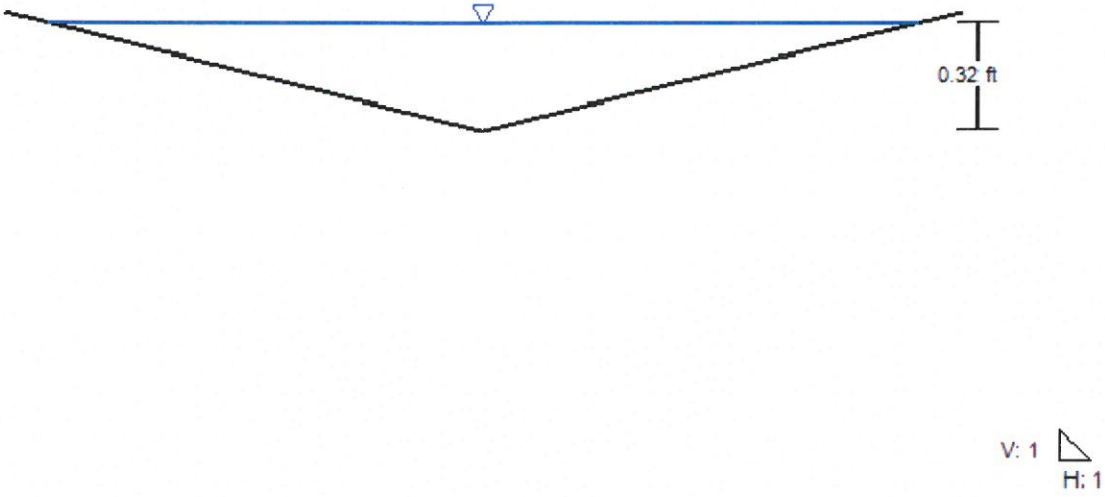
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Normal Depth	0.32	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	0.50	ft³/s

Cross Section Image



Worksheet for ULT West Swale - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	0.50	ft^3/s

Results

Normal Depth	0.32	ft
Flow Area	0.41	ft^2
Wetted Perimeter	2.63	ft
Hydraulic Radius	0.15	ft
Top Width	2.55	ft
Critical Depth	0.25	ft
Critical Slope	0.01469	ft/ft
Velocity	1.23	ft/s
Velocity Head	0.02	ft
Specific Energy	0.34	ft
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.32	ft
Critical Depth	0.25	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01469	ft/ft

Cross Section for ULT West Swale - 100 year

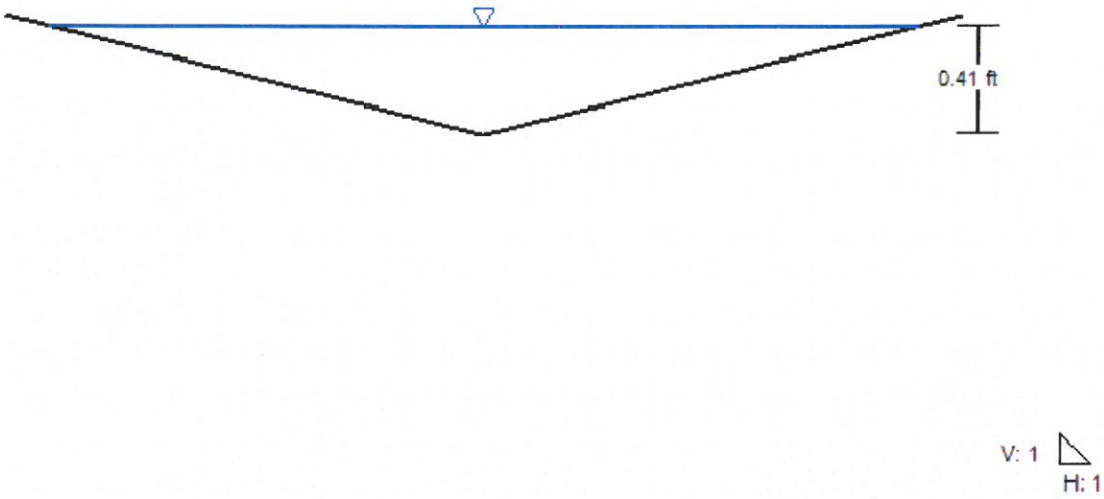
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Normal Depth	0.41	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	1.00	ft^3/s

Cross Section Image



Worksheet for ULT West Swale - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	1.00	ft^3/s

Results

Normal Depth	0.41	ft
Flow Area	0.68	ft^2
Wetted Perimeter	3.41	ft
Hydraulic Radius	0.20	ft
Top Width	3.31	ft
Critical Depth	0.33	ft
Critical Slope	0.01340	ft/ft
Velocity	1.46	ft/s
Velocity Head	0.03	ft
Specific Energy	0.45	ft
Froude Number	0.57	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.33	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01340	ft/ft

Cross Section for ULT East Swale - 10 year

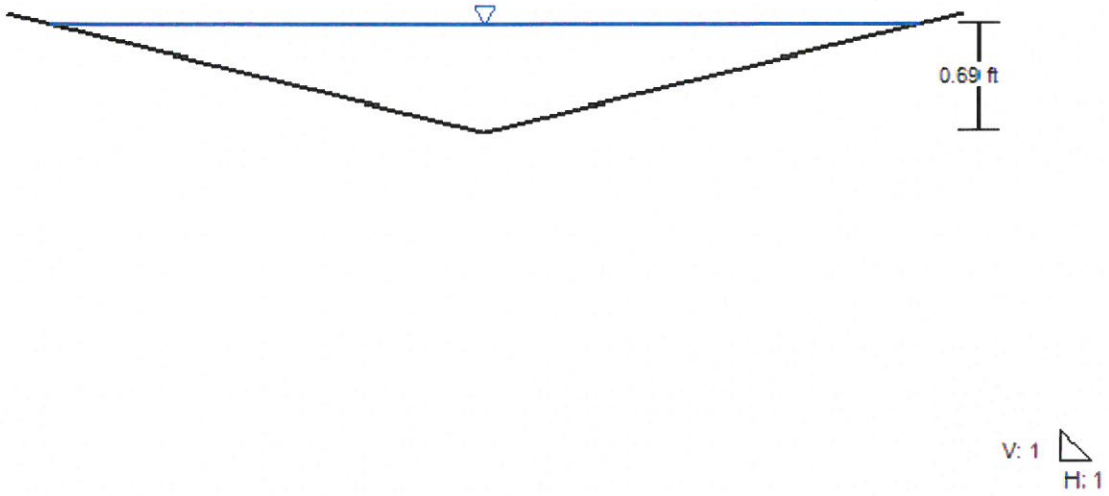
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Normal Depth	0.69	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	4.00	ft³/s

Cross Section Image



Worksheet for ULT East Swale - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	4.00	ft^3/s

Results

Normal Depth	0.69	ft
Flow Area	1.90	ft^2
Wetted Perimeter	5.68	ft
Hydraulic Radius	0.33	ft
Top Width	5.51	ft
Critical Depth	0.57	ft
Critical Slope	0.01114	ft/ft
Velocity	2.11	ft/s
Velocity Head	0.07	ft
Specific Energy	0.76	ft
Froude Number	0.63	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.69	ft
Critical Depth	0.57	ft
Channel Slope	0.00420	ft/ft
Critical Slope	0.01114	ft/ft

Cross Section for ULT East Swale - 100 year

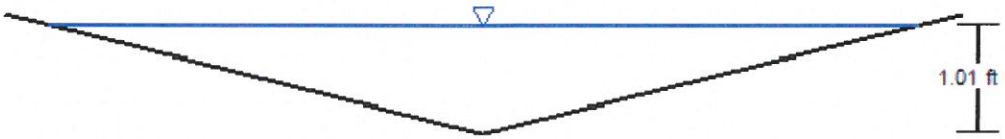
Project Description

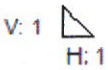
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Normal Depth	1.01	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	11.00	ft³/s

Cross Section Image





Worksheet for ULT East Swale - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00420	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	11.00	ft^3/s

Results

Normal Depth	1.01	ft
Flow Area	4.05	ft^2
Wetted Perimeter	8.30	ft
Hydraulic Radius	0.49	ft
Top Width	8.05	ft
Critical Depth	0.86	ft
Critical Slope	0.00973	ft/ft
Velocity	2.71	ft/s
Velocity Head	0.11	ft
Specific Energy	1.12	ft
Froude Number	0.67	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.01	ft
Critical Depth	0.86	ft
Channel Slope	0.00420	ft/ft
Critical Slope	0.00973	ft/ft

Cross Section for ULT. West Drive - 10 year

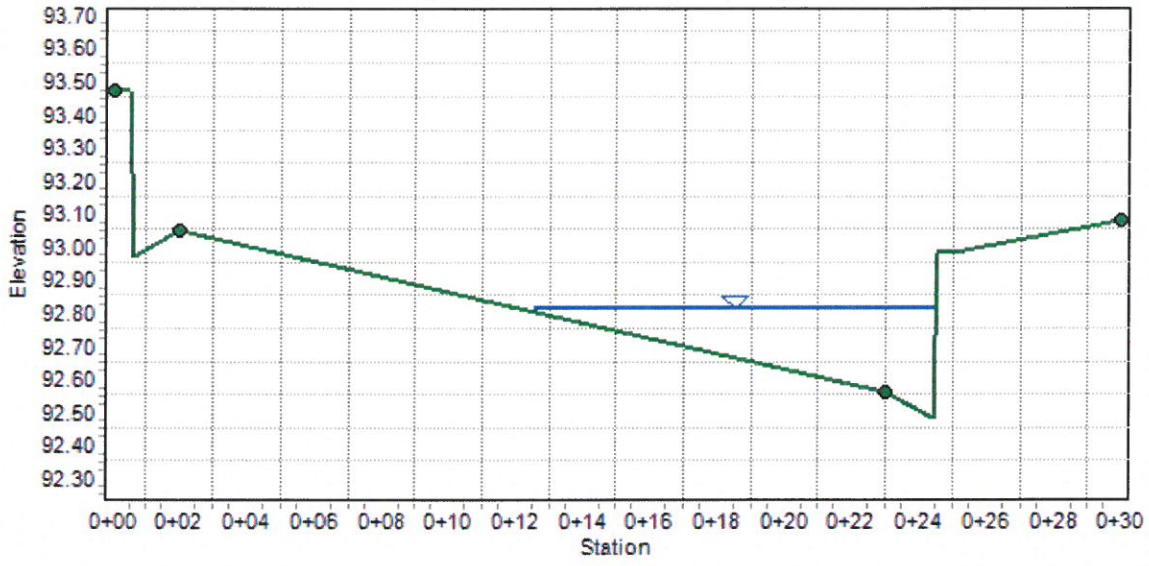
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01190	ft/ft
Normal Depth	0.33	ft
Discharge	5.00	ft³/s

Cross Section Image



Worksheet for ULT. West Drive - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01190	ft/ft
Discharge	5.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	93.47
0+00.50	93.47
0+00.58	92.97
0+02.00	93.05
0+23.00	92.56
0+24.42	92.48
0+24.50	92.98
0+25.00	92.98
0+30.00	93.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 93.47)	(0+02.00, 93.05)	0.013
(0+02.00, 93.05)	(0+23.00, 92.56)	0.015
(0+23.00, 92.56)	(0+30.00, 93.08)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.33	ft
Elevation Range	92.48 to 93.47 ft	

Worksheet for ULT. West Drive - 10 year

Results

Flow Area		1.70	ft²
Wetted Perimeter		12.21	ft
Hydraulic Radius		0.14	ft
Top Width		11.93	ft
Normal Depth		0.33	ft
Critical Depth		0.37	ft
Critical Slope		0.00599	ft/ft
Velocity		2.95	ft/s
Velocity Head		0.14	ft
Specific Energy		0.46	ft
Froude Number		1.38	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.37	ft
Channel Slope	0.01190	ft/ft
Critical Slope	0.00599	ft/ft

Cross Section for ULT. West Drive - 100 year

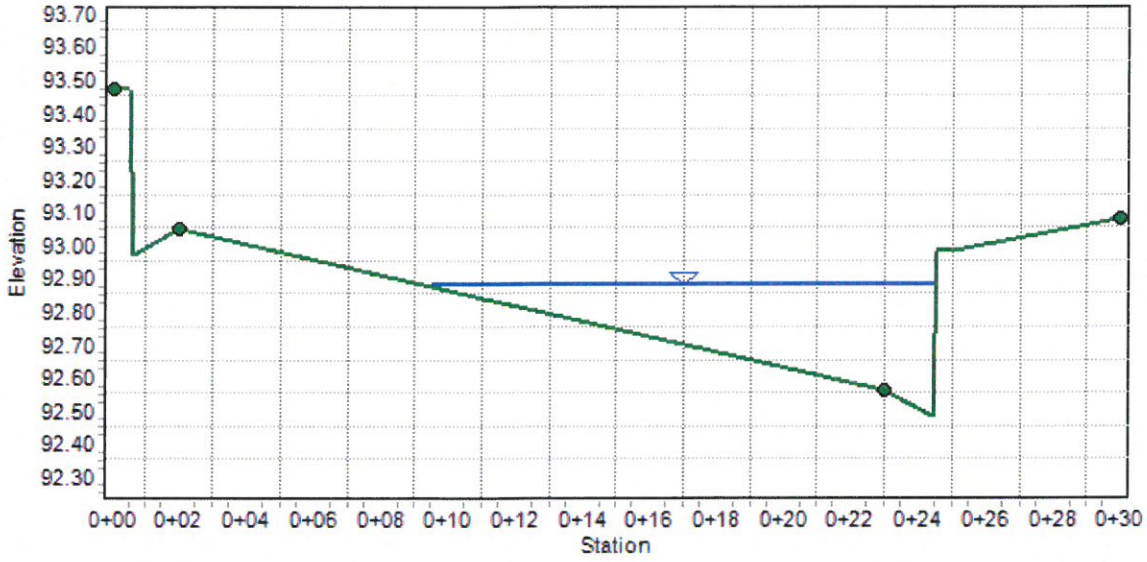
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01190	ft/ft
Normal Depth	0.40	ft
Discharge	9.00	ft³/s

Cross Section Image



Worksheet for ULT. West Drive - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01190	ft/ft
Discharge	9.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	93.47
0+00.50	93.47
0+00.58	92.97
0+02.00	93.05
0+23.00	92.56
0+24.42	92.48
0+24.50	92.98
0+25.00	92.98
0+30.00	93.08

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 93.47)	(0+02.00, 93.05)	0.013
(0+02.00, 93.05)	(0+23.00, 92.56)	0.015
(0+23.00, 92.56)	(0+30.00, 93.08)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.40	ft
Elevation Range	92.48 to 93.47 ft	

Worksheet for ULT. West Drive - 100 year

Results

Flow Area		2.64	ft²
Wetted Perimeter		15.30	ft
Hydraulic Radius		0.17	ft
Top Width		14.96	ft
Normal Depth		0.40	ft
Critical Depth		0.45	ft
Critical Slope		0.00557	ft/ft
Velocity		3.40	ft/s
Velocity Head		0.18	ft
Specific Energy		0.58	ft
Froude Number		1.43	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.45	ft
Channel Slope	0.01190	ft/ft
Critical Slope	0.00557	ft/ft

Cross Section for ULT. East Drive - 10 year

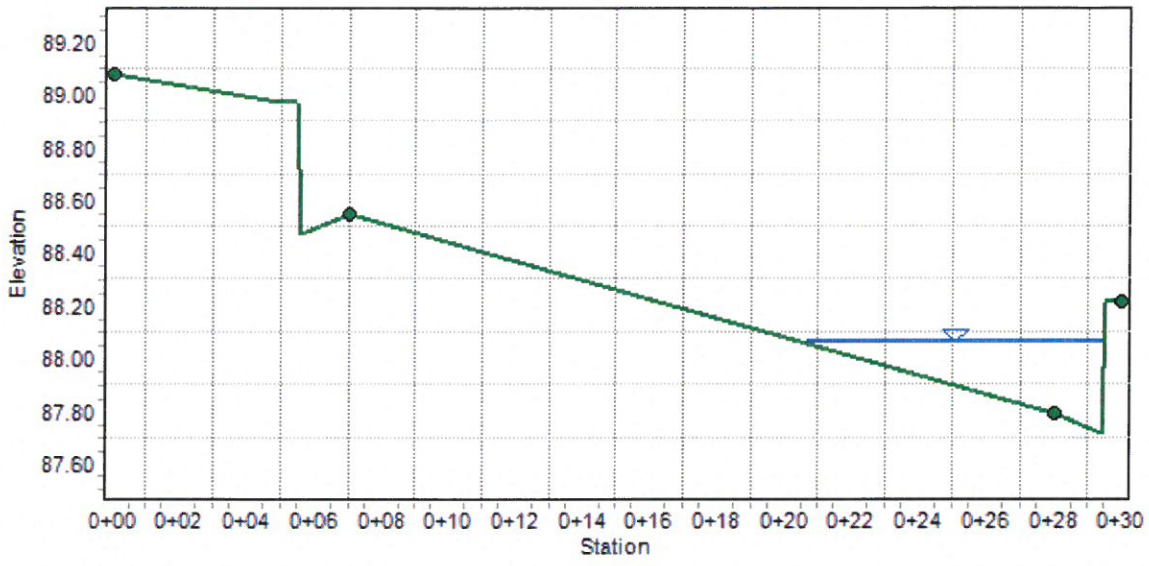
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02320	ft/ft
Normal Depth	0.35	ft
Discharge	6.30	ft³/s

Cross Section Image



Worksheet for ULT. East Drive - 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02320	ft/ft
Discharge	6.30	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.08
0+05.00	88.97
0+05.50	88.97
0+05.58	88.47
0+07.00	88.55
0+28.00	87.79
0+29.42	87.71
0+29.50	88.21
0+30.00	88.21

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.08)	(0+07.00, 88.55)	0.013
(0+07.00, 88.55)	(0+28.00, 87.79)	0.015
(0+28.00, 87.79)	(0+30.00, 88.21)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.35	ft
Elevation Range	87.71 to 89.08 ft	

Worksheet for ULT. East Drive - 10 year

Results

Flow Area		1.41	ft²
Wetted Perimeter		9.08	ft
Hydraulic Radius		0.16	ft
Top Width		8.78	ft
Normal Depth		0.35	ft
Critical Depth		0.45	ft
Critical Slope		0.00549	ft/ft
Velocity		4.46	ft/s
Velocity Head		0.31	ft
Specific Energy		0.66	ft
Froude Number		1.96	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.45	ft
Channel Slope	0.02320	ft/ft
Critical Slope	0.00549	ft/ft

Cross Section for ULT. East Drive - 100 year

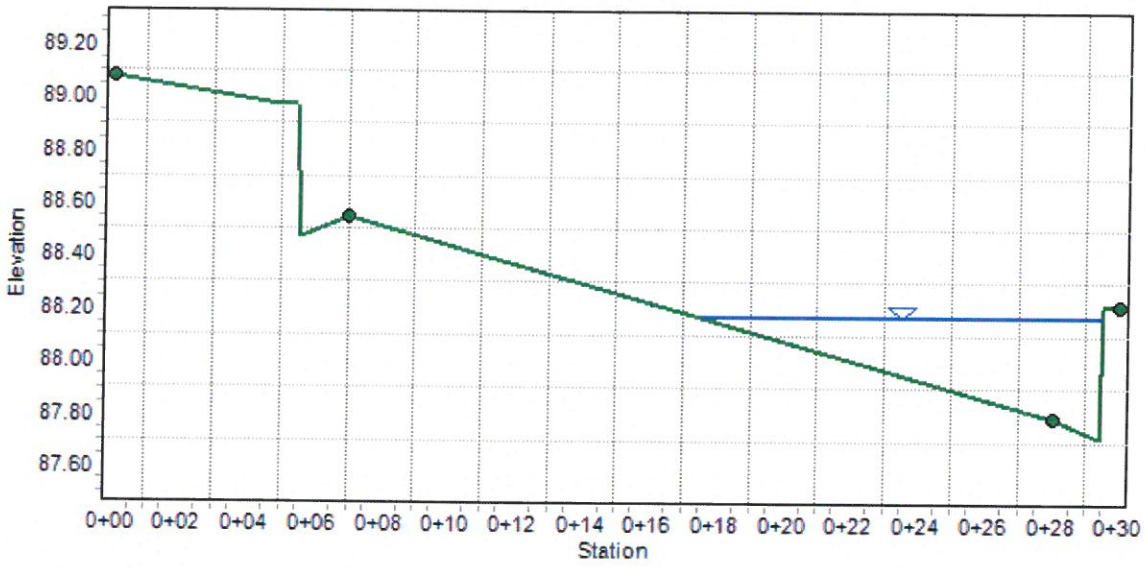
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02320	ft/ft
Normal Depth	0.46	ft
Discharge	14.00	ft^3/s

Cross Section Image



Worksheet for ULT. East Drive - 100 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02320	ft/ft
Discharge	14.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	89.08
0+05.00	88.97
0+05.50	88.97
0+05.58	88.47
0+07.00	88.55
0+28.00	87.79
0+29.42	87.71
0+29.50	88.21
0+30.00	88.21

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 89.08)	(0+07.00, 88.55)	0.013
(0+07.00, 88.55)	(0+28.00, 87.79)	0.015
(0+28.00, 87.79)	(0+30.00, 88.21)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.46	ft
Elevation Range	87.71 to 89.08 ft	

Worksheet for ULT. East Drive - 100 year

Results

Flow Area	2.58	ft²
Wetted Perimeter	12.32	ft
Hydraulic Radius	0.21	ft
Top Width	11.92	ft
Normal Depth	0.46	ft
Critical Depth	0.61	ft
Critical Slope	0.00502	ft/ft
Velocity	5.43	ft/s
Velocity Head	0.46	ft
Specific Energy	0.92	ft
Froude Number	2.06	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.46	ft
Critical Depth	0.61	ft
Channel Slope	0.02320	ft/ft
Critical Slope	0.00502	ft/ft

Appendix A-8

Storm Drain System Hydraulic Model

```
                                                                  Wasden-North
T1 Wasden Elementary School                                                                                                  0
T2 North Storm Drain
T3 Ultimate condition
SO    990.0002089.340  1                                                2089.890
R    1000.0002089.430  1       .015                                                                          .000 -90.000 0
WX   1000.0002089.430  2
R    1099.3302090.040  2       .013                                                                          .000  90.000 0
WE   1099.3302090.040  3       .500
R    1100.3302090.046  3       .013                                                                          .000  90.000 0
WX   1100.3302090.046  4
R    1114.3302090.130  4       .013                                                                          .000  65.690 1
R    1213.8302090.710  4       .013                                                                          .000    .000 0
JX   1214.1632090.715  4  5    .013      .300          2090.715                                              -90.0          .000
R    1277.4902091.090  4       .013                                                                          .000    .000 0
JX   1277.8232091.095  4  5    .013      .400          2091.095                                              -90.0          .000
R    1382.3902091.710  4       .013                                                                          .000 -54.570 1
R    1469.1402092.220  4       .013                                                                          .000    .000 0
JX   1470.1402092.225  4  4    .013     2.400          2092.225                                              -90.0          .000
R    1609.5902092.920  4       .013                                                                          .000 -90.000 1
R    1647.9102093.110  4       .013                                                                          .000    .000 0
JX   1648.2432093.115  4  5    .013      .200          2093.115                                              -90.0          .000
R    1694.0702093.350  4       .013                                                                          .000    .000 0
JX   1694.4032093.355  4  5    .013      .200          2093.355                                              -90.0          .000
R    1737.8202093.560  4       .013                                                                          .000    .000 0
JX   1738.1532093.565  4  5    .013      .200          2093.565                                              -90.0          .000
R    1809.6902093.920  4       .013                                                                          .000    .000 0
JX   1810.0202093.925  4  5    .013      .200          2093.925                                              -90.0          .000
R    1822.9702093.990  4       .013                                                                          .000 -90.000 1
R    1844.4002094.100  4       .013                                                                          .000    .000 0
SH   1844.4002094.100  4                                                    .000
CD   1  1   0    .000   1.000    60.000 6.000 6.000   .00
CD   2  4   3    .000    .667       .000  .000  .000   .00
CD   3  4   1    .000   1.000       .000  .000  .000   .00
CD   4  4   1    .000   1.000       .000  .000  .000   .00
CD   5  4   1    .000    .333       .000  .000  .000   .00
Q              .200   .0
```

Wasden Elementary School
North Storm Drain
Ultimate condition

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
990.000	2089.340	.550	2089.890	4.10	.12	.00	2089.89	.00	.05	66.60	1.000	60.000	6.00	0 .0
2.711	.0090					.0000	.00	.55	.03	.05	.015	.00	6.00	TRAP
992.711	2089.365	.525	2089.890	4.10	.12	.00	2089.89	.00	.05	66.31	1.000	60.000	6.00	0 .0
2.596	.0090					.0000	.00	.53	.03	.05	.015	.00	6.00	TRAP
995.308	2089.388	.502	2089.890	4.10	.13	.00	2089.89	.00	.05	66.03	1.000	60.000	6.00	0 .0
2.486	.0090					.0000	.00	.50	.03	.05	.015	.00	6.00	TRAP
997.793	2089.410	.480	2089.890	4.10	.14	.00	2089.89	.00	.05	65.76	1.000	60.000	6.00	0 .0
2.207	.0090					.0000	.00	.48	.04	.05	.015	.00	6.00	TRAP
1000.000	2089.430	.460	2089.890	4.10	.14	.00	2089.89	.00	.05	65.52	1.000	60.000	6.00	0 .0
1000.000	2089.430	.011	2089.441	4.10	6.02	.56	2090.00	.00	.05	60.14	1.000	60.000	6.00	0 .0
WALL	EXIT													
1000.000	2089.430	.551	2089.981	4.10	4.48	.31	2090.29	.00	.55	.49	.660	.000	.00	3 .0
.583	.0061					.0126	.01	.55	.58	.66	.013	.00	.00	PIPE
1000.583	2089.434	.583	2090.017	4.10	4.27	.28	2090.30	.00	.55	.42	.660	.000	.00	3 .0
3.017	.0061					.0119	.04	.58	.50	.66	.013	.00	.00	PIPE
1003.600	2089.452	.626	2090.078	4.10	4.07	.26	2090.34	.00	.55	.29	.660	.000	.00	3 .0
4.232	.0061					.0119	.05	.63	.39	.66	.013	.00	.00	PIPE
1007.832	2089.478	.660	2090.138	4.10	3.99	.25	2090.39	.00	.55	.00	.660	.000	.00	3 .0
91.498	.0061					.0128	1.17	.66	.00	.66	.013	.00	.00	PIPE

Wasden Elementary School
North Storm Drain
Ultimate condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1099.330	2090.040	1.333	2091.373	4.10	3.99	.25	2091.62	.00	.55	.00	.660	.000	.00	3 .0
WALL ENTRANCE														
1099.330	2090.040	1.245	2091.285	4.10	5.22	.42	2091.71	.00	.86	.00	1.000	.000	.00	1 .0
1.000	.0059					.0132	.01	1.25	.00	1.00	.013	.00	.00	PIPE
1100.330	2090.046	1.378	2091.424	4.10	5.22	.42	2091.85	.00	.86	.00	1.000	.000	.00	0 .0
WALL EXIT														
1100.330	2090.046	1.379	2091.425	4.10	5.22	.42	2091.85	.00	.86	.00	1.000	.000	.00	1 .0
14.000	.0060					.0132	.19	1.38	.00	1.00	.013	.00	.00	PIPE
1114.330	2090.130	1.593	2091.723	4.10	5.22	.42	2092.15	.00	.86	.00	1.000	.000	.00	1 .0
99.500	.0058					.0132	1.32	1.59	.00	1.00	.013	.00	.00	PIPE
1213.830	2090.710	2.331	2093.041	4.10	5.22	.42	2093.46	.00	.86	.00	1.000	.000	.00	1 .0
JUNCT STR	.0154					.0123	.00	2.33	.00		.013	.00	.00	PIPE
1214.163	2090.715	2.449	2093.164	3.80	4.84	.36	2093.53	.00	.83	.00	1.000	.000	.00	1 .0
63.327	.0059					.0114	.72	2.45	.00	1.00	.013	.00	.00	PIPE
1277.490	2091.090	2.795	2093.885	3.80	4.84	.36	2094.25	.00	.83	.00	1.000	.000	.00	1 .0
JUNCT STR	.0147					.0102	.00	2.79	.00		.013	.00	.00	PIPE
1277.823	2091.095	2.938	2094.033	3.40	4.33	.29	2094.32	.00	.79	.00	1.000	.000	.00	1 .0
104.567	.0059					.0091	.95	2.94	.00	1.00	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING

Date: 1-24-2019 Time: 2:44:53

Wasden Elementary School
North Storm Drain
Ultimate condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1382.390	2091.710	3.342	2095.052	3.40	4.33	.29	2095.34	.00	.79	.00	1.000	.000	.00	1 .0
86.750	.0059					.0091	.79	3.34	.00	1.00	.013	.00	.00	PIPE
1469.140	2092.220	3.623	2095.843	3.40	4.33	.29	2096.13	.00	.79	.00	1.000	.000	.00	1 .0
JUNCT STR	.0051					.0049	.00	3.62	.00		.013	.00	.00	PIPE
1470.140	2092.225	4.154	2096.379	1.00	1.27	.03	2096.40	.00	.42	.00	1.000	.000	.00	1 .0

139.450	.0050					.0008	.11	4.15	.00	.44	.013	.00	.00	PIPE					
1609.590	2092.920	3.578	2096.498	1.00	1.27	.03	2096.52	.00	.42	.00	1.000	.000	.00	1	.0				
38.320	.0050					.0008	.03	3.58	.00	.44	.013	.00	.00	PIPE					
1647.910	2093.110	3.418	2096.528	1.00	1.27	.03	2096.55	.00	.42	.00	1.000	.000	.00	1	.0				
JUNCT STR	.0147					.0006	.00	3.42	.00		.013	.00	.00	PIPE					
1648.243	2093.115	3.431	2096.546	.80	1.02	.02	2096.56	.00	.37	.00	1.000	.000	.00	1	.0				
45.827	.0051					.0005	.02	3.43	.00	.38	.013	.00	.00	PIPE					
1694.070	2093.350	3.219	2096.570	.80	1.02	.02	2096.59	.00	.37	.00	1.000	.000	.00	1	.0				
JUNCT STR	.0147					.0004	.00	3.22	.00		.013	.00	.00	PIPE					
1694.403	2093.355	3.229	2096.584	.60	.76	.01	2096.59	.00	.32	.00	1.000	.000	.00	1	.0				
43.417	.0047					.0003	.01	3.23	.00	.34	.013	.00	.00	PIPE					
1737.820	2093.560	3.036	2096.596	.60	.76	.01	2096.61	.00	.32	.00	1.000	.000	.00	1	.0				
JUNCT STR	.0147					.0002	.00	3.04	.00		.013	.00	.00	PIPE					

♀ FILE: WASDEN-NORTH.WSW

W S P G W - CIVILDESIGN Version 14.06

Program Package Serial Number: 1615

WATER SURFACE PROFILE LISTING

Date: 1-24-2019 Time: 2:44:53

Wasden Elementary School
North Storm Drain
Ultimate condition

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1738.153	2093.565	3.041	2096.606	.40	.51	.00	2096.61	.00	.26	.00	1.000	.000	.00	1 .0
71.537	.0050					.0001	.01	3.04	.00	.27	.013	.00	.00	PIPE
1809.690	2093.920	2.695	2096.615	.40	.51	.00	2096.62	.00	.26	.00	1.000	.000	.00	1 .0
JUNCT STR	.0155					.0001	.00	2.70	.00		.013	.00	.00	PIPE
1810.020	2093.925	2.696	2096.621	.20	.25	.00	2096.62	.00	.18	.00	1.000	.000	.00	1 .0
12.950	.0050					.0000	.00	2.70	.00	.19	.013	.00	.00	PIPE
1822.970	2093.990	2.632	2											

```
                                                    WASDEN-N-CENTRAL
T1 WASDEN ELEMENTARY SCHOOL                                                                                    0
T2 NORTH-CENTRAL STORM DRAIN
T3 ULTIMATE CONDITION
SO   1469.1402092.220  1                                2095.843
R    1507.6902092.410  1      .013                                          .000    .000 0
JX   1508.0202092.415  1  2   .013      .200          2092.415            -90.0          .000
R    1552.3602092.640  1      .013                                          .000    .000 0
JX   1552.6902092.775  1  2   .013      .200          2092.775            -90.0          .000
R    1583.8102092.790  1      .013                                          .000    .000 0
JX   1584.1432092.795  1  2  2.013      .200      .4002092.8652092.865-90.0 90.0    .000
R    1595.9302092.860  1      .013                                          .000    .000 0
JX   1596.2632092.865  1  2   .013      .500          2092.865             90.0          .000
R    1658.6302093.340  1      .013                                          .000    .000 0
JX   1658.9632093.345  1  2   .013      .500          2092.865             90.0          .000
R    1663.2402093.360  1      .013                                          .000  90.000 1
R    1677.9102093.440  1      .013                                          .000    .000 0
SH   1677.9102093.440  1                                2093.440
CD   1  4   1    .000   1.000      .000  .000  .000    .00
CD   2  4   1    .000    .333      .000  .000  .000    .00
Q              .400   .0
```

WASDEN ELEMENTARY SCHOOL
NORTH-CENTRAL STORM DRAIN
ULTIMATE CONDITION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1469.140	2092.220	3.623	2095.843	2.40	3.06	.14	2095.99	.00	.66	.00	1.000	.000	.00	1 .0
38.550	.0049					.0045	.17	3.62	.00	.79	.013	.00	.00	PIPE
1507.690	2092.410	3.608	2096.018	2.40	3.06	.14	2096.16	.00	.66	.00	1.000	.000	.00	1 .0
JUNCT STR	.0155					.0042	.00	3.61	.00		.013	.00	.00	PIPE
1508.020	2092.415	3.651	2096.066	2.20	2.80	.12	2096.19	.00	.63	.00	1.000	.000	.00	1 .0
44.340	.0051					.0038	.17	3.65	.00	.72	.013	.00	.00	PIPE
1552.360	2092.640	3.595	2096.235	2.20	2.80	.12	2096.36	.00	.63	.00	1.000	.000	.00	1 .0
JUNCT STR	.4092					.0035	.00	3.59	.00		.013	.00	.00	PIPE
1552.690	2092.775	3.503	2096.278	2.00	2.55	.10	2096.38	.00	.60	.00	1.000	.000	.00	1 .0
31.120	.0005					.0032	.10	3.50	.00	1.00	.013	.00	.00	PIPE
1583.810	2092.790	3.586	2096.376	2.00	2.55	.10	2096.48	.00	.60	.00	1.000	.000	.00	1 .0
JUNCT STR	.0147					.0023	.00	3.59	.00		.013	.00	.00	PIPE
1584.143	2092.795	3.685	2096.480	1.40	1.78	.05	2096.53	.00	.50	.00	1.000	.000	.00	1 .0
11.787	.0055					.0015	.02	3.68	.00	.52	.013	.00	.00	PIPE
1595.930	2092.860	3.638	2096.498	1.40	1.78	.05	2096.55	.00	.50	.00	1.000	.000	.00	1 .0
JUNCT STR	.0147					.0011	.00	3.64	.00		.013	.00	.00	PIPE
1596.263	2092.865	3.691	2096.556	.90	1.15	.02	2096.58	.00	.40	.00	1.000	.000	.00	1 .0
62.367	.0076					.0006	.04	3.69	.00	.37	.013	.00	.00	PIPE

WASDEN ELEMENTARY SCHOOL
NORTH-CENTRAL STORM DRAIN
ULTIMATE CONDITION

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch

1658.630	2093.340	3.256	2096.596	.90	1.15	wasden-n-central .02	2096.62	.00	.40	.00	1.000	.000	.00	1	.0								
JUNCT STR	.0147					.0004	.00	3.26	.00		.013	.00	.00	PIPE									
1658.963	2093.345	3.284	2096.629	.40	.51	.00	2096.63	.00	.26	.00	1.000	.000	.00	1	.0								
4.277	.0035					.0001	.00	3.28	.00	.29	.013	.00	.00	PIPE									
1663.240	2093.360	3.271	2096.631	.40	.51	.00	2096.63	.00	.26	.00	1.000	.000	.00	1	.0								

```
T1 WASDEN ELEMENTARY SCHOOL                                    WASDEN-EAST
T2 EAST STORM DRAIN                                                        0
T3 ULTIMATE CONDITION
SO   1000.0002088.740  1                          2089.000
R    1066.1902090.322  1       .013                                .000    .000 0
WE   1066.1902090.322  2       .500
R    1067.1902090.346  2       .013                                .000 -90.000 0
WX   1067.1902090.346  2
R    1096.1902091.036  2       .013                                .000  90.000 0
JX   1096.1902091.041  2  2    .013      .500         2091.041      35.1          .000
R    1197.8002091.544  2       .013                                .000 -90.000 0
JX   1198.8002091.549  2  3    .013     1.600         2091.549      90.0          .000
R    1230.0302091.705  2       .013                                .000    .000 0
JX   1230.3632091.710  2  4 4.013       .400      .0012091.7052091.705 90.0-90.0    .000
R    1339.8502092.254  2       .013                                .000  90.000 1
R    1401.1502092.561  2       .013                                .000    .000 0
JX   1401.4832092.566  2  4    .013      .200         2092.566      90.0          .000
R    1432.5502092.718  2       .013                                .000  90.000 1
R    1457.3102092.842  2       .013                                .000    .000 0
SH   1457.3102092.842  2                                .000
CD   1  4   2    .000    .500      .000  .000  .000   .00
CD   2  4   1    .000   1.000      .000  .000  .000   .00
CD   3  4   1    .000    .667      .000  .000  .000   .00
CD   4  4   1    .000    .333      .000  .000  .000   .00
Q              .400   .0
```

WASDEN ELEMENTARY SCHOOL
EAST STORM DRAIN
ULTIMATE CONDITION

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	2088.740	.495	2089.235	3.10	7.91	.97	2090.21	.00	.49	.10	.500	.000	.00	2 .0
.038	.0239					.0688	.00	.49	.71	.50	.013	.00	.00	PIPE
1000.038	2088.741	.500	2089.241	3.10	7.90	.97	2090.21	.00	.49	.00	.500	.000	.00	2 .0
66.152	.0239					.0718	4.75	.50	.00	.50	.013	.00	.00	PIPE
1066.190	2090.322	3.970	2094.292	3.10	7.90	.97	2095.26	.00	.49	.00	.500	.000	.00	2 .0
WALL	ENTRANCE													
1066.190	2090.322	5.060	2095.382	3.10	3.95	.24	2095.62	.00	.75	.00	1.000	.000	.00	1 .0
1.000	.0239					.0076	.01	5.06	.00	.54	.013	.00	.00	PIPE
1067.190	2090.346	5.115	2095.461	3.10	3.95	.24	2095.70	.00	.75	.00	1.000	.000	.00	0 .0
WALL	EXIT													
1067.190	2090.346	5.116	2095.461	3.10	3.95	.24	2095.70	.00	.75	.00	1.000	.000	.00	1 .0
29.000	.0238					.0076	.22	5.12	.00	.54	.013	.00	.00	PIPE
1096.190	2091.036	4.717	2095.753	3.10	3.95	.24	2096.00	.00	.75	.00	1.000	.000	.00	1 .0
JUNCT STR	.0000					.0065	.00	4.72	.00		.013	.00	.00	PIPE
1096.190	2091.041	4.845	2095.886	2.60	3.31	.17	2096.06	.00	.69	.00	1.000	.000	.00	1 .0
101.610	.0049					.0053	.54	4.85	.00	.86	.013	.00	.00	PIPE
1197.800	2091.544	4.934	2096.478	2.60	3.31	.17	2096.65	.00	.69	.00	1.000	.000	.00	1 .0
JUNCT STR	.0051					.0031	.00	4.93	.00		.013	.00	.00	PIPE

WASDEN ELEMENTARY SCHOOL
EAST STORM DRAIN
ULTIMATE CONDITION

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch

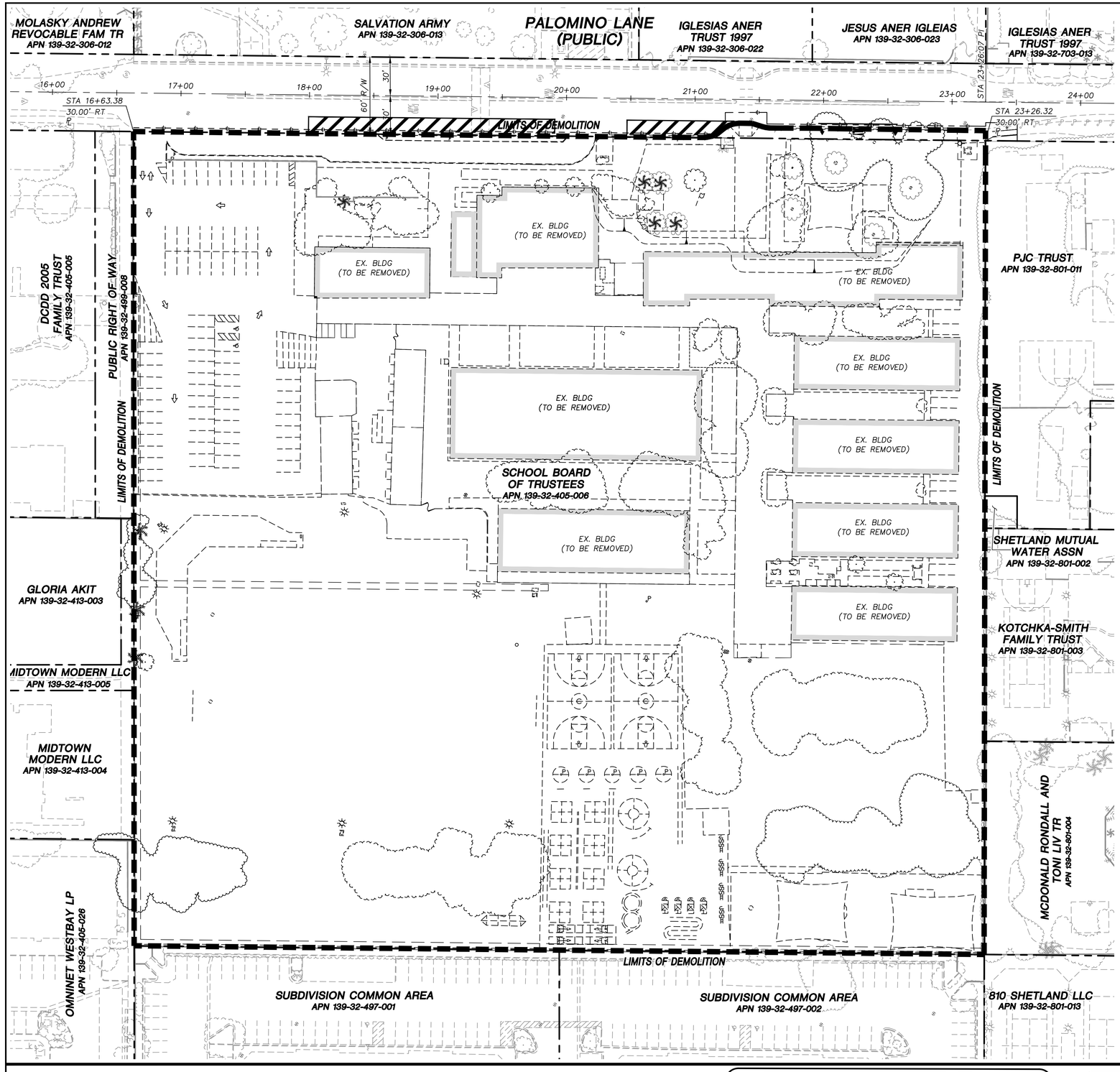
wasden-east

1198.800	2091.549	5.222	2096.771	1.00	1.27	.03	2096.80	.00	.42	.00	1.000	.000	.00	1	.0			
31.230	.0050					.0008	.02	5.22	.00	.44	.013	.00	.00	PIPE				
1230.030	2091.705	5.091	2096.796	1.00	1.27	.03	2096.82	.00	.42	.00	1.000	.000	.00	1	.0			
JUNCT STR	.0147					.0005	.00	5.09	.00		.013	.00	.00	PIPE				
1230.363	2091.710	5.119	2096.829	.60	.76	.01	2096.84	.00	.32	.00	1.000	.000	.00	1	.0			
109.487	.0050					.0003	.03	5.12	.00	.33	.013	.00	.00	PIPE				
1339.850	2092.254	4.609	2096.863	.60	.76	.01	2096.87	.00	.32	.00	1.000	.000	.00	1	.0			
61.300	.0050					.0003	.02	4.61	.00	.33	.013	.00	.00	PIPE				
1401.150	2092.561	4.319	2096.880	.60	.76	.01	2096.89	.00	.32	.00	1.000	.000	.00	1	.0			
JUNCT STR	.0147					.0002	.00	4.32	.00		.013	.00	.00	PIPE				
1401.483	2092.566	4.324	2096.890	.40	.51	.00	2096.89	.00	.26	.00	1.000	.000	.00	1	.0			
31.067	.0049					.0001	.00	4.32	.00	.27	.013	.00	.00	PIPE				
1432.550	2092.718	4.178	2096.896	.40	.51	.00	2096.90	.00	.26	.00	1.000	.000	.00	1	.0			

```
T1 WASDEN ELEMENTARY SCHOOL                                                0
T2 EAST CENTRAL STORM DRAIN
T3 ULTIMATE CONDITION
SO   1198.8002091.549  1                        2096.771
R    1234.7202091.724  1      .013                          .000  26.300 1
JX   1235.0532091.729  1  2   .013     .100         2091.729      .0          .000
R    1269.1202091.896  1      .013                          .000    .000 0
JX   1269.4532091.901  1  2   .013     .400         2091.901    -90.0         .000
R    1327.0302092.264  1      .013                          .000    .000 0
JX   1327.3632092.269  1  2  2.013     .400     .5002092.2692092.269 90.0-90.0    .000
R    1373.1902092.495  1      .013                          .000    .000 1
SH   1373.1902092.495  1                             .000
CD   1  4   1    .000   1.000     .000  .000  .000   .00
CD   2  4   1    .000    .333     .000  .000  .000   .00
Q              .200   .0
```

WASDEN ELEMENTARY SCHOOL
EAST CENTRAL STORM DRAIN
ULTIMATE CONDITION

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1198.800	2091.549	5.222	2096.771	1.60	2.04	.06	2096.84	.00	.54	.00	1.000	.000	.00	1 .0
35.920	.0049					.0020	.07	5.22	.00	.58	.013	.00	.00	PIPE
1234.720	2091.724	5.128	2096.852	1.60	2.04	.06	2096.92	.00	.54	.00	1.000	.000	.00	1 .0
JUNCT STR	.0147					.0019	.00	5.13	.00		.013	.00	.00	PIPE
1235.053	2091.729	5.135	2096.864	1.50	1.91	.06	2096.92	.00	.52	.00	1.000	.000	.00	1 .0
34.067	.0049					.0018	.06	5.13	.00	.56	.013	.00	.00	PIPE
1269.120	2091.896	5.028	2096.924	1.50	1.91	.06	2096.98	.00	.52	.00	1.000	.000	.00	1 .0
JUNCT STR	.0147					.0014	.00	5.03	.00		.013	.00	.00	PIPE
1269.453	2091.901	5.076	2096.977	1.10	1.40	.03	2097.01	.00	.44	.00	1.000	.000	.00	1 .0
57.577	.0063					.0010	.05	5.08	.00	.43	.013	.00	.00	PIPE
1327.030	2092.264	4.768	2097.032	1.10	1.40	.03	2097.06	.00	.44	.00	1.000	.000	.00	1 .0
JUNCT STR	.0154					.0005	.00	4.77	.00		.013	.00	.00	PIPE
1327.363	2092.269	4.822	2097.091	.20	.25	.00	2097.09	.00	.18	.00	1.000	.000	.00	1 .0
45.827	.0049													



GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

CLARK COUNTY BENCHMARK: BC20 5W4 1998
(REVISION DATE: 2003)
RIVET AND ROUND ALUMINUM PLATE IN A CONCRETE MONUMENT, NORTHEAST QUADRANT OF FORT APACHE ROUND AND MAULE AVENUE.
ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING RECORDED UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER – STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY	UNIT
DEMOLITION		
CURB AND GUTTER REMOVAL	943	LF
CONCRETE AREA REMOVAL	92,450	SF
ASPHALT REMOVAL	48,610	SF
LANDSCAPE REMOVAL	187,100	SF
BUILDING REMOVAL	58,400	SF
CANOPY REMOVAL(BUILDING)	21,400	SF
PORTABLE STRUCTURE REMOVAL	4	EA
AREA LIGHT REMOVAL/RELOCATION	5	EA
POWER POLE REMOVAL/RELOCATION	1	EA
DCDA REMOVAL	1	EA
WALL REMOVAL	1420	LF
FENCE REMOVAL	1708	LF

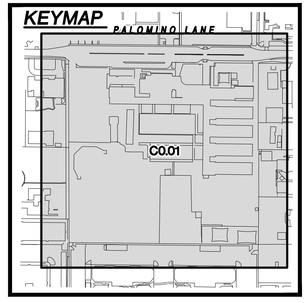
MASTER PLAN NOTE

THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

NOTES:

SEE SHEETS C0.02 TO C0.05 FOR CONSTRUCTION NOTES.

KEYMAP



REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

OVERALL DEMOLITION PLAN

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 1/30
C0.01

CLV00-00000-XXX

X:\Projects\Land Development\SH Architecture\100062041 – Wasden Elementary_Sheets\62041-01-MDEMO-R1.dwg LAYOUT: C0.01 Jan 22, 2019 – 8:22AM

CLARK COUNTY SCHOOL DISTRICT IMPROVEMENT PLANS FOR:

PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT

2831 PALOMINO LANE
LAS VEGAS, NEVADA 89107

SHEET INDEX

SHEET LIST TABLE

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2	C0.02	DEMOLITION PLAN 1	
3	C0.03	DEMOLITION PLAN 2	
4	C0.04	DEMOLITION PLAN 3	
5	C0.05	DEMOLITION PLAN 4	
6	C1.01	COVER SHEET	
7	C1.02	LEGEND	
8	C1.03	GENERAL NOTES	
9	C2.01	OVERALL HORIZONTAL CONTROL	--
10	C2.02	HORIZONTAL CONTROL PLAN 1	
11	C2.03	HORIZONTAL CONTROL PLAN 2	
12	C2.04	HORIZONTAL CONTROL PLAN 3	
13	C2.05	HORIZONTAL CONTROL PLAN 4	
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17	C3.04	GRADING PLAN 3	
18	C3.05	GRADING PLAN 4	
19	C4.01	PLAN AND PROFILE 1	BEGIN TO STA 20+00
20	C4.02	PLAN AND PROFILE 2	STA 20+00 TO END
21	C4.03	SIGNAGE AND STRIPING PLAN	
22	C5.01	MASTER UTILITY AND FIRE ACCESS PLAN	
23	C5.02	UTILITY PLAN 1	
24	C5.03	UTILITY PLAN 2	
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27	C6.01	TYPICAL SECTION	
28	C6.02	SECTION DETAILS	
29	C6.03	ONSITE DETAILS	
30	C6.04	STORM DRAIN DETAILS	

UTILITY NOTE

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

CALL BEFORE YOU DIG: 1-800-227-2600

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE) PRESSURE REDUCING VALVES BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY AND WILL NOTE BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

NOTICE OF INTENT NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH APPROPRIATE FILLING FEE.

NPDES PERMIT NOTE

THE CONTRACTOR SHOULD CONTACT THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO CONSTRUCTION. ALL CONSTRUCTION PROJECTS ONE ACRE OR LARGER MUST APPLY FOR THE PERMIT THROUGH NDEP. ALL QUESTIONS REGARDING THE NPDES PERMIT REQUIREMENTS SHOULD BE DIRECTED TO THE NDEP AT (775) 687-9429.

DISCLAIMER NOTE

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON, THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, DATED 9/27/2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

OWNER /DEVELOPER

OWNER

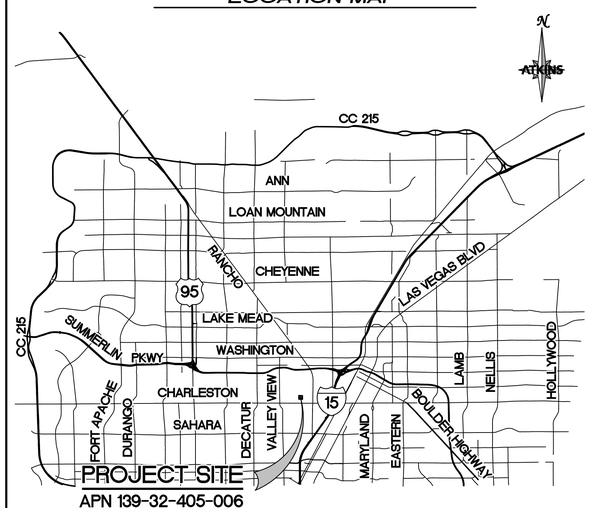
CONTACT: HEIDI ZUPANCIC
CLARK COUNTY SCHOOL DISTRICT
4415 WEST MESA VERDE LANE
LAS VEGAS, NEVADA 89139

ENGINEER / CONSULTANT

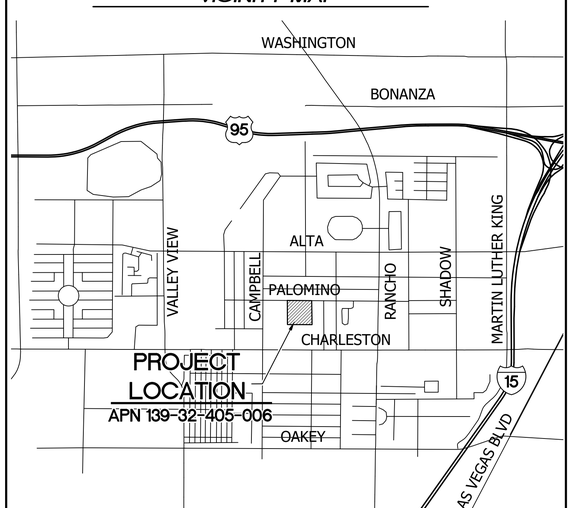
CIVIL

CONTACT: JULIA IZZOLO P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

LOCATION MAP



VICINITY MAP



APPROVALS

ALLEN PAVELKA, P.E. #9029 — DATE
CITY ENGINEER

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY AND OR/ DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER DEVIATIONS FROM STANDARD. THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARDS DRAWING AND SPECIFICATIONS CLARK COUNTY AREA, NEVADA.

KEVIN MCOSKER, DIRECTOR – BUILDING AND SAFETY — DATE

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE PLANNING DEPARTMENT.

LAS VEGAS FIRE AND RESCUE — DATE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK — DATE

THE AFFIXED CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES, AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. _____ FIRST APPROVED DATE: _____

SHEETS: _____

NV ENERGY — DATE

NV ENERGY HAS ACKNOWLEDGED WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA UTILITY COMMISSION'S RULES AND REGULATIONS.

SOUTHWEST GAS CORPORATION — DATE

COX COMMUNICATIONS OF LAS VEGAS, INC — DATE

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M, CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

CLARK COUNTY BENCHMARK: 8C20 5W4 1998 (REVISION DATE: 2003)
RIVET AND ROUND ALUMINUM PLATE IN A CONCRETE MONUMENT, NORTHEAST QUADRANT OF FORT APACHE ROUND AND MAULE AVENUE.
ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

LEGAL DESCRIPTION

BEING ALL OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CLARK COUNTY, NEVADA.

Call before you Dig — Call 811 OR 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD. 1-702-227-2929

FAST — Call before you UnderGround 1-702-432-5300

PROFESSIONAL ENGINEER-STATE OF NEVADA — JULIA L IZZOLO — EXP. 06-30-19 — CIVIL — No. 20926

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

COVER SHEET

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: NONE
VERT.: NONE

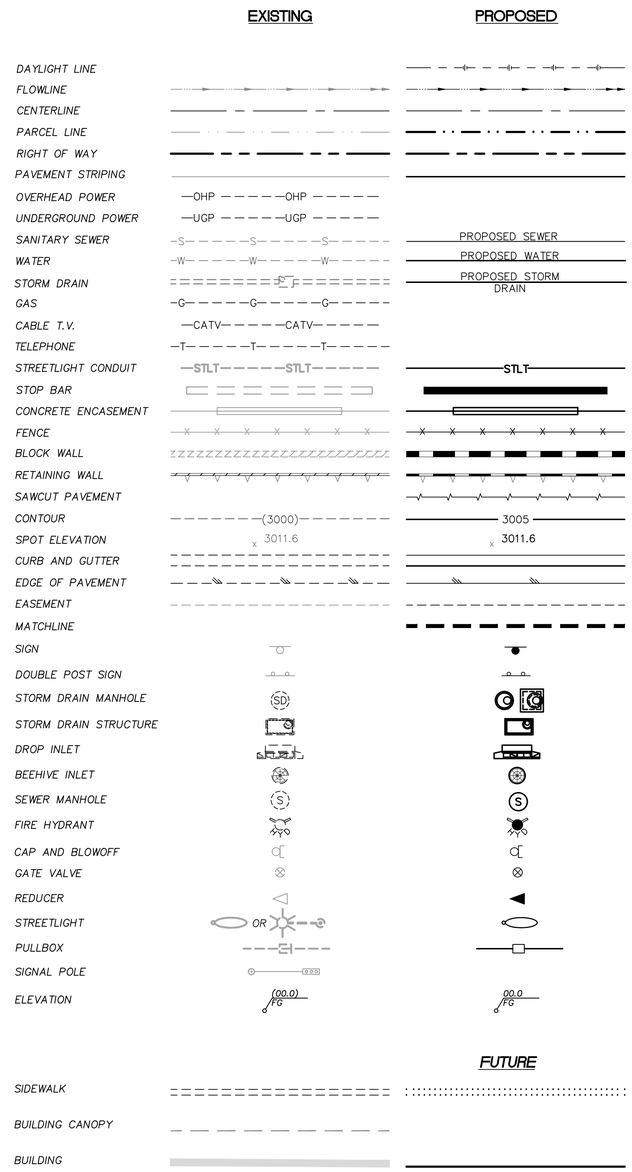
JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 6/30
C101

CLV 00-00000-XXX

X:\Projects\Land Development\SH Architecture\100062041 - Wasden Elementary_Sheets\62041-05-TITL-C1.dwg LAYOUT: C1.01 Jan 22, 2019 - 8:23AM

@	AT
#	NUMBER
AB	ABANDONED
AC	ASPHALTIC CONCRETE
ACP	ASBESTOS CEMENT PIPE
AGG	AGGREGATE
AIP	ABANDON IN PLACE
ALT	ALTERNATE
AP	ANGLE POINT
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL
AV/AR	AIR VACUUM AIR RELIEF VALVE
BC	BACK OF CURB
BCR	BACK OF CURB RADIUS
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW OFF
BP	BOTTOM OF PIPE
BSW	BACK OF SIDEWALK
BVC	BEGIN VERTICAL CURVE
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION
BVCS	BEGINNING OF VERTICAL CURVE STATION
BW	BOTTOM WIDTH
C&G	CURB AND GUTTER
C–C	CENTER TO CENTER
CATV	CABLE TELEVISION
CCAUSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
CF	CUBIC FOOT
CIP	CAST IRON PIPE OR CAST IN PLACE
CL	CENTERLINE
CLR	CLEAR
CLV	CITY OF LAS VEGAS
CM	CONSTRUCTION MANAGER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNDT	CONDUIT
CNLV	CITY OF NORTH LAS VEGAS
CO	CLEANOUT
COH	CITY OF HENDERSON
COL	COLUMN
CON'T	CONTINUATION
CONC	CONCRETE
CONST	CONSTRUCT OR CONSTRUCTION
COR	CORNER
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CU	CUBIC
CULV	CULVERT
CY	CUBIC YARD
D	DEPTH
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
DET, DTL	DETAIL
DEPT	DEPARTMENT
DG	DESIGN GRADE
DI	DROP INLET
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DOC	DOCUMENT
DW	DRIVEWAY
DWG	DRAWING
E	EAST
EA	EACH
EB	EASTBOUND
EC	END OF CURVE
ECR	END CURB RETURN
EF	EACH FACE
EG	EXISTING GROUND
ELEC	ELECTRICAL
ELEV	ELEVATION
EMBK	EMBANKMENT
EOP	EDGE OF PAVEMENT
EP	EDGE OF PAVEMENT ALIGNMENT END
EQ	EQUAL
ESMT	EASEMENT
EVC	END VERTICAL CURVE
EVCS	END VERTICAL CURVE STATION
EW	EACH WAY
EX, EXST	EXISTING
EXP, JT	EXPANSION JOINT
FA	FIRE ALARM
FC	FACE OF CURB
FF	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTIC
FT	FOOT OR FEET
G	GAS LINE
GALV	GALVANIZED
GB	GRADE BREAK
GL	GRATE LENGTH
GM	GAS METER
GUT	GUTTER
GV	GATE VALVE
H	HEIGHT
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HDWL	HEADWALL
HE	HORIZONTAL ELLIPTICAL
HGL	HYDRAULIC GRADE LINE
HOA	HOMEOWNER'S ASSOCIATION
HOR	HORIZONTAL
HP	HIGH POINT
ID	INSIDE DIAMETER
IN	INCH(ES)
INT	INTERSECTION
INV	INVERT
IQAC	INTERAGENCY QUALITY ASSURANCE COMMITTEE
IRR	IRRIGATION
ISL	ISLAND
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
K	VERTICAL CURVE K VALUE
L	LENGTH
LB	POUND(S)
LF	LINEAR FEET
LIN	LINEAR
LIN #	CCWRD MANHOLE NUMBER
LOC	LENGTH OF CURVE
LOL	LAYOUT LINE
LP	LOW POINT
LS	LANDSCAPE
LT	LEFT
LVC	LENGTH OF VERTICAL CURVE
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAS	MASONRY
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MON	MONOLITHIC, MONUMENT
MOW	MOW CURB
MTL	MATERIAL
ME	MATCH EXISTING
MUE	MUNICIPAL UTILITY EASEMENT
N	NORTH
NAP	NOT A PART
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NF	NEAR FACE
NG	NUMBER OF GRATES, NATURAL GRADE
NIC	NOT IN CONTRACT
No.	NUMBER
NTS	NOT TO SCALE
NVE	NV ENERGY
OC	ON CENTER
OD	OUTSIDE DIAMETER
OG	OPEN GRADE
OH	OVERHEAD
OHP	OVERHEAD POWER
OS	OFFSET
P	POWER
PB	PULL BOX
PBS	PLANTMIX BITUMINOUS SURFACE
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE OR POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE
PG	PROPOSED GRADE
PGL	PROFILE GRADE LINE
PH	POT HOLE
PI	POINT OF INTERSECTION
PIP	PROTECT IN PLACE
PL	PROPERTY LINE
PLCS	PLACES
PMF	PAVEMENT MARKING FILM
POC	POINT OF CONNECTION
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PROP	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENCY
PUE	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
QTY	QUANTITY
(R)	RADIAL
R/W,ROW	RIGHT OF WAY
R	RADIUS
RC	REINFORCED CONCRETE
RCB	REINFORCED CONCRETE BOX
RCC	ROLLER COMPACTED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REINF	REINFORCED OR REINFORCEMENT
RELOC	RELOCATE
REV	REVISION
RG	ROUGH GRADE
RP	RADIUS POINT
RPM	RAISED PAVEMENT MARKER
RR	RAILROAD
RT	RIGHT
SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SF	SQUARE FOOT/SQUARE FEET
SHLD	SHOULDER
SHT	SHEET
SHP	STEEL HIGH PRESSURE PIPE
SMFO	SINGLE MODE FIBER OPTIC
SNWA	SOUTHERN NEVADA WATER AUTHORITY
SQ	SQUARE
SS	SANITARY SEWER OR SIDE SLOPE
SSD	SUMMERLIN STANDARD DRAWING
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STLT	STREETLIGHT
SDHW	STORM DRAIN HEADWALL
STRUCT	STRUCTURAL OR STRUCTURE
SUM #	CCWRD MANHOLE NUMBER
SURV	SURVEY
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
SY	SQUARE YARD
T	TELEPHONE LINE
TAN	TANGENT
TB	TOP OF BOX
TBA	TO BE ADJUSTED
TBC	TOP OF BACK OF CURB
TBR	TO BE REMOVED
TC	TOP OF CURB
TCD	TRAFFIC CONTROL DEVICE
TDS	TECHNICAL DRAINAGE STUDY
TEL	TELEPHONE
TEMP	TEMPORARY
TF	TOP OF FOOTING
THK	THICK
THR	THRUST
THW	TOP OF HEADWALL
TOF	TOP OF FACE
TW/TOW	TOP OF WALL
TP	TOP OF PIPE
TRANS	TRANSITION
TS	TRAFFIC SIGNAL
TSI	TRAFFIC SIGNAL INTERCONNECT
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS
UG	UNDERGROUND
UGP	UNDERGROUND POWER
UIE	UPPER INVERT ELEVATION
UNO	UNLESS NOTED OTHERWISE
UPRR	UNION PACIFIC RAILROAD
USD	UNIFORM STANDARD DRAWING
UTACS	ULTRA THIN ASPHALT CONCRETE SURFACE
USTCDE	UTILITY, STREETLIGHT, TRAFFIC CONTROL DEVICE EASEMENT
V	VOLT
VAR	VARIABLE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VG	VALLEY GUTTER
W	WEST, WATER
W/	WITH
WB	WEST BOUND
WL	WATER LINE
WM	WATER METER
W/O	WITHOUT
WPJ	WEAKENED PLANE JOINT
WV	WATER VALVE
WW	WING WALL
YD	YARD(S)

FENCE



NOTE TO CONTRACTOR

- QUANTITIES SHOWN ARE ESTIMATES ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICE MANAGER DATE
PROJECT NO. LVVWD DATE:
LVVWD APPROVED FIRE FLOW 2500GPM AT 20 PSI RESIDUAL

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

CLARK COUNTY BENCHMARK: 8C20 5W4 1998
(REVISION DATE: 2003)
RIVET AND ROUND ALUMINUM PLATE IN A CONCRETE MONUMENT, NORTHEAST QUADRANT OF FORT APACHE ROUND AND MAULE AVENUE.
ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

FAST Call Before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES, IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20926

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

LEGEND

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: NONE
VERT.: NONE

JOB NO. 100062041
DATE: 01/16/2019
DRAWING NO. 7/30
C102

CLV 00-00000-XXX

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CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE ONE-HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (COMPANY, REPORT #, DATE) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. AFTER HAUNCHING AND PRIOR TO BACKFILL OPERATIONS WHICH WOULD COVER SANITARY SEWER AND STORM DRAIN FACILITIES, CONTRACTOR IS REQUIRED TO SCHEDULE CLV OPEN-TRENCH UTILITY SURVEY INSPECTION FOR DETERMINATION OF FINAL LOCATION COORDINATES. FACILITIES TO BE LOCATED BY CLV SHALL INCLUDE AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES, STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT-OF-WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS.
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED 06/04/2018

LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDELINES

1. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24.40 AND IN THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

SOUTHWEST NEVADA - SOUTHWEST GAS CORPORATION

GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
2. THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-INCHES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC
3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099

ALL CIVIL IMPROVEMENT PLANS MUST INCLUDE SOUTHWEST GAS CORPORATION HIGH PRESSURE NOTES ON THE NOTES SHEET AND ALL SHEETS DEPICTING HIGH PRESSURE NATURAL GAS MAINS AS INDICATED BELOW:

CAUTION: HIGH PRESSURE GAS!!
CALL SOUTHWEST GAS AT 702-400-1799 FOR STANDBY WHEN EXCAVATING OVER OR
NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION

SOUTHWEST GAS CORPORATION _____ DATE

CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC § 105.7.12
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. IFC § 3310, § 3312
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC § 507.5.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC § 507.2.1, NFPA 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. IFC § 507
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC § 507.5.7.1
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC § 507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102
    - RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. IFC § C102.8
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. IFC § C102.12
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § 102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IFC § C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. IFC § C104
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. IFC § 503.2.3
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. IFC § 503.2.7; 503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. IFC § 503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. IFC § 503.2.1
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24FT WIDE, FLOW LINE TO FLOW LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC § 503.2.1.1
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. IFC § 503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. IFC § 503.1.2
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. IFC § 503.2.5
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC § 503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

REVISED MARCH 1, 2016

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

		HORIZONTAL	VERTICAL	COMPACTION
A.	PAVEMENT AREA SUBGRADE	0.1'+	+0.0' TO -0.1'	SEE SOILS REPORT
B.	ENGINEERED FILL	0.5'+	+0.1' TO -0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT-OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 04/15/10

GRADING NOTES

1. INDICATED GRADES OTHER THAN TC, FG & GUTTER FL ARE ROUGH GRADES.
2. THE ROUGH GRADING PLANS SHALL BE ON THE JOB SITE AT ALL TIMES. THE ROUGH GRADING SHALL BE FINISHED IN CONFORMANCE WITH THE LINES AND GRADES SHOWN ON THE PLANS. THE GRADING QUANTITIES ARE BASED ON THE ELEVATION AND DETAILS SHOWN ON THE PLANS. ANY DEVIATIONS FROM THE PLAN WILL RESULT IN QUANTITY CHANGES.
3. SOILS REPORT PREPARED BY:

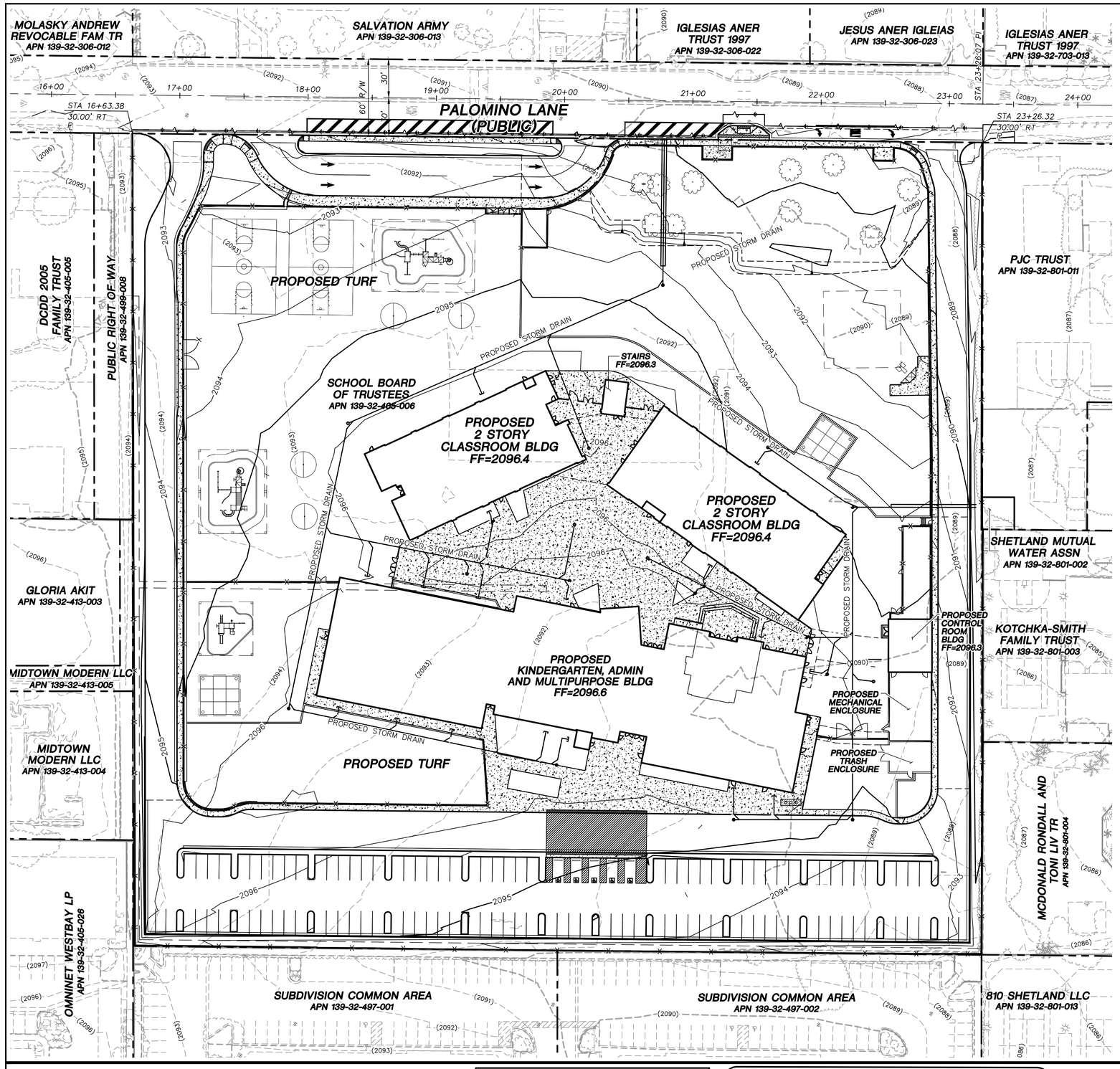
4. EARTHWORK QUANTITIES (RAW):

   -CUT = 210 CUBIC YARDS
   -FILL = 39,390 CUBIC YARDS

A. THE ABOVE QUANTITIES DO NOT REFLECT LOSSES DUE TO SUBSIDENCE OR SHRINKAGE.
B. THE ABOVE QUANTITIES DO REFLECT USING NATIVE MATERIAL IN LIEU OF TYPE 1 GRAVEL BASE MATERIAL FOR STREET SECTIONS.
C. THE ABOVE QUANTITIES DO NOT REFLECT ANY EARTHWORK WHICH MAY BE REQUIRED BY THE ENGINEER TO CONSTRUCT ADDITIONAL PROTECTIVE DITCHES OR BERMS NOT SHOWN ON THESE DRAWINGS.

GENERAL NOTES

1. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES, THE PROJECT ENGINEER AND CLARK COUNTY AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF WORK.
2. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE CONTRACT DRAWINGS. ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE PROJECT ENGINEER.
3. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST ISSUE; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE.
4. LOCATIONS OF UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS WERE OBTAINED FROM INFORMATION RECEIVED FROM THE APPLICABLE UTILITY COMPANIES. NEITHER THE OWNER NOR ENGINEER ASSUMES ANY RESPONSIBILITY FOR UTILITIES OR STRUCTURES NOT SHOWN, OR NOT IN THE LOCATION SHOWN ON THE DRAWINGS. CONTRACTOR TO VERIFY EXACT LOCATION OF UTILITIES PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR'S RESPONSIBILITY REGARDING UTILITIES SHALL BE AS REQUIRED UNDER SECTION 107.17 OF THE "UNIFORM STANDARD SPECIFICATIONS FOR CLARK COUNTY AREA, NEVADA" AND AS PROVIDED IN THE SPECIFICATIONS.
5. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT EXISTING UTILITY LINES, STRUCTURES, AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE. ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE COUNTY ENGINEER OR OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
6. THE CONTRACTOR SHALL NOT REMOVE TREES, SHRUBS, LAWNS, WALLS, FENCES, SIGNS, STRUCTURES, LIGHTS, OR ANY OTHER EXISTING IMPROVEMENTS OUTSIDE OF STREET RIGHT-OF-WAY, EXCEPT WHERE REQUIRED TO DO SO BY THE CONTRACT DRAWINGS OR THE PROJECT ENGINEER. REPLACEMENT, RELOCATION OR RECONSTRUCTION OF ALL EXISTING IMPROVEMENTS INCLUDING SPRINKLER SYSTEMS, LAWNS, FENCES, WALLS, SIGNS, STEPS, SIDEWALKS, DRIVEWAYS, LAWN LIGHTS, AND ALL OTHER ITEMS APPLICABLE TO THIS CONTRACT SHALL BE REQUIRED BY THE PROJECT ENGINEER.
7. THE CONTRACTOR SHALL BACKFILL AND FINE GRADE ALL CUT OR FILL SLOPES TO MATCH EXISTING CONDITIONS TO THE SATISFACTION OF THE PROJECT ENGINEER. WHERE EXISTING LAWNS ARE DAMAGED BY THE CONTRACTOR'S OPERATIONS THE CONTRACTOR WILL SOD THE AFFECTED AREA TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN PER CONTRACT DRAWINGS.
9. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH N.R.S. STATUTE NO. 625.550.
10. THE ACTUAL LOCATIONS OF SAW CUT LINES, LIMITS OF COLD MILLING, LIMITS OF DRIVEWAY TRANSITIONS, AND LANDSCAPE REPAIR SHALL BE DETERMINED IN THE FIELD BY THE RESIDENT PROJECT REPRESENTATIVE.
11. THE ACTUAL LIMITS OF EXISTING OPEN GRADE REMOVAL AND UDACS APPLICATION SHALL BE DETERMINED IN THE FIELD BY THE RESIDENT PROJECT REPRESENTATIVE.
12. ALL STANDARD DRAWINGS REFERENCED IN THIS SET ARE BASED ON THE CURRENT "UNIFORM STANDARD DRAWINGS REVISION SET II-1997 RELEASE".
13. UNLESS OTHERWISE SHOWN ON THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OR RELOCATION OF ALL WATER SERVICES AND METERS WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON THE CONTRACT DRAWINGS.
14. THE CONTRACTOR SHALL MAINTAIN AN ONGOING REMOVAL PROCESS OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.
15. CURB AND GUTTER OF A GRADE OF LESS THAN 4/10 OF ONE PERCENT SHALL BE CONSTRUCTED BY FORMING. EACH JOINT SHALL BE CHECKED FOR GRADE PRIOR TO CONSTRUCTION AND WATER TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION.
16. THE CONTRACTOR SHALL VERIFY IN THE FIELD ALL DIMENSIONS, EXISTING CONDITIONS AND POINTS OF CONNECTION WITH ADJOINING PROPERTY (PUBLIC AND PRIVATE). ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE PROJECT ENGINEER PRIOR TO PROCEEDING WITH THE WORK.
17. REMOVAL OR RELOCATION OF POWER POLES, TELEPHONE POLES, JOINTLY-OWNED POLES, AND APPURTENANCES WHICH INTERFERE WITH IMPROVEMENTS REQUIRED TO BE CONSTRUCTED UNDER THIS CONTRACT, SHALL BE THE RESPONSIBILITY OF THE RESPECTIVE UTILITY COMPANY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH THE UTILITY COMPANIES FAR ENOUGH IN ADVANCE SO AS TO NOT IMPACT THE SCHEDULE.
18. COX COMMUNICATIONS SHALL BE RESPONSIBLE FOR THE VERTICAL OR HORIZONTAL ADJUSTMENT OF ALL CATV FACILITIES WHICH INTERFERE WITH IMPROVEMENTS SHOWN ON THE CONTRACT DR



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ATKINS

SUMMARY OF QUANTITIES

DESCRIPTION	QUANTITY	UNIT
DRAINAGE		
6" SDR-35 STORM DRAIN PIPE	368	LF
12" SDR-35 STORM DRAIN PIPE	1,801	LF
STORM DRAIN AREA DRAIN	5	EA
STORM DRAIN CLEAN OUT	7	EA

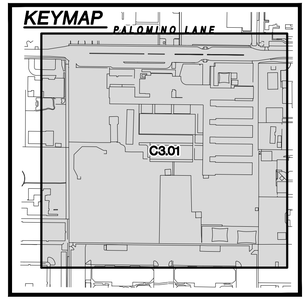
MASTER PLAN NOTE

THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

DRAINAGE NOTES

1. SEE SHEETS C3.02 TO C3.05 FOR CONSTRUCTION NOTES AND INFORMATION RELATED TO STORM DRAIN.
2. ALL STORM DRAIN MATERIAL TO BE PVC SDR-35, UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.

KEYMAP



GRAPHIC SCALE
40 0 20 40 80
HORIZONTAL: 1"= 40'

GRADING PLAN CERTIFICATION

NAME: JULIA L. IZZO PE: 20326 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

CLARK COUNTY BENCHMARK: BC20 5W4 1998 (REVISION DATE: 2003)
RIVET AND ROUND ALUMINUM PLATE IN A CONCRETE MONUMENT, NORTHEAST QUADRANT OF FORT APACHE ROUND AND MAULE AVENUE.
ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. ITS COSTLY. Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER-STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

MASTER DRAINAGE PLAN

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"=40'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO.14/30
C3.01

CLV 00-00000-XXX

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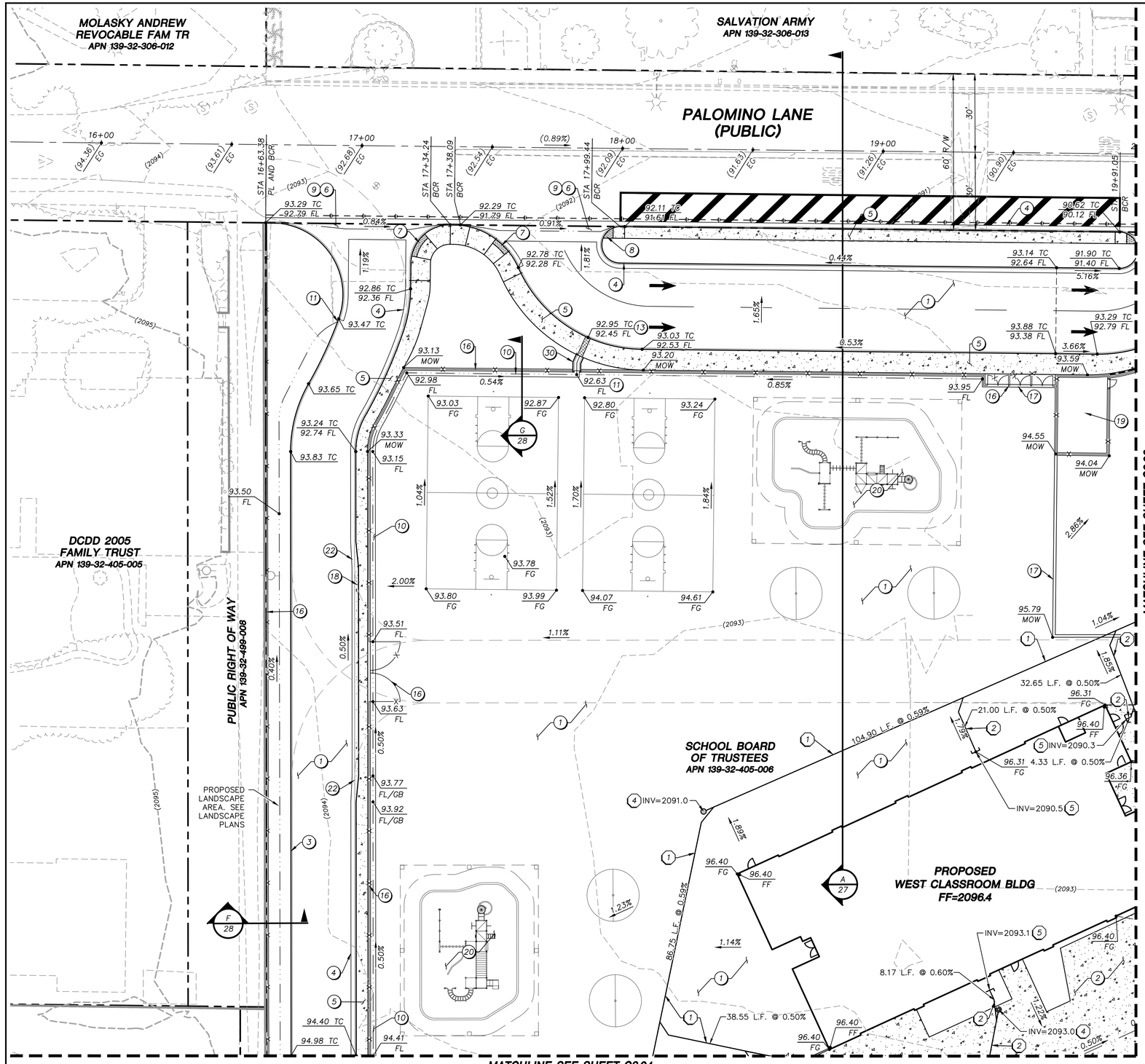
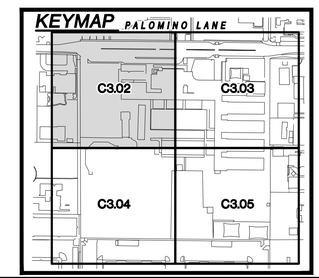


	CONSTRUCTION NOTES
1	CONSTRUCT AC PAVEMENT PER DETAIL 1 ON SHEET 29.
2	CONSTRUCT CONCRETE PAVEMENT PER DETAIL 2 ON SHEET 29.
3	CONSTRUCT "A" TYPE CURB PER DETAIL 3 ON SHEET 29.
4	CONSTRUCT "L" TYPE CURB PER CCAUSD NO. 216.
5	CONSTRUCT CONCRETE SIDEWALK PER CCAUSD NO. 234. REFER TO ARCH. PLANS FOR FINISHING SPECIFICATIONS.
6	CONSTRUCT VALLEY GUTER PER CCAUSD NO. 228.
7	CONSTRUCT SIDEWALK RAMP CCAUSD NO. 235 CASE I.
8	CONSTRUCT ACCESSIBLE RAMP PER DETAIL 4 ON SHEET 29.
9	CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD NO. 225.
10	CONSTRUCT 2" VALLEY GUTTER PER DETAIL 10 ON SHEET 29.
11	CONSTRUCT 2" CURB OPENING DETAIL 6 ON SHEET 29.
12	INSTALL 7" CONCRETE RISERS WITH HANDRAIL PER ARCH. PLANS.
13	CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD NO. 236.
14	CONSTRUCT RIPRAP SWALE. D50=--", THICKNESS=--". PER DETAIL 7 ON SHEET 29
15	CONSTRUCT RETAINING WALL PER PLAN BY OTHERS.
16	INSTALL FENCE/GATE PER ARCH. PLANS ON 12" MOW CURB PER DETAIL 5 ON SHEET 29.
17	INSTALL 12" MOW CURB PER DETAIL 8 ON SHEET 29.
18	INSTALL ROLL CURB PER CCAUSD NO. 217.2.S1.
19	PROPOSED IRRIGATION ENCLOSURE PER LANDSCAPE DRAWINGS.
20	PROPOSED PLAYGROUND STRUCTURE BY OTHERS.
21	CONSTRUCT TACK-ON ISLAND CURB PER CCAUSD NO. 220.
22	CONSTRUCT 'L' CURB TO ROLL CURB TRANSITION PER DETAIL 11 ON SHEET 29.
23	CONSTRUCT ACCESSIBLE RAMP PER DETAIL 9 ON SHEET 29.
24	CONSTRUCT 0" TO 6" CURB FACE TRANSITION.
25	INSTALL RAISED PAVEMENT MARKERS PER CCAUSD 235.
26	PROPOSED PLANTER PER LANDSCAPE DRAWINGS.
27	CONSTRUCT RAMP WITH HANDRAIL PER ARCH. DRAWINGS.
28	INSTALL 12" MODIFIED MOW CURB PER DETAIL 12 ON SHEET 29
29	MATCH EXISTING ELEVATION
30	CONSTRUCT U-CHANNEL PER DETAIL _ ON SHEET _
31	CONSTRUCT MODIFIED "L" TYPE CURB WITH 9" CF AND STORM DRAIN OUTLET PER DETAIL 15 ON SHEET 30
32	CONSTRUCT 6" TO 9" CURB FACE TRANSITION
	STORM DRAIN CONSTRUCTION NOTES
1	INSTALL 12" C-900 PVC STORM DRAIN PIPE.
2	INSTALL 6" SDR-35 STORM DRAIN PIPE.
3	INSTALL ATRIUM DRAIN PER DETAILS ON SHEET 30.
4	INSTALL STORM DRAIN CLEAN OUT PER CLARK COUNTY WATER RECLAMATION DISTRICT STANDARD DRAWING SD-26.
5	INSTALL STORM DRAIN CAP, REFER TO PLUMBING PLANS FOR CONTINUATION.
6	PROPOSED STORM DRAIN OUTLET TO DAYLIGHT THROUGH RETAINING WALL PER DETAIL PLANS BY OTHERS.
7	CONSTRUCT TRIPLE STORM DRAIN MANIFOLD PER DETAIL 13 ON SHEET 30
8	CONSTRUCT DUAL STORM DRAIN MANIFOLD PER DETAIL 14 ON SHEET 30

	STORM DRAIN CONSTRUCTION NOTES
9	INSTALL 8" SDR-35 STORM DRAIN PIPE
10	CONSTRUCT STORM DRAIN OUTLET PER DETAIL 15 ON SHEET 30

KEYMAP PALOMINO LANE



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"= 20'

GRADING PLAN CERTIFICATION

NAME: JULIA L. IZZO PE: 20326 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#

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PROFESSIONAL ENGINEER - STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

GRADING PLAN 1

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/16/2019
DRAWING NO. 15/30
C3.02

CLV 00-00000-XXX

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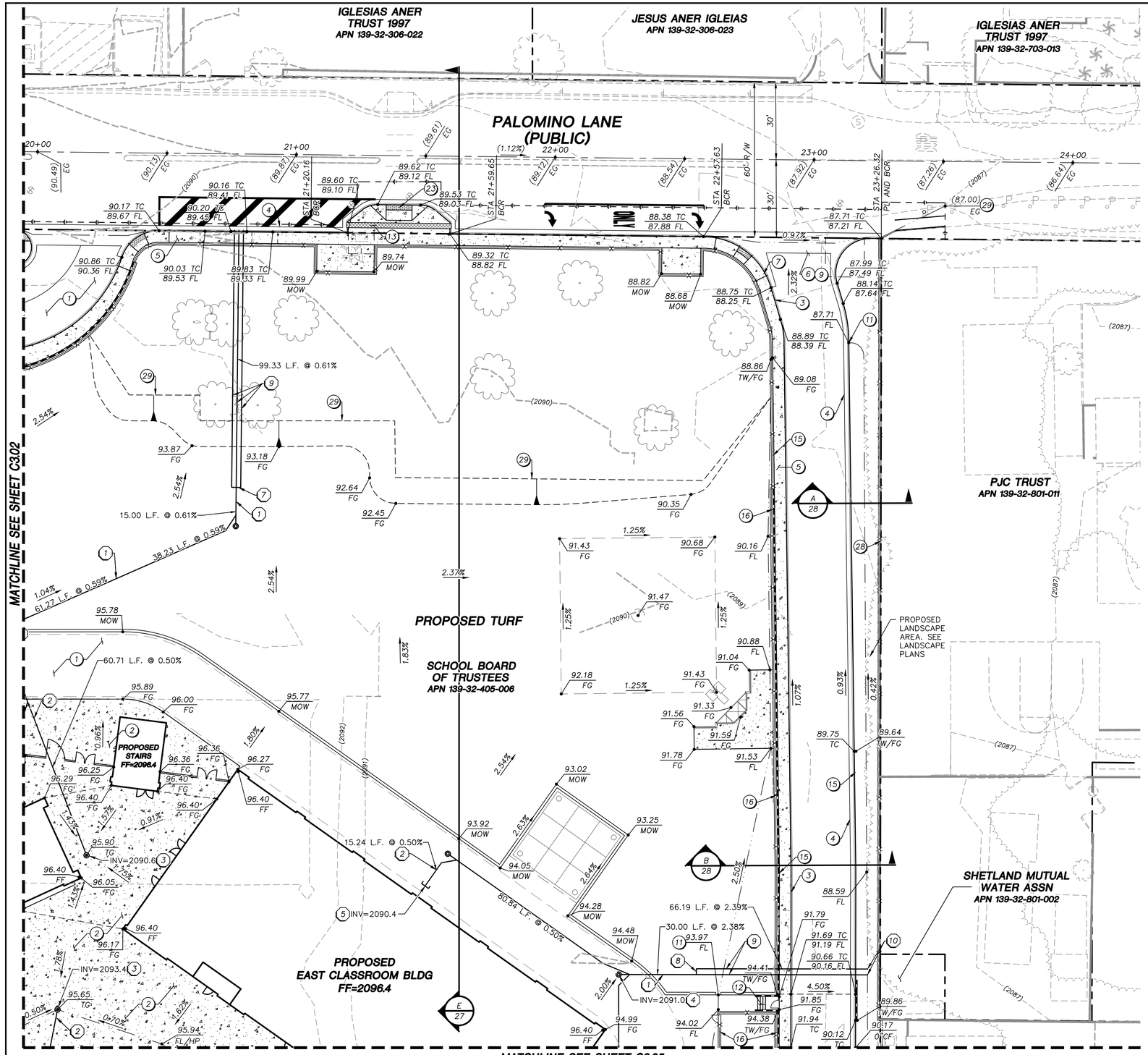

GRAPHIC SCALE

20 0 10 20 40

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	CONSTRUCTION NOTES
1	CONSTRUCT AC PAVEMENT PER DETAIL 1 ON SHEET 29.
2	CONSTRUCT CONCRETE PAVEMENT PER DETAIL 2 ON SHEET 29.
3	CONSTRUCT "A" TYPE CURB PER DETAIL 3 ON SHEET 29.
4	CONSTRUCT "L" TYPE CURB PER CCAUSD NO. 216.
5	CONSTRUCT CONCRETE SIDEWALK PER CCAUSD NO. 234. REFER TO ARCH. PLANS FOR FINISHING SPECIFICATIONS.
6	CONSTRUCT VALLEY GUTER PER CCAUSD NO. 228.
7	CONSTRUCT SIDEWALK RAMP CCAUSD NO. 235 CASE I.
8	CONSTRUCT ACCESSIBLE RAMP PER DETAIL 4 ON SHEET 29.
9	CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSD NO. 225.
10	CONSTRUCT 2' VALLEY GUTTER PER DETAIL 10 ON SHEET 29.
11	CONSTRUCT 2' CURB OPENING DETAIL 6 ON SHEET 29.
12	INSTALL 7" CONCRETE RISERS WITH HANDRAIL PER ARCH. PLANS.
13	CONSTRUCT SIDEWALK UNDERDRAIN PER CCAUSD NO. 236.
14	CONSTRUCT RIPRAP SWALE. D50=--", THICKNESS=--". PER DETAIL 7 ON SHEET 29
15	CONSTRUCT RETAINING WALL PER PLAN BY OTHERS.
16	INSTALL FENCE/GATE PER ARCH. PLANS ON 12" MOW CURB PER DETAIL 5 ON SHEET 29.
17	INSTALL 12" MOW CURB PER DETAIL 8 ON SHEET 29.
18	INSTALL ROLL CURB PER CCAUSD NO. 217.2.S1.
19	PROPOSED IRRIGATION ENCLOSURE PER LANDSCAPE DRAWINGS.
20	PROPOSED PLAYGROUND STRUCTURE BY OTHERS.
21	CONSTRUCT TACK–ON ISLAND CURB PER CCAUSD NO. 220.
22	CONSTRUCT 'L' CURB TO ROLL CURB TRANSITION PER DETAIL 11 ON SHEET 29.
23	CONSTRUCT ACCESSIBLE RAMP PER DETAIL 9 ON SHEET 29.
24	CONSTRUCT 0" TO 6" CURB FACE TRANSITION.
25	INSTALL RAISED PAVEMENT MARKERS PER CCAUSD 235.
26	PROPOSED PLANTER PER LANDSCAPE DRAWINGS.
27	CONSTRUCT RAMP WITH HANDRAIL PER ARCH. DRAWINGS.
28	INSTALL 12" MODIFIED MOW CURB PER DETAIL 12 ON SHEET 29
29	MATCH EXISTING ELEVATION
30	CONSTRUCT U–CHANNEL PER DETAIL _ ON SHEET _
31	CONSTRUCT MODIFIED "L" TYPE CURB WITH 9" CF AND STORM DRAIN OUTLET PER DETAIL 15 ON SHEET 30
32	CONSTRUCT 6" TO 9" CURB FACE TRANSITION
	STORM DRAIN CONSTRUCTION NOTES
1	INSTALL 12" C–900 PVC STORM DRAIN PIPE.
2	INSTALL 6" SDR–35 STORM DRAIN PIPE.
3	INSTALL ATRIUM DRAIN PER DETAILS ON SHEET 30.
4	INSTALL STORM DRAIN CLEAN OUT PER CLARK COUNTY WATER RECLAMATION DISTRICT STANDARD DRAWING SD–26.
5	INSTALL STORM DRAIN CAP, REFER TO PLUMBING PLANS FOR CONTINUATION.
6	PROPOSED STORM DRAIN OUTLET TO DAYLIGHT THROUGH RETAINING WALL PER DETAIL PLANS BY OTHERS.
7	CONSTRUCT TRIPLE STORM DRAIN MANIFOLD PER DETAIL 13 ON SHEET 30
8	CONSTRUCT DUAL STORM DRAIN MANIFOLD PER DETAIL 14 ON SHEET 30

	STORM DRAIN CONSTRUCTION NOTES
9	INSTALL 8" SDR–35 STORM DRAIN PIPE
10	CONSTRUCT STORM DRAIN OUTLET PER DETAIL 15 ON SHEET 30

KEYMAP PALOMINO LANE

C3.02 C3.03 C3.04 C3.05

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PROFESSIONAL ENGINEER-STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

GRADING PLAN 2

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORZ.: 1"=20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 16/30
C3.03

CLV 00-00000-XXX

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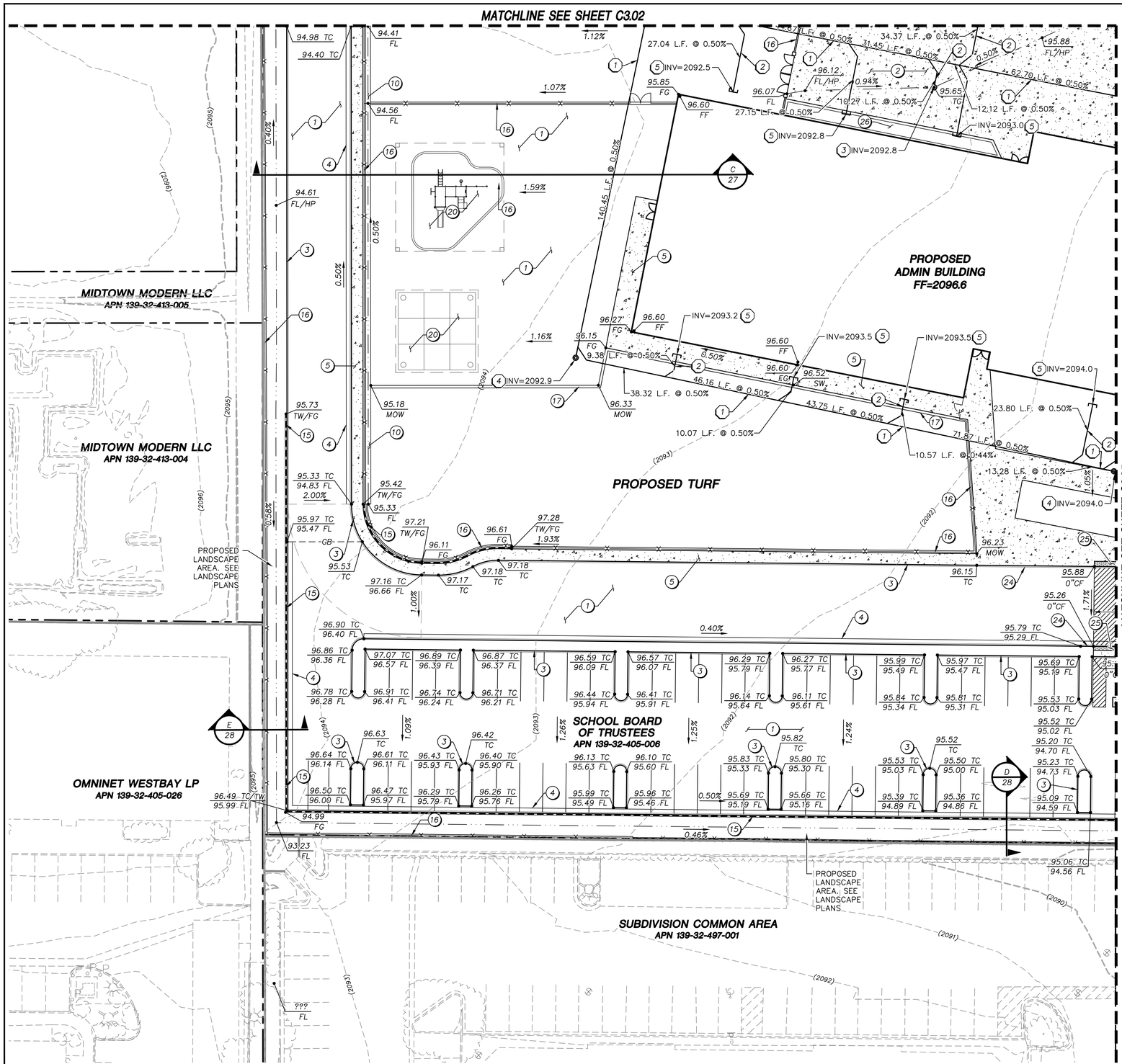

GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"= 20'

GRADING PLAN CERTIFICATION

NAME: JULIA L. IZZO PE: 20326 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

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ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

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	STORM DRAIN CONSTRUCTION NOTES
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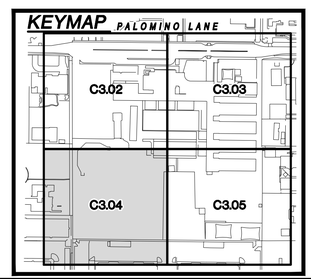
KEYMAP — PALOMINO LANE



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PROFESSIONAL ENGINEER – STATE OF NEVADA — JULIA L IZZOLO — EXP. 06-30-19 — CIVIL — No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

GRADING PLAN 3

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"= 20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 17/30
C3.04

CLV 00-00000-XXX

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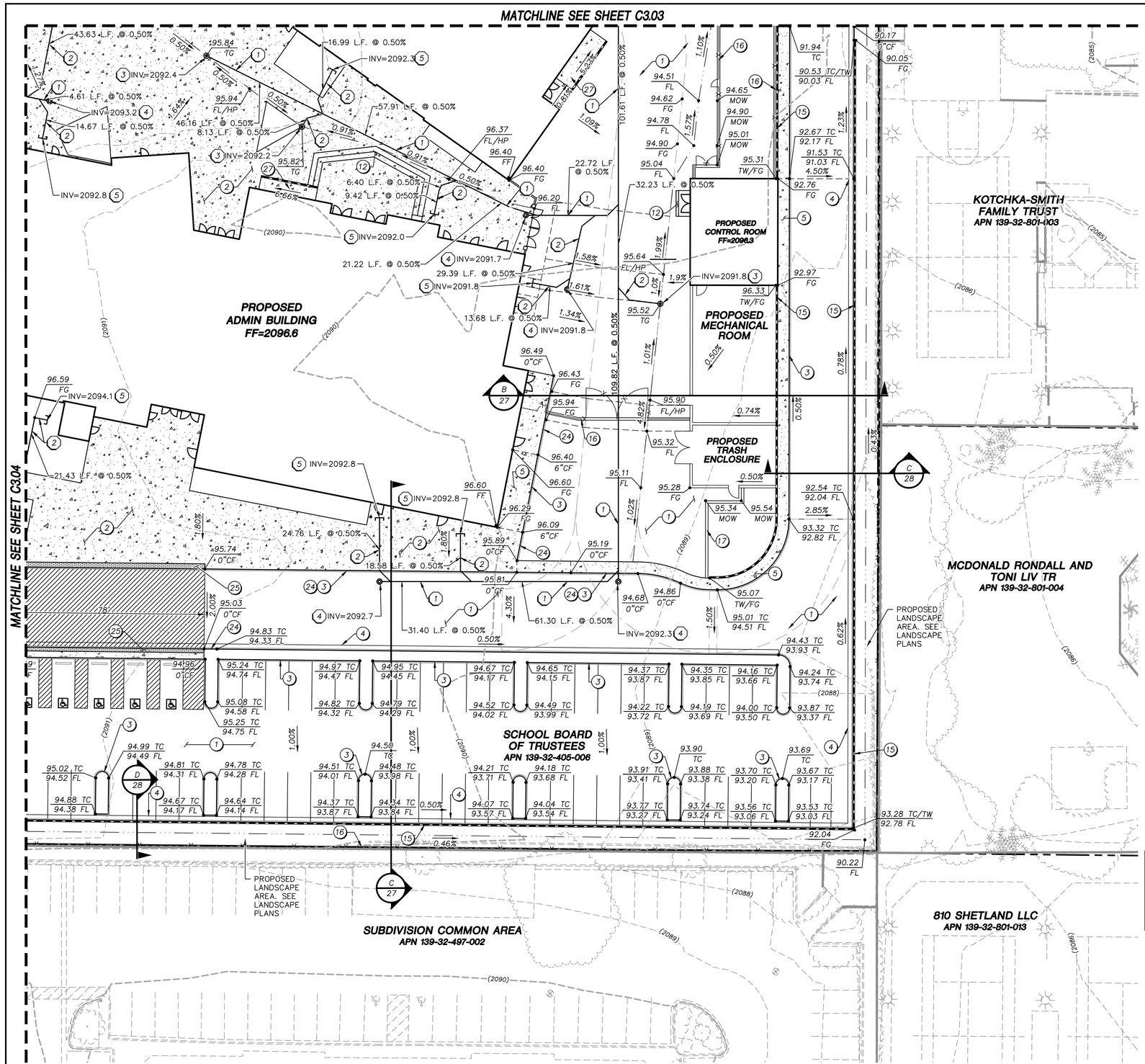

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"= 20'

GRADING PLAN CERTIFICATION

NAME: JULIA L. IZZO PE: 20326 DATE:

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#

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KEYMAP PALOMINO LANE
C3.02 C3.03 C3.04 C3.05

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PROFESSIONAL ENGINEER – STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

GRADING PLAN 4

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1" = 20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO.: 18/30
C3.05

CLV 00-00000-XXX

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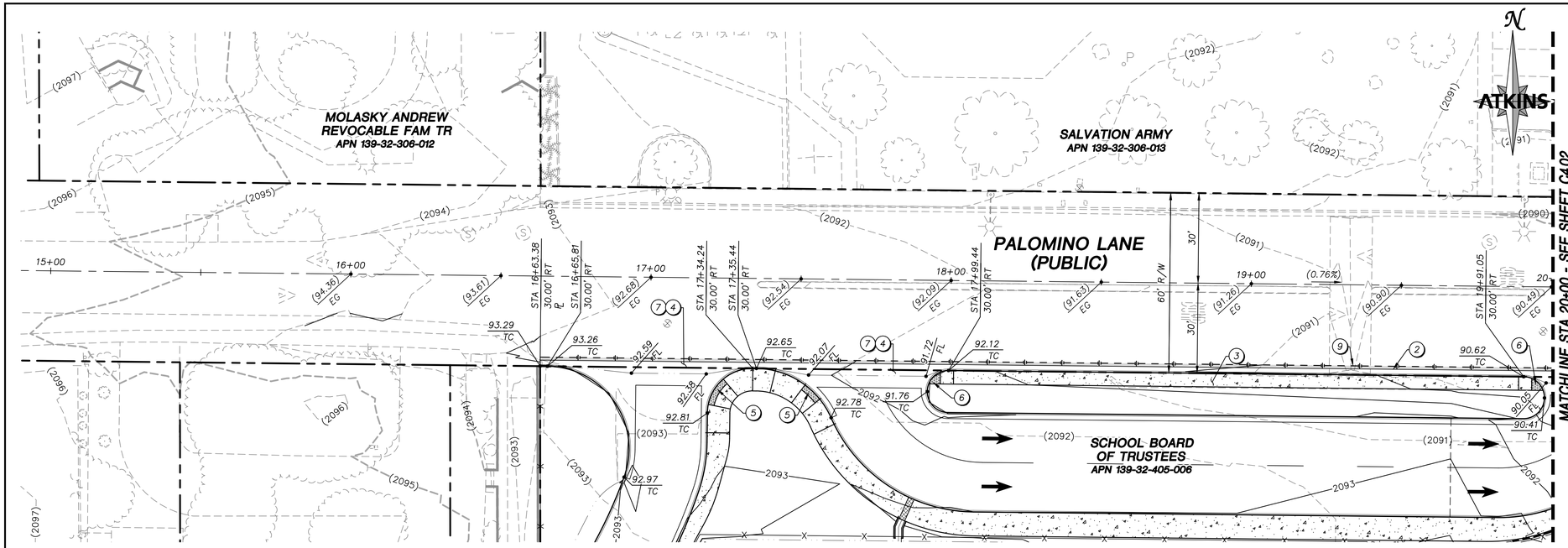

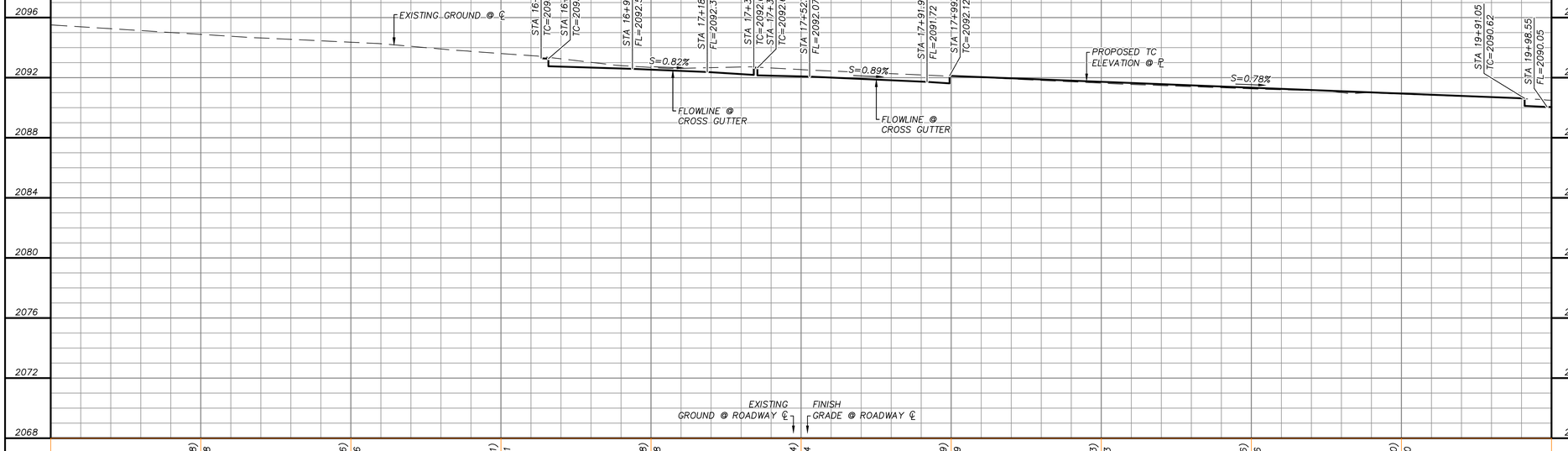

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"= 20'

BASIS OF BEARING

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KEYMAP — PALOMINO LANE
C4.01 C4.02

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JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

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ATKINS
2270 Corporate Circle Suite 200
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Telephone: +1702.263.7275
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CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

PLAN AND PROFILE 1
BEGIN TO STA 20+00

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"= 20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO.19/30
C4.01

CLV00-00000-XXX

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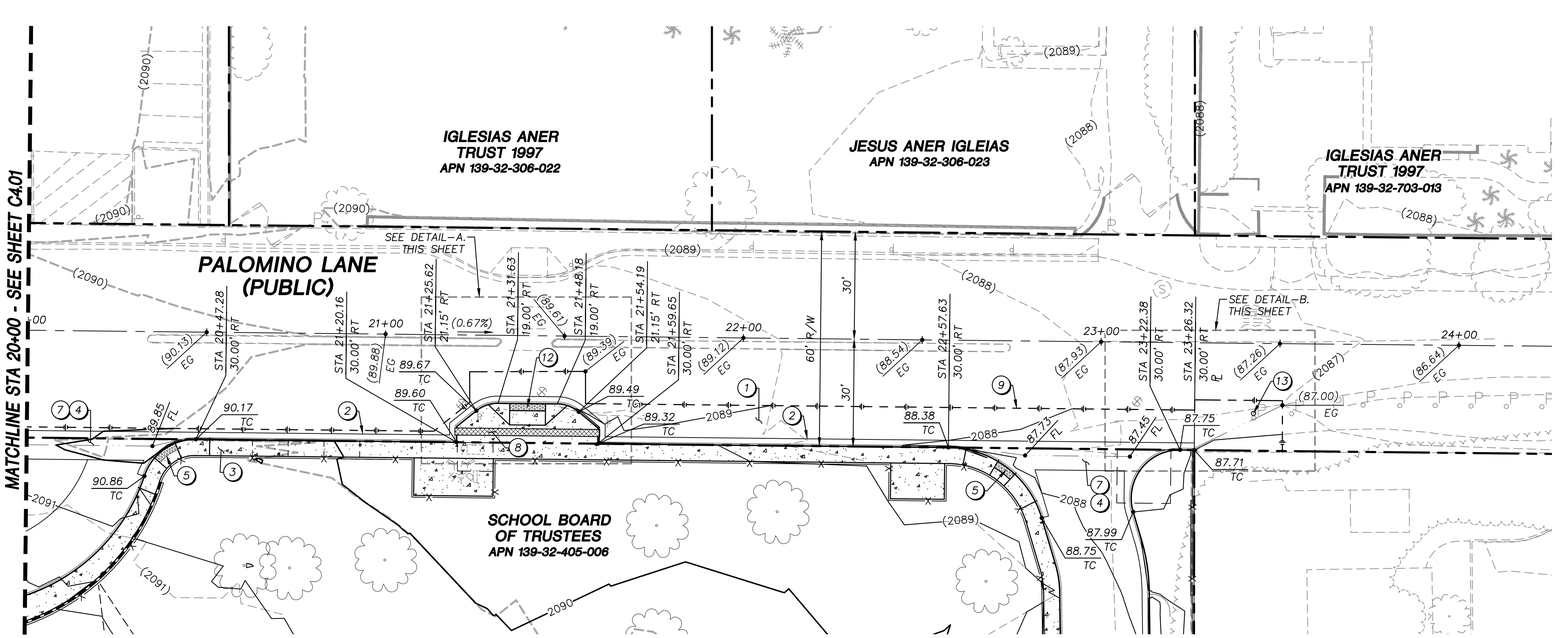

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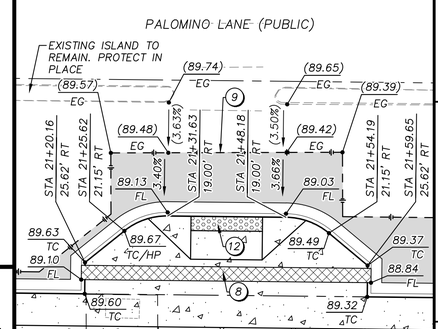
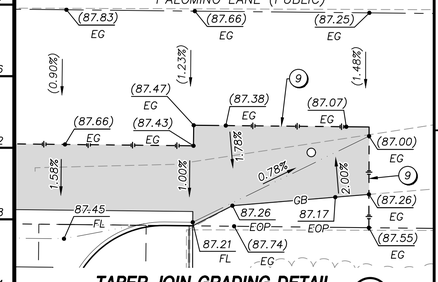
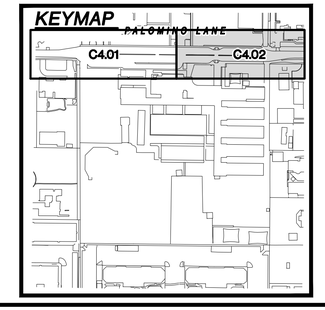


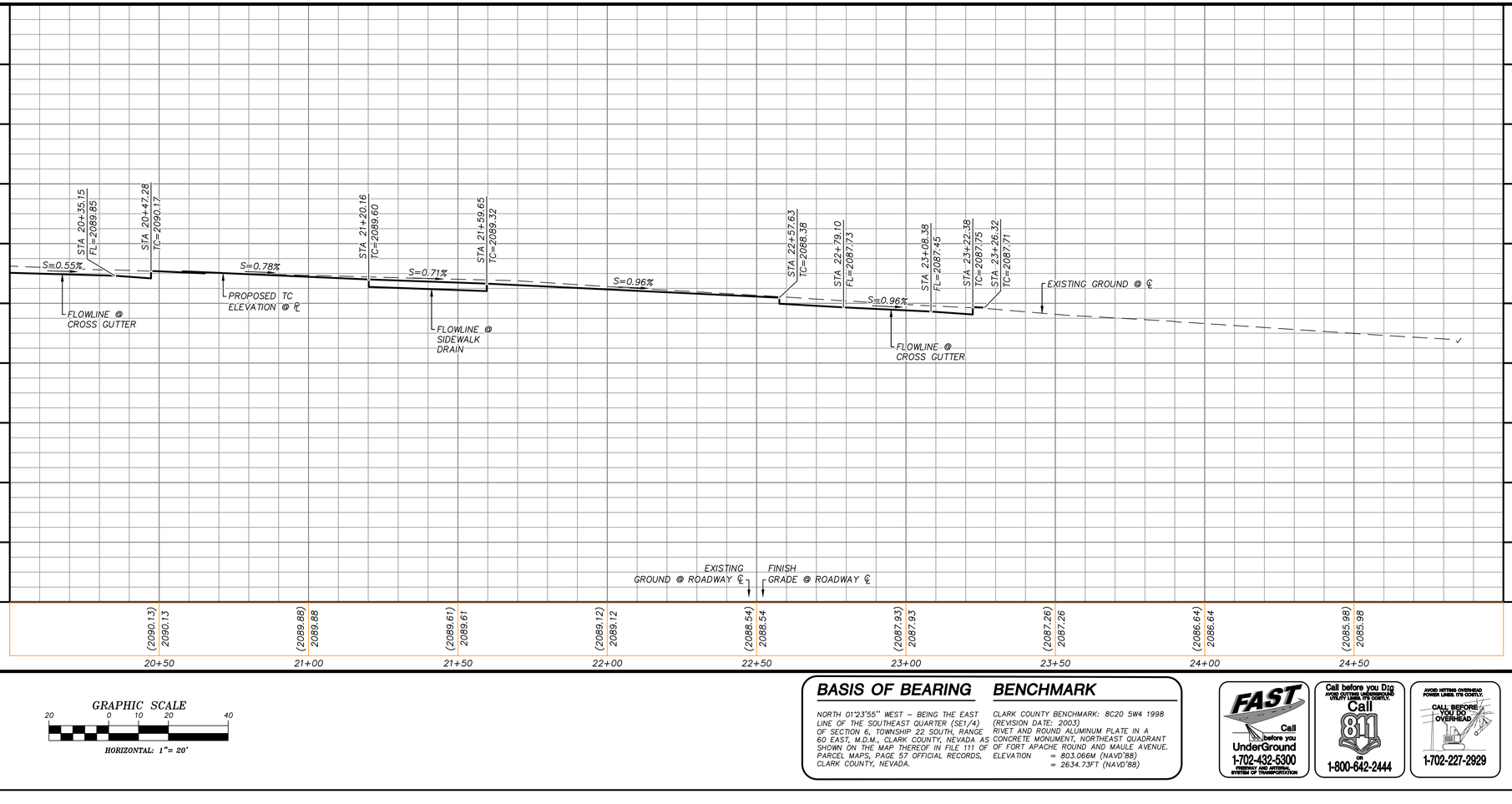
BUMP OUT GRADING DETAIL (A / 20)
SCALE: 1"=10'



TAPER JOIN GRADING DETAIL (B / 20)
SCALE: 1"=10'

KEYMAP





GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"= 20'

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

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PROFESSIONAL ENGINEER-STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20826

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

PLAN AND PROFILE 2
STA 20+00 TO END

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: 1"=20'
VERT.: NONE

JOB NO. 100062041
DATE: 01/16/2019
DRAWING NO. 20/30
C4.02

CLV00-00000-XXX

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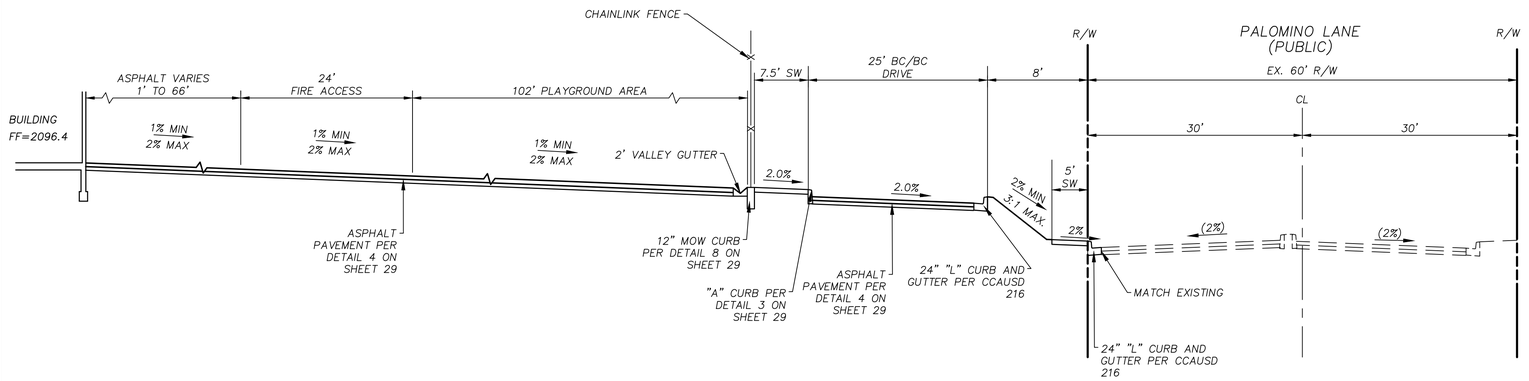
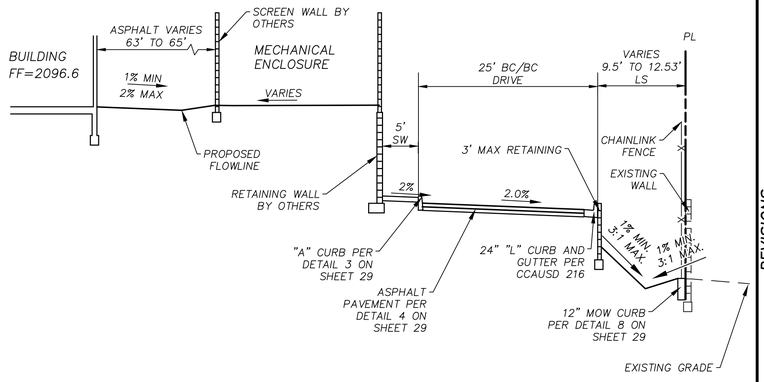


NORTH PROPERTY CROSS SECTION

N.T.S.

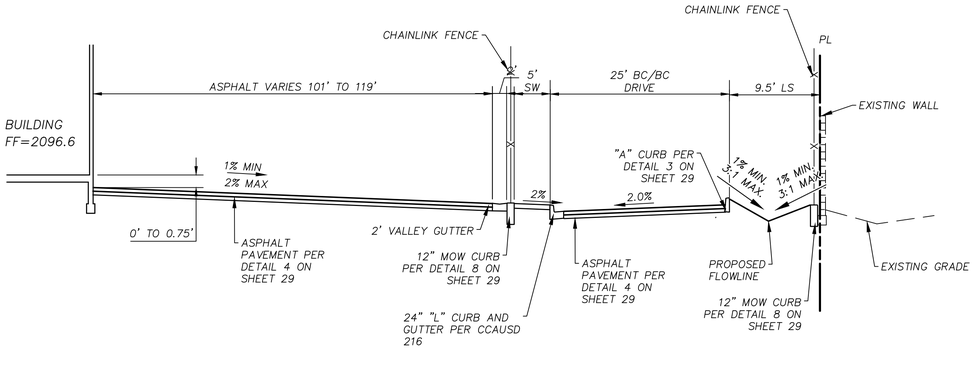
A 27



EAST PROPERTY CROSS SECTION

N.T.S.

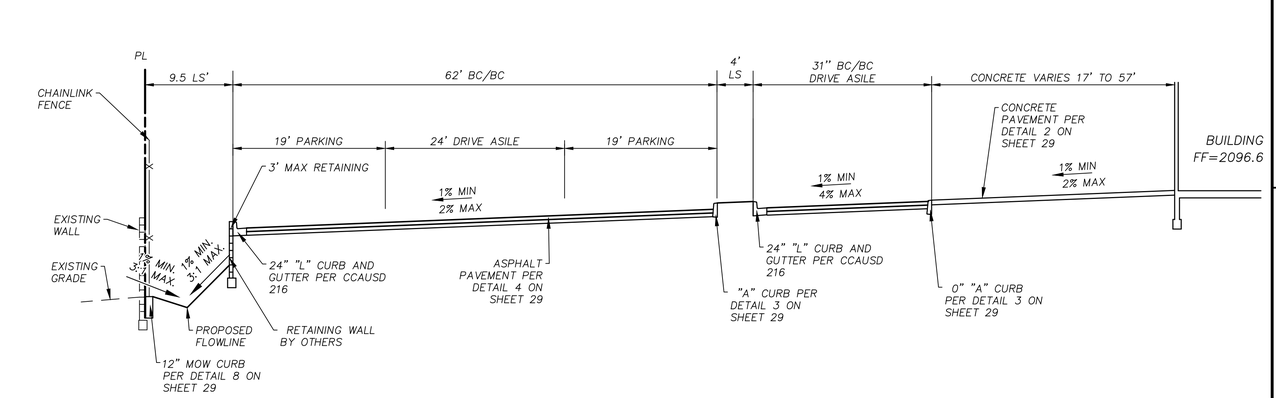
B 27



WEST PROPERTY CROSS SECTION

N.T.S.

C 27



SOUTH PROPERTY CROSS SECTION

N.T.S.

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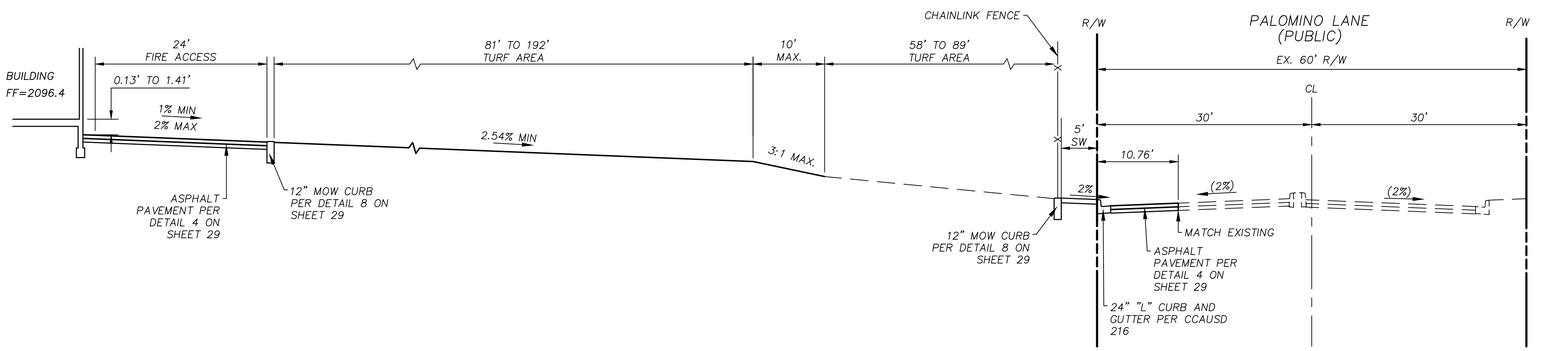

NORTH PROPERTY CROSS SECTION

N.T.S.

E 27

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EXP. 06-30-19
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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

TYPICAL SECTION

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORZ.: AS SHOWN
VERT.: AS SHOWN

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. C6.01
C6.01

CLV 00-00000-XXX

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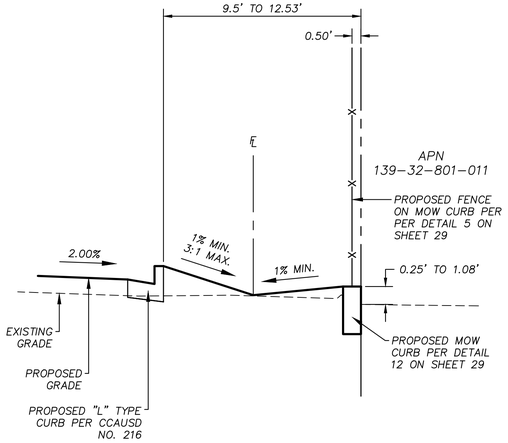
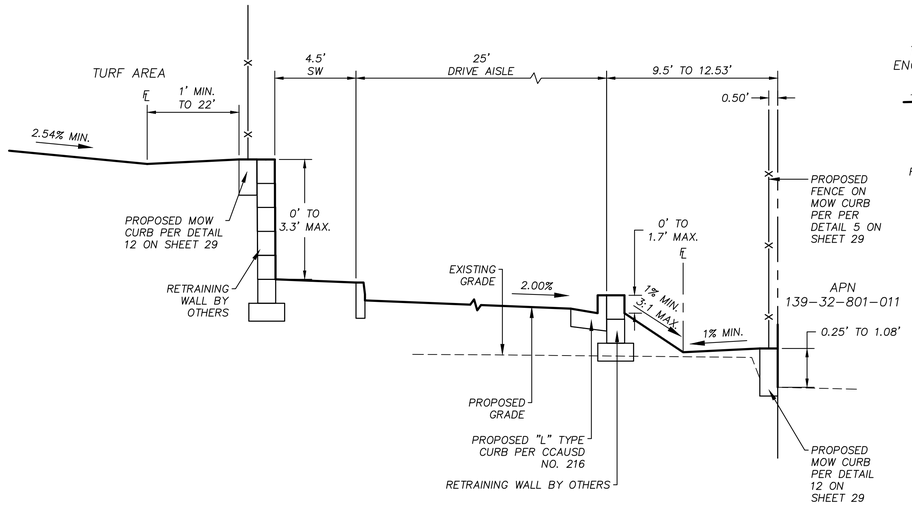


EAST PROPERTY CHANNEL AND FENCE DETAIL

A

N.T.S.



EAST PROPERTY CHANNEL, FENCE AND WALL DETAIL

B

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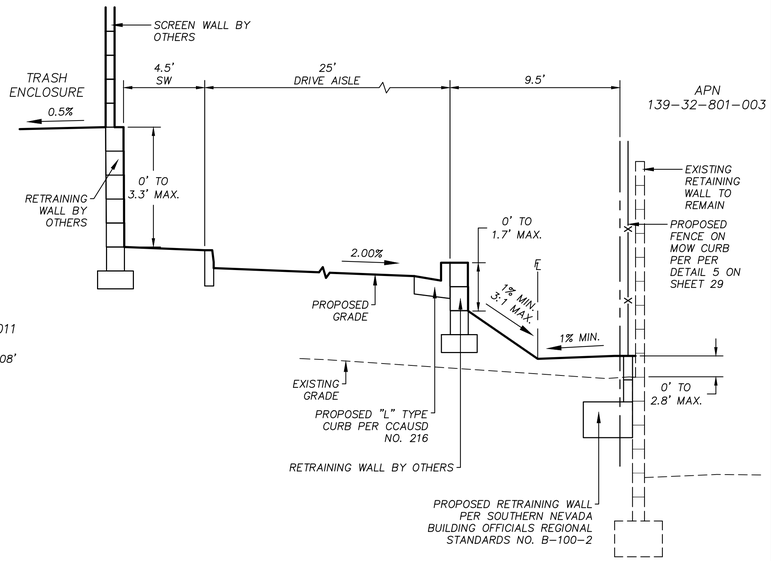

EAST PROPERTY CHANNEL AND EXISTING WALL DETAIL

C

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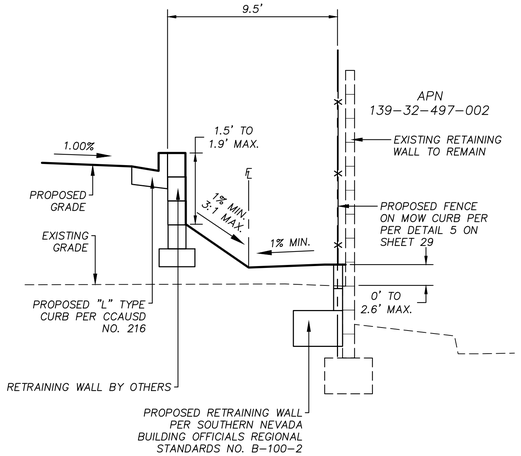

SOUTH PROPERTY CHANNEL AND EXISTING WALL DETAIL

D

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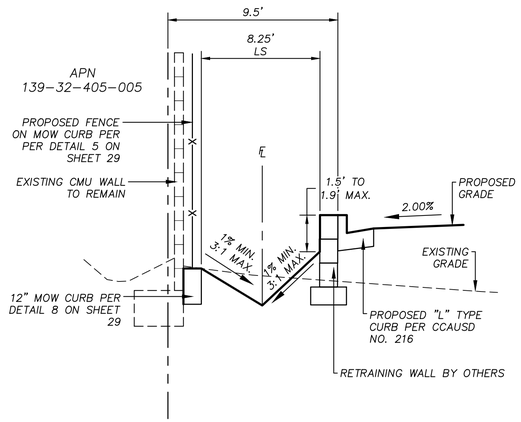
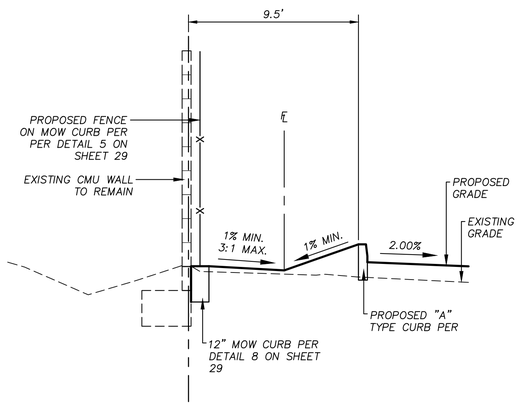


WEST PROPERTY CHANNEL DETAIL

E

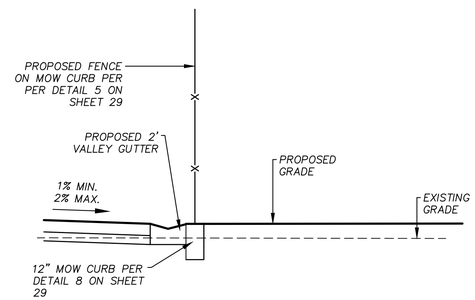
N.T.S.



WEST PROPERTY CHANNEL DETAIL

F

N.T.S.



VALLEY GUTTER GRADING DETAIL

G

N.T.S.

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JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20026

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

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Fax: +1702.263.7200

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2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

SECTION DETAILS

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: AS SHOWN
VERT.: AS SHOWN

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 28/30
C6.02

CLV 00-00000-XXX

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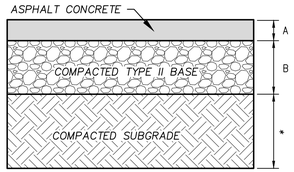
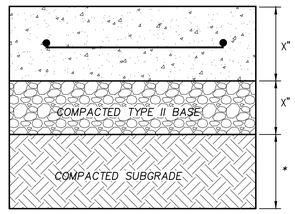
THICKNESS SCHEDULE

TRAFFIC AREA	A ASPHALT	B TYPE II BASE
AUTOMOBILE PARKING AND PLAYGROUNDS	X"	X"
MAIN CORRIDORS AND TRUCK ACCESS	X"	X"



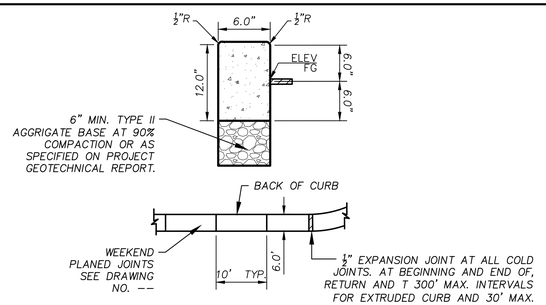
* REFER TO GEOTECHNICAL INVESTIGATION REPORT. FOR PLACEMENT OF COMPACTED SUBGRADE

ONSITE AC PAVEMENT
N.T.S. — 1/29

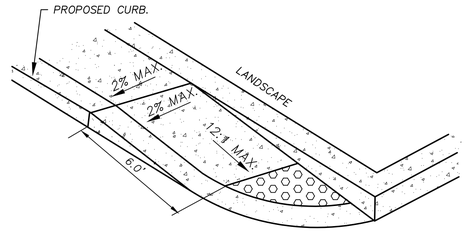


* REFER TO GEOTECHNICAL INVESTIGATION REPORT. FOR PLACEMENT OF COMPACTED SUBGRADE

ONSITE CONCRETE PAVEMENT
N.T.S. — 2/29

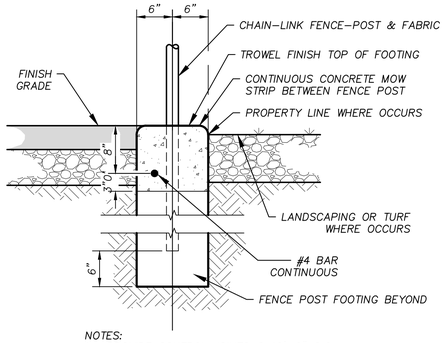


ONSITE TYPE "A" CURB
N.T.S. — 3/29



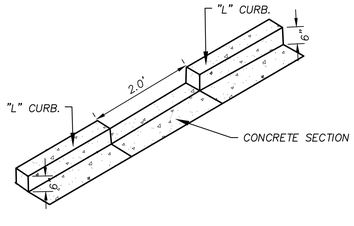
NOTES:
1. RAMP LENGTHS SHALL BE 6'–0" (72") MAXIMUM FOR EACH 6" RISE.
2. RAMP LANDINGS SHALL BE FLAT FOR A MINIMUM OF 5'–0"
3. RAMP CROSS SLOPES SHALL NOT NOT EXCEED 1:48
4. RAMP SLOPES SHALL NOT EXCEED 1:12
5. HEIGHT OF CURBS (OR EDGES) SHALL NOT EXCEED 6"
6. RAMP CLEAR WIDTHS TO BE 3'–0" MINIMUM
7. RAMP HEIGHTS ARE NOT INTENDED TO EXCEED 6" HEIGHT PER EACH RUN
8. DETECTABLE WARNING CONSISTING OF RAISED TRUNCATED DOMES TO BE INSTALLED PER CCAUSD NO. 235.

ACCESSIBLE CURB RAMP
N.T.S. — 4/29

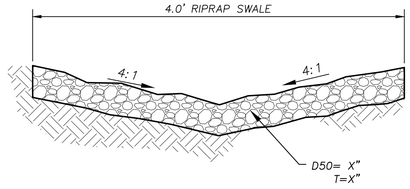


NOTES:
1. PROVIDE CONTROL JOINTS @ 10'–0" O.C

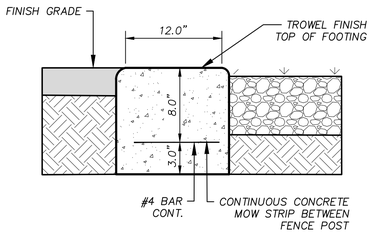
MOW CURB W/ FENCE
N.T.S. — 5/29



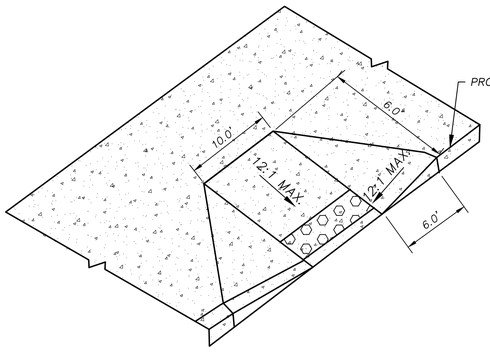
CURB CUT
N.T.S. — 6/29



RIPRAP SWALE
N.T.S. — 7/29



MOW CURB
N.T.S. — 8/29



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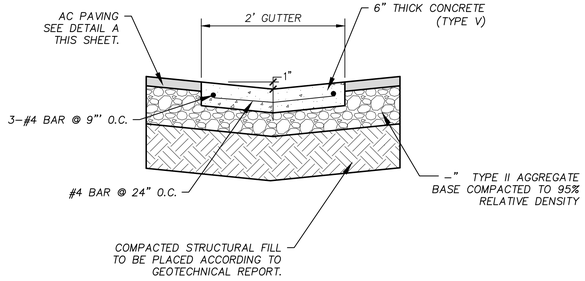
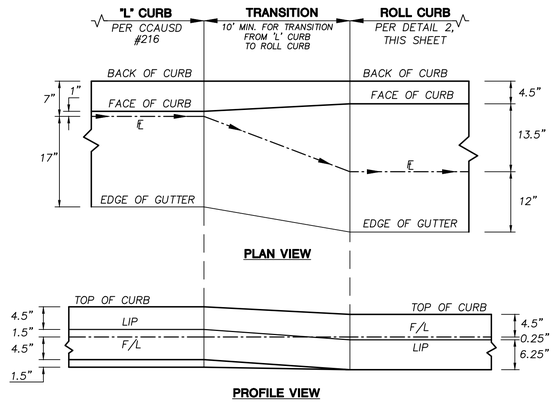
MOW CURB
N.T.S. — 9/29



NOTE:
PROVIDE EXPANSION JOINTS @ 30'–0" O.C.
AND CONTROL JOINTS @ 5'–0" O.C.
IN CONCRETE DRAIN.

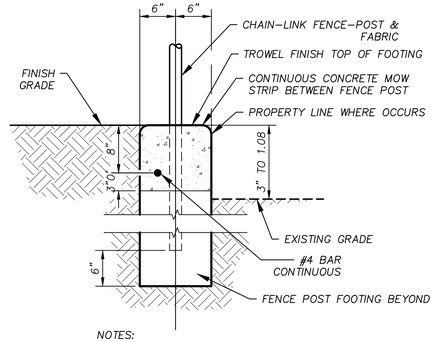
2' CONCRETE GUTTER
N.T.S. — 10/29



NOTE:

FOR CLARITY THE FLOWLINE IN THIS DETAIL IS SHOWN AT 0% SLOPE, HOWEVER CONTRACTOR SHALL MAINTAIN SLOPE OF FLOWLINE PER PLAN THROUGHOUT TRANSITION.

TYPE "L" CURB TO ROLL CURB TRANSTION
N.T.S. — 11/29



NOTES:
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MODIFIED MOW CURB W/ FENCE
N.T.S. — 12/29

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PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

ONSITE DETAILS

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: AS SHOWN
VERT.: AS SHOWN

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 29/30
C6.03

CLV00-00000-XXX

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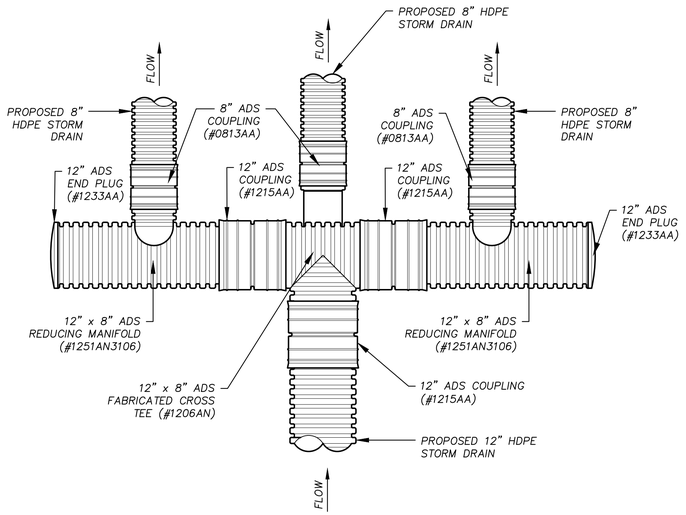
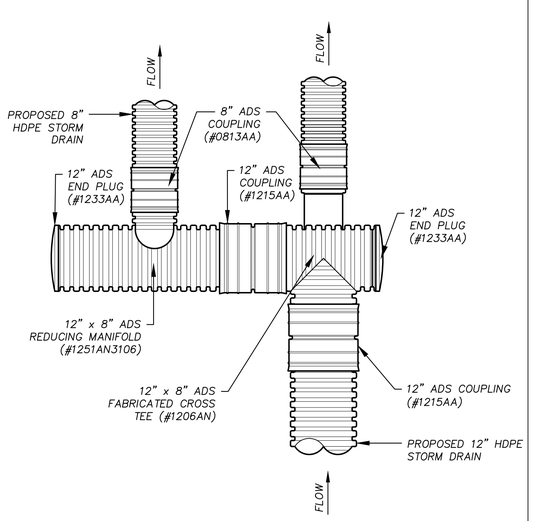


TRIPLE PIPE MANIFOLD OUTLET

N.T.S.

13/30



DUAL PIPE MANIFOLD

N.T.S.

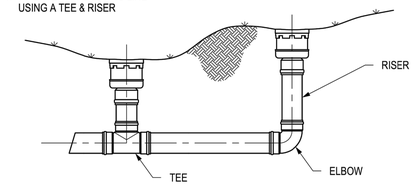
14/30

WHEN ARE INLINE DRAINS USED?

2708AG _ _ X
2710AG _ _ X
2712AG _ _ X
2715AG _ _ X
2718AG _ _ X
2724AG _ _ X
2730AG _ _ X

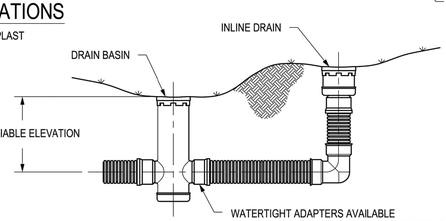
1: TO ENTER AN EXISTING LINE USING A TEE & RISER

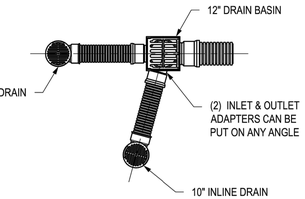
2: AT THE BEGINNING OF A DRAIN LINE USING AN ELBOW & RISER



TYPICAL INSTALLATIONS

TYPICAL INSTALLATION OF NYLOPLAST DRAIN BASIN AND INLINE DRAIN

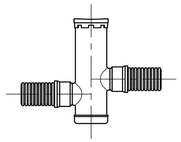




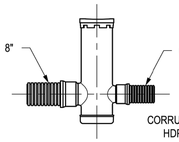
WHEN ARE DRAIN BASINS USED?

2808AG _ _ X
2810AG _ _ X
2812AG _ _ X
2815AG _ _ X
2818AG _ _ X
2824AG _ _ X
2830AG _ _ X
2836AG _ _ X

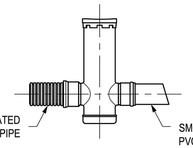
1: TO CHANGE ELEVATION



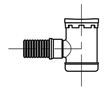
2: TO CHANGE PIPE DIAMETER



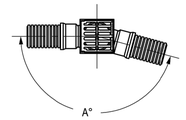
3: TO CHANGE PIPE TYPE



4: FOR SHALLOW APPLICATIONS



5: TO CHANGE DIRECTION



1 - STRUCTURES & ADAPTERS AVAILABLE IN SIZES 8" - 36"
2 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°, TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS SEE DRAWING NO. 7001-110-065
4 - REDUCING CONES DOWN TO 30" DIAMETER WILL BE REQUIRED FOR 36" DRAIN BASINS.

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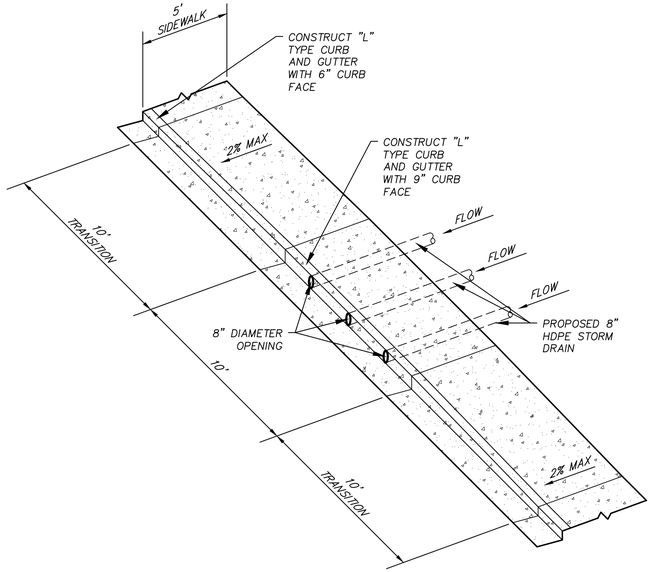
DRAWN BY	AWA
DATE	8-10-00
REVISED BY	NMH
DATE	11-2-18
DWG SIZE	A
MATERIAL	
PROJECT NO./NAME	
SCALE	1:40
SHEET	1 OF 1

Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 8 IN - 36 IN TYPICAL INSTALLATION OPTIONS

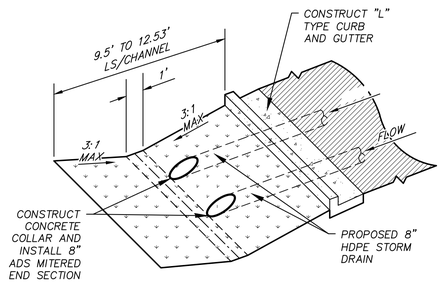
DWG NO. 7001-110-042 REV E



STORM DRAIN OUTLET @ CURB

N.T.S.

15/30



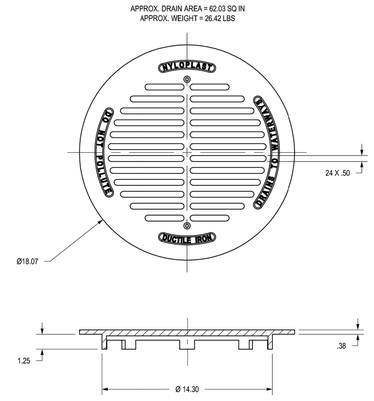
STORM DRAIN OUTLET @ CHANNEL

N.T.S.

14/30

1501DI

APPROX. DRAIN AREA = 62.03 SQ IN
APPROX. WEIGHT = 26.42 LBS



DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
GRATE HAS LIGHT DUTY RATING
QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
SIZE OF OPENING MEETS REQUIREMENTS OF AMERICAN DISABILITY ACT AS STATED IN FEDERAL REGISTER PART III, DEPARTMENT OF JUSTICE, 28 CFR PART 36.

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DRAWN BY	CJA
DATE	7-5-01
REVISED BY	JJC
DATE	8-14-12
DWG SIZE	A
MATERIAL	
PROJECT NO./NAME	
SCALE	1:6
SHEET	1 OF 1

Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 15 IN DROP IN

DWG NO. 7001-110-073 REV D

BASIS OF BEARING

NORTH 01°23'55" WEST – BEING THE EAST LINE OF THE SOUTHEAST QUARTER (SE1/4) OF SECTION 6, TOWNSHIP 22 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA AS SHOWN ON THE MAP THEREOF IN FILE 111 OF PARCEL MAPS, PAGE 57 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

BENCHMARK

CLARK COUNTY BENCHMARK: BC20 5W4 1998 (REVISION DATE: 2003)
RIVET AND ROUND ALUMINUM PLATE IN A CONCRETE MONUMENT, NORTHEAST QUADRANT OF FORT APACHE ROUND AND MAULE AVENUE.
ELEVATION = 803.066M (NAVD'88)
= 2634.73FT (NAVD'88)

FAST Call before you UnderGround 1-702-432-5300 FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
JULIA L IZZOLO
EXP. 06-30-19
CIVIL
No. 20326

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVAL

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1702.263.7275
Fax: +1702.263.7200

CLARK COUNTY SCHOOL DISTRICT
PROPOSED WASDEN ELEMENTARY SCHOOL REPLACEMENT
2831 PALOMINO LANE, LAS VEGAS NEVADA 89107

DETAILS

DESIGNED BY: J. CABRERA
DRAWN BY: M. FREY
CHECKED BY: J. IZZOLO
HORIZ.: AS SHOWN
VERT.: AS SHOWN

JOB NO. 100062041
DATE: 01/18/2019
DRAWING NO. 30/30
C6.04

CLV 00-00000-XXX

X:\Projects\Land Development\SH Architecture\100062041 – Wasden Elementary_Sheets\62041-25-DETL-01.dwg LAYOUT: C6.04 Jon 22, 2019 – 8:27AM

Appendix C

Reference Material

- Appendix C-1: Salvation Army Community Center
- Appendix C-2: Westbay at Charleston
- Appendix C-3: Update to Hastings & Campbell

Appendix C-1

Hydrology Study

The Salvation Army Community Center

HYDROLOGY STUDY

THE SALVATION ARMY COMMUNITY CENTER

SECTION 32, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.B.&M.

LAS VEGAS, NEVADA

December 2, 1988

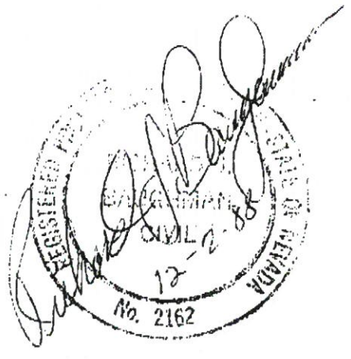
V-55-88

PREPARED FOR:

LEO F. BORNS, A.I.A.

PREPARED BY:

BAUGHMAN & TURNER, INC.
2325 WEST CHARLESTON BOULEVARD
LAS VEGAS, NEVADA 89102
702/870-8771



runoffs of 1.0, 1.9 and 3.7 c.f.s. for the 10, 25 and 100 year events. The area enters the property along the West property line. Area "C" contains 24.3 acres with the potential to generate 5.1, 9.4 and 17.3 c.f.s. for the 10, 25 and 100 year events. The area collects in Palomino Lane from a residential subdivision to the West and flows in the street in the front of the property.

The site itself contains 3.0 acres with the potential to generate runoffs of 3.1, 4.7 and 7.2 c.f.s. for the 10, 25 and 100 year storms.

Q100
27.3 o/s cfs.
7.2 on site

SALVATION ARMY
10 YEAR FREQUENCY

SUB-BASIN	DISC. POINT	Tc hrs	Ti hrs	AREA ACRES	RAIN-FALL inch	CN	RUN-OFF inch	12.00 Hrs cfs	12.25 Hrs cfs	12.50 Hrs cfs
A	5	0.30	0.13	7.5	1.39	80	0.23	1.0	1.0	0.7
B	3	0.26	0.12	3.7	1.39	80	0.23	0.6	0.5	0.3
C	4	0.60	0.29	24.3	1.39	82	0.29	1.5	2.7	2.9
S1	1	0.11	0.00	2.3	1.39	98	1.17	0.6	0.1	0.1
S2	2	0.06	0.07	0.8	1.39	98	1.17	0.2	0.1	0.0
TOTALS				38.6				3.9	4.4	4.1

SALVATION ARMY
25 YEAR FREQUENCY

SUB-BASIN	DISC. POINT	Tc hrs	Ti hrs	AREA ACRES	RAIN-FALL inch	CN	RUN-OFF inch	12.00 Hrs cfs	12.25 Hrs cfs	12.50 Hrs cfs
A	5	0.30	0.13	7.5	1.82	80	0.46	2.0	2.0	1.4
B	3	0.26	0.12	3.7	1.82	80	0.46	1.2	1.0	0.6
C	4	0.60	0.29	24.3	1.82	82	0.53	2.7	4.9	5.4
S1	1	0.11	0.00	2.3	1.82	98	1.60	0.8	0.2	0.1
S2	2	0.06	0.07	0.8	1.82	98	1.60	0.3	0.1	0.1
TOTALS				38.6				7.0	8.1	7.6

SALVATION ARMY
100 YEAR FREQUENCY

SUB-BASIN	DISC. POINT	Tc hrs	Ti hrs	AREA ACRES	RAIN-FALL inch	CN	RUN-OFF inch	12.00 Hrs cfs	12.25 Hrs cfs	12.50 Hrs cfs
A	5	0.36	0.13	7.5	2.48	80	0.88	3.9	3.8	2.7
B	3	0.26	0.12	3.7	2.48	80	0.88	2.4	1.8	1.1
C	4	0.60	0.29	24.3	2.48	82	0.96	5.0	9.1	10.0
S1	1	0.11	0.00	2.3	2.48	98	2.25	1.1	0.2	0.2
S2	2	0.06	0.07	0.8	2.48	98	2.25	0.4	0.1	0.1
TOTALS				38.6				12.7	15.1	14.0

RUNOFF CURVE NUMBERS
(URBAN AREAS[1])

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage[1]	Percent Impervious[2]	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less[3]	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.
2 Actual percent impervious value should be compared to selected land use type.
3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A

Appendix C-2

Storm Drainage Report for

"Westbay at Charleston"

Nenad Mirkovic, P.E.

ID# 16105
M32
$250
BSI

RECEIVED
JUL 18 1995
CLV PUBLIC WORKS
FLOOD CONTROL

S.H.A. ENGINEERS
Stan Hansen & Associates
LAND SURVEYING • CIVIL ENGINEERING • STRUCTURAL ENGINEERING • FORENSIC ENGINEERING

STORM DRAINAGE REPORT

FOR

"WESTBAY AT CHARLESTON"

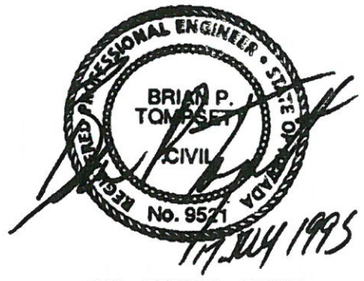
A.P.N.'S

139-32-405-008, 009, 011, 012, 014, 017, 018

LOCATED NORTHEAST OF CAMPBELL & CHARLESTON
A PORTION OF SECTION 32, T. 20 S., R. 61 E.,
M.D.M., CITY OF LAS VEGAS, NEVADA

PREPARED BY:
DENNIS P. WERTZLER, P.E.

CHECKED BY:
BRIAN P. TOMPSETT, P.E.



17 JULY 1995

JOB No. 94419

3089 S. VALLEY VIEW BLVD. • LAS VEGAS, NV 89102 • (702) 247-6003 • FAX (702) 247-6110

CITY OF LAS VEGAS

INTER-OFFICE MEMORANDUM

DATE: April 15, 1997

TO:

Diane Phomninh, P.E.
Land Development Services
Department of Public Works

FROM:

Dennis W. Smansky, P.E.
Project Manager, Flood Control
Department of Public Works

SUBJECT:
Drainage Study Update for **"Westbay at Charleston"**
File No. DS1615E
Date of Engineer's Stamp: 04/08/97
Date Received by City: 04/03/97

COPIES TO:
P. R. Engineering (Phil Regeski)
Tower Realty & Development
John McNellis, P.E.

HISTORY:

		Review Fees:
1st Submittal	07/25/95 - Not Acceptable	$250.00
2nd Submittal	08/22/95 - Not Acceptable	$250.00
3rd Submittal	09/18/95 - Not Acceptable	$250.00
4th Submittal	09/27/95 - Acceptable in Concept	N/C
5th Submittal	04/14/97 - See Below Comment	N/C
	Review Fees Total	**$750.00**

REMARKS:

5th Submittal (Update study)

The drainage study for the subject project has been reviewed and

__X__ is acceptable in concept subject to conformance to all CLV standards and the following conditions:

____ must be resubmitted or supplemented including the following:

1. The information provided indicates that some facilities were not constructed as planned. The differences are not considered significant and the calculations provided indicate that the drainage of the site is adequate. The wall opening constructed as 7.5 feet wide is acceptable provided the 2 foot height is maintained.

2. Subsequent grading plans and drainage study updates for the site must include the current (as-built) site information to include finished floor elevations channel widths and finish grades.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Amendment and accepted by the City of Las Vegas Flood Control Section. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the City of Las Vegas reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction.

PLANS SENT TO LAND DEVELOPMENT _____ (initial)

END OF REMARKS

T/R/S: 20/61/32
M-32

ssn

CAMPBELL DRIVE

HASTINGS AVE

CAMPBELL DRIVE

"DEV1"

"DEV2"

"OFF3"

"OFF2"

NOT A PART

20,722 SF
0.475 ACRES

17,694 SF
0.41 ACRES

0.46 ACRES

0.55 ACRES

21,781 SF
0.50 ACRES

A
9,000 SF
(PHASE I)

23' COVERED PARKING

C
11,775 SF

"DEV3"

31,884 SF
0.73 ACRES

21,699 SF
0.50 ACRES

UNDEVELOPED RESIDENTIAL PARCELS
(2.8 ACRES)

24,053 SF
0.55 ACRES

25,188 SF
0.58 ACRES

18,987 SF
0.44 ACRES

16,734 SF
0.45 ACRES

21,697 SF
0.50 ACRES

CHARLESTON BLVD.

A

Q_{100} = 4 CFS

CLOCK TOWER

270.03'

B
,800 SF

"DEV5"

"DEV4"

COVERED PARKING

Q_{100} = 6 CFS

Q_{100} = 13 CFS

D
12,150 SF

18,025 SF
22,691 SF
.41 ACRES
0.52 ACRES

18,911 SF
22,806 SF
0.43 ACRES
0.525 ACRES

25,817 SF
21,697 SF
0.59 ACRES
0.50 ACRES

25,650 SF
21,696 SF
0.59 ACRES
0.50 ACRES

Q_{100} = 4 CFS

Q_{100} = 23 CFS.

EAST CHANNEL OUTLET

EAST CHANNEL

DEVELOPED Q_{100} = 44 CFS.

Q_{100} = 23 CFS.

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SHA PROPERTIES
STAN HANSEN & ASSOCIATES

WESTBAY OFFICE PARK
BEING A PORTION OF THE SOUTH HALF (S1/2) OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., CITY OF LAS VEGAS, NEVADA.

SITE PLAN

DATE: 17 JULY 1988
JOB NO: 84419
SCALE:
DRAWN: TJE
DESIGNED: SPH
CHKD BY: SPH
DWG NAME: 419_C1
sheet
EXHIBIT 7

S.H.A. ENGINEERS
Stan Hansen & Associates
LAND SURVEYING • CIVIL ENGINEERING • STRUCTURAL ENGINEERING • FORENSIC ENGINEERING

WESTBAY AT CHARLESTON
HEC-1 RESULTS
100 YEAR, 6 HOUR STORM

BASIN	AREA (ACRES)	CN	100 YR. FLOW (CFS)
OFF1	21.0	85	38
OFF2	1.15	88	3
OFF3	1.28	95	4
EXON1	6.16	88	14
EXON2	1.3	95	4
EXRES	2.48	88	6
DEV1	0.57	85	1
DEV2	1.85	85	4
DEV3	4.45	95	13
DEV4	1.95	95	6
DEV5	1.1	95	4

14 JULY 1995

JOB No. 94419

TABLE 1

3089 S. VALLEY VIEW BLVD. • LAS VEGAS, NV 89102 • (702) 247-6003 • FAX (702) 247-6110

REFERENCE:

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

STANDARD FORM 4

TIME OF CONCENTRATION

DEVELOPMENT WESTBAY AT CHARLESTON

CACULATED BY DPW DATE 12 JULY 1995

	SUB-BASIN DATA			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				t_c CHECK (URBANIZED BASINS)		FINAL t_c	REMARKS
	DESIGN (1)	K (2)	AREA Ac (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min (6)	LENGTH Ft (7)	SLOPE % (8)	VEL. FPS (9)	t_t Min (10)	TOTAL LENGTH Ft (11)	$t_c = (L/180)+10$ Min (12)	Min (13)	T_{LAG} (HRS)
CN=85	DEV 1	0.73	0.57	50	0.5	5.9	50	1.0	2.0	0.4			6.3	0.063
CN=85	DEV 2	0.73	1.85	100	0.5	8.4	450	1.1	2.1	3.6			12.0	0.120
CN=95	DEV 3	0.86	4.45	100	1.0	4.3	450	0.7	1.7	4.4			8.7	0.087
CN=95	DEV 4	0.86	1.95	100	2.0	3.4	400	0.5	1.4	4.8			8.2	0.082
CN=95	DEV 5	0.96	1.10	100	3.0	3.0	150	1.3	2.3	1.1			4.1	0.041

$t_i = 1.8(1.1 - K) L^{1/2} / S^{1/3}$ $t_c = t_i + t_t$

$K = 0.0132(CN) - 0.39$

$T_t = L/60(V) =$

$T_{LAG} = 0.6(T_c)/60 =$

Revised	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

STANDARD FORM 4

REFERENCE:

TIME OF CONCENTRATION

DEVELOPMENT WESTBAY AT CHARLESTON

CACULATED BY DPW DATE 14 JULY 1995

	SUB-BASIN DATA			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				t_c CHECK (URBANIZED BASINS)		FINAL t_c	REMARKS
	DESIG' (1)	K (2)	AREA Ac (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min (6)	LENGTH Ft (7)	SLOPE % (8)	VEL. FPS (9)	t_t Min (10)	TOTAL LENGTH Ft (11)	$t_c = (L/180)+10$ Min (12)	Min (13)	T_{CAC} (HRS)
CN = 88	EXON1	0.77	6.16	100	1.1	5.75	500	1.1	2.1	4.0			9.7	0.097
CN = 45	EXON2	0.86	1.30	50	0.6	3.62	160	0.6	1.6	1.7			5.3	0.053
CN = 88	EXRES	0.77	2.48	50	0.5	5.3	350	1.0	2.0	2.9			8.2	0.082
CN = 85	OFF1	0.73	21.0	100	0.5	8.4	1200	1.0	2.0	10.0	1200	16.7	16.7	0.167
CN = 88	OFF2	0.77	1.15	100	1.0	5.9	150	2.0	2.8	0.9			6.8	0.068
CN = 95	OFF3	0.86	1.28	100	1.0	4.3	150	1.0	2.0	1.3			5.6	0.056

$t_i = 1.8\,(1.1 - K)\,L^{1/2} / S^{1/3}$ $t_c = t_i + t_t$

Revised

Date

$K = 0.0132\,(CN) - 0.39 =$

$T_t = L/60(V) =$

$T_{CAC} = 0.6\,(T_c)/60 =$

Appendix C-3

Update to the Technical Drainage Study for Hastings & Campbell

UPDATE

TO

TECHNICAL DRAINAGE STUDY

FOR

HASTINGS & CAMPBELL

RESIDENTIAL DEVELOPMENT

November 20, 2017

CUSTOM RESIDENCES

750 AND 800 WEXLER COURT

LAS VEGAS, NV 89107

Prepared By:

BYRON ANDERSON, PE

2641 Copper Cove
Henderson, Nv. 89074
702-807-6239

Prepared For:

MIDTOWN MODERN, LLC
4675 W. TECO AVE #250
LAS VEGAS, NV. 89118

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Avoid cutting underground utility lines. It's easy.
Call 811
or 1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S EASY.
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FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

BLUE HERON RESIDENCE
SITE/GRADING PLAN

BEING A PORTION OF SECTION 6, TOWNSHIP 23 SOUTH, RANGE 61 EAST, M.D.B.&M., CLARK COUNTY, NEVADA
APN# 139-32-413-003

STORMWATER MANAGEMENT NOTES

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHT OF WAYS OF CLARK COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FORM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED BY THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN CLARK COUNTY TITLE 24 40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES GUIDANCE MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN FOURTEEN (14) DAYS AFTER CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMP's WEEKLY, AND WITHIN 24HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.3 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMP's SHALL BE REMOVED WITHIN SEVEN (7) DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVEN WHICHEVER IS EARLIER. SEDIMENT MIST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50% OR MORE.

LEGEND/ABBREVIATIONS

TC	TOP OF CURB
FS	FINISH SURFACE
FG	FINISH GRADE
HP	HIGH POINT
FL	FLOW LINE
INV	INVERT
TRW	TOP OF RETAINING WALL
WM	WATER METER
APN	ASSESSOR PARCEL NUMBER
PVC	POLYVINYL CHLORIDE PIPE
FF	FINISH FLOOR
PL	PROPERTY LINE
TOP	ELEVATION AT TOP OF DRAIN
	EXISTING CENTERLINE
	EXISTING LOT LINE
(72.8)	ELEVATION BASED ON APPROVED PLOT/GRADING PLAN ON FILE AT CITY RECORDS DEPARTMENT
(72)	EXISTING CONTOUR
72	PROPOSED CONTOUR
	RIP RAP PAD
	SWALE
	PROPERTY LINE
	CONCRETE SURFACE
	POOL
	EXISTING SCREEN WALL/VIEW FENCE
	AREA DRAIN

CONSTRUCTION NOTES:

1. INSTALL 4" CONCRETE SURFACE
2. CONSTRUCT 6' PRIVACY WALL (PERMIT BY OTHERS)
3. INSTALL NDS 1200 NGB 12"X12" AREA DRAIN (OR SIMILAR)
4. INSTALL BLOCK WALL OPENING
5. INSTALL 3" PVC DRAINAGE PIPE
6. CONSTRUCT CONCRETE EMBEDDED RIP RAP PAD, D50=4"
7. CONSTRUCT DRIVEWAY PER CCAUSD #223
8. INSTALL TILE INFRAME INFINITY DRAIN SYSTEM
9. INSTALL 6" PVC DRAINAGE PIPE

BASIS OF BEARING

THE BASIS OF BEARING IS THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 61 EAST, M.D.M., AS SHOWN ON FILE 90, PAGE 49 OF PLATS, CLARK COUNTY, NEVADA OFFICIAL RECORDS, SAID LINE BEARS NORTH 89°59'40" WEST

LEGAL DESCRIPTION

LOT 3 OF 805 CAMPBELL, PLAT BOOK 153, PAGE 100, A PORTION OF SECTION 32, T 20 S, RANGE 61 E, CLARK COUNTY, NEVADA
APN 139-32-413-003

BENCHMARK

CITY OF LAS VEGAS BENCHMARK BLV01 32SW6 RIVET AND PLATE IN THE TOP OF CURB AT THE SOUTHWEST CORNER OF CAMPBELL DRIVE AND PALOMINO LANE

ELEVATION = 640.727 METERS (NAVD'88)
ELEVATION = 2102.1185 US SURVEY FEET (NAVD'88)

FLOOD ZONE INFORMATION:

THIS SITE IS LOCATED IN ZONE "X", AREAS DETERMINED TO BE OUTSIDE

THE 0.2% ANNUAL CHANCE FLOOD PLAIN, PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C2170 F. CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011.

NORTH

(IN FEET)
1 inch = 10 ft.
GRAPHIC SCALE

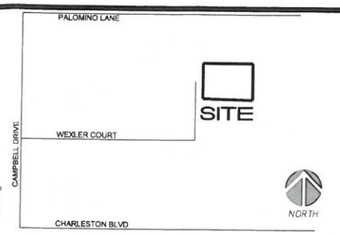
GRADING NOTE:

ALL GRADING FOR THIS SITE SHALL BE IN ACCORDANCE WITH THE APPROVED GEOTECHNICAL REPORT LISTED BELOW:

SOILS REPORT INFORMATION:

TITLED: GEOTECHNICAL EXPLORATION REPORT
RESIDENTIAL DEVELOPMENT
805 CAMPBELL DRIVE
LAS VEGAS, NEVADA
PROJECT NO. E-16-069
DATED MAY 3, 2016

NOVA GEOTECHNICAL AND INSPECTION SERVICES, LLC
4480 WEST HACIENDA AVENUE
SUITE 104
LAS VEGAS, NV. 89118



VICINITY MAP
Not to scale

Earthwork Quantities
(CONTRACTOR TO VERIFY)
Cut = 30 cu. yds
Fill = 10 cu. yds

UTILITY SERVICES

WATER	LAS VEGAS VALLEY WATER DISTRICT
SANITARY SEWER	CLARK COUNTY WATER RECLAMATION DISTRICT
ELECTRIC	NV ENERGY
GAS	SOUTHWEST GAS
TELEPHONE	CENTURYLINK
TRASH DISPOSAL	REPUBLIC SERVICES OF NEVADA

NOTE:
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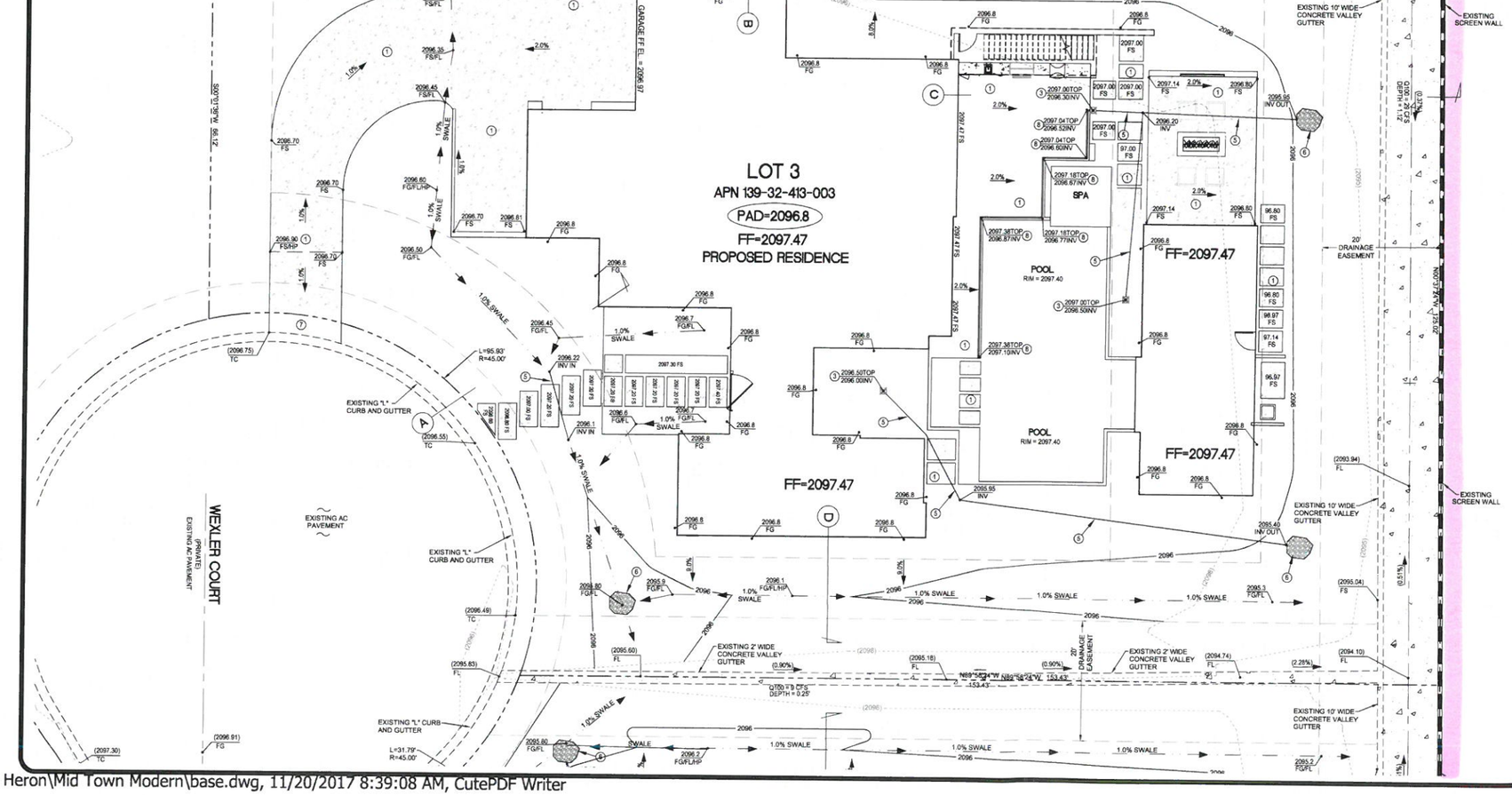

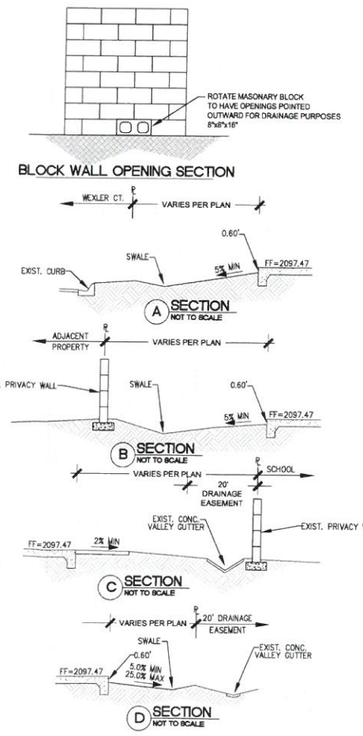

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BLUE HERON RESIDENCE
CITY OF LAS VEGAS NEVADA
SHEET:

GRADING PLAN
750 WEXLER COURT
APN 139-32-413-003

BYRON ANDERSON, PE
2641 COPPER COVE DRIVE, HENDERSON, NV. 89074
TEL. (702) 807-6239
SANDERSON1018@COX.NET

DEVELOPER:
BLUE HERON
4675 W. TECO AVE #250
LAS VEGAS, NV 89118

SEAL
PROFESSIONAL ENGINEER - STATE OF NEVADA
BYRON S. ANDERSON
Exp. 12/31/18
CIVIL
No.15718

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SCALE:
PROJECT DATE:

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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APN# 139-32-413-004

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GRAPHIC SCALE

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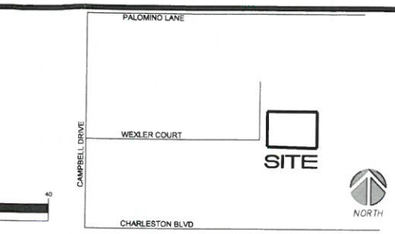

VICINITY MAP
Not to scale

Earthwork Quantities
(CONTRACTOR TO VERIFY)
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Fill = 10 cu. yds

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SANITARY SEWER	CLARK COUNTY WATER RECLAMATION DISTRICT
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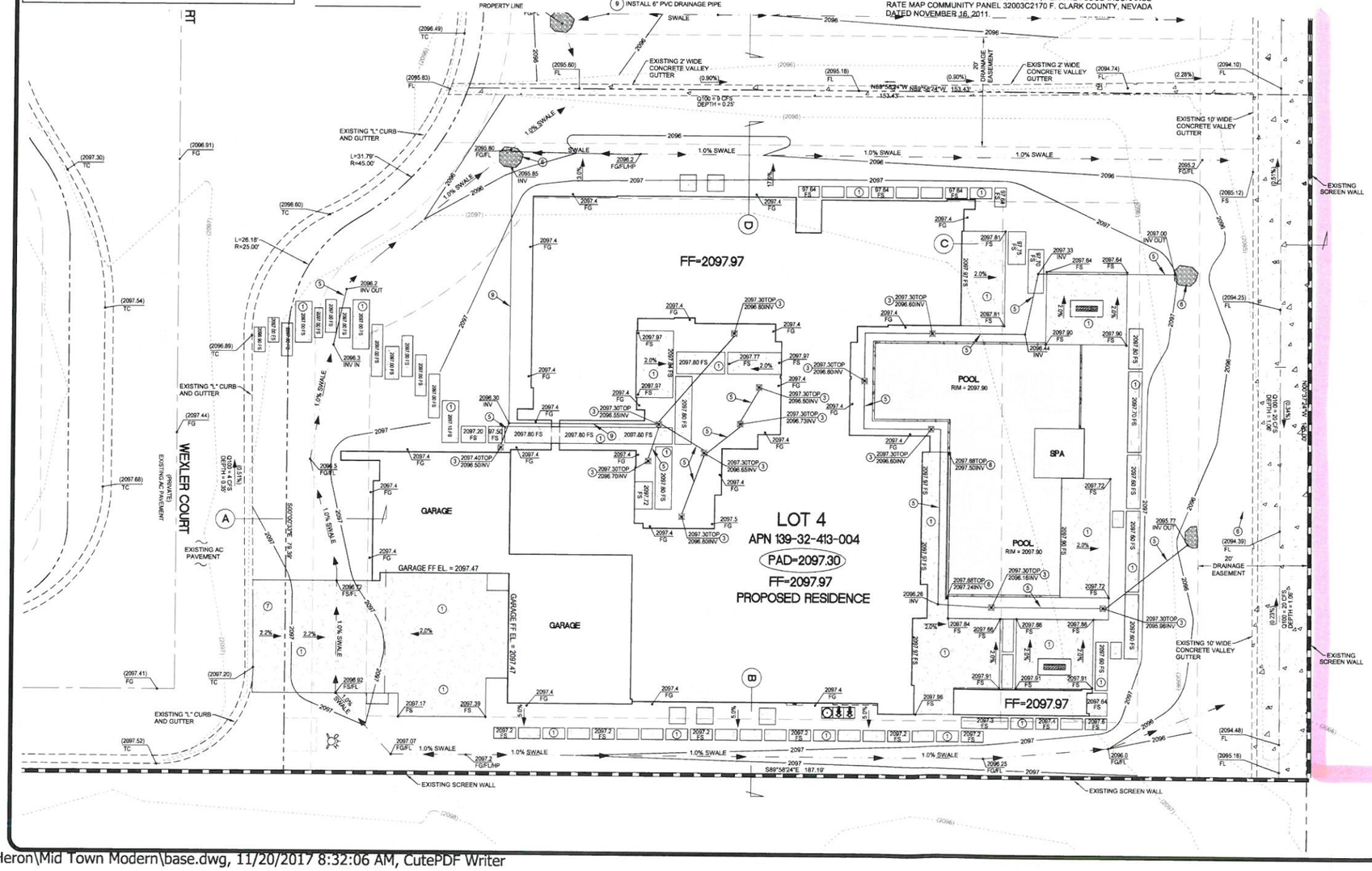
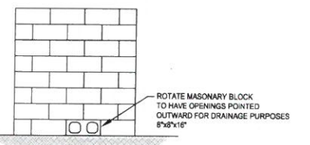
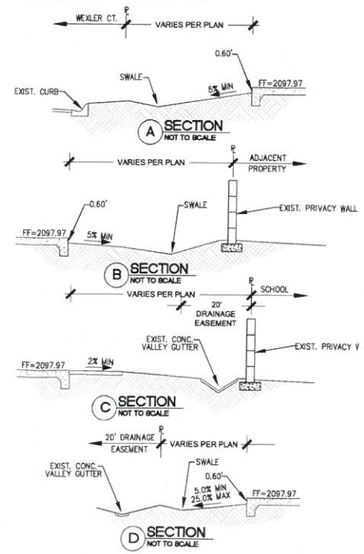




BLOCK WALL OPENING SECTION



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BLUE HERON RESIDENCE
CITY OF LAS VEGAS NEVADA
SHEET:

GRADING PLAN
800 WEXLER COURT
APN 139-32-413-004

BYRON ANDERSON, PE
2641 COPPER COVE DRIVE, HENDERSON, NV. 89074
TEL. (702) 807-6239
SANDERSON1018@COX.NET

DEVELOPER:
BLUE HERON
4675 W. TECO AVE #250
LAS VEGAS, NV 89118

SEAL
PROFESSIONAL ENGINEER - STATE OF NEVADA
BYRON S. ANDERSON
Exp. 12/31/18
CIVIL
No.15718

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SCALE:
PROJECT DATE:

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AGENCY DWG. NO.

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TANEY ENGINEERING

TECHNICAL DRAINAGE STUDY

FOR

Hastings & Campbell

Residential Development

CITY OF LAS VEGAS
NEVADA

May 2016

Prepared by:
Taney Engineering
6030 S. Jones
Las Vegas, Nevada 89118
Telephone: (702) 362-8844
Fax: (702) 362-5233

Prepared for:
Dax Contracting, LLC
4675 W Teco Ave, Ste 250
Las Vegas, NV 89118
Telephone: (702) 256-8866
Fax: (702) 256-8862

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: June 16, 2016
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Hastings & Campbell**			**COPIES TO:** Taney Engineering
Cross Streets:	NEQ of Charleston Blvd. & Campbell Ave.			DAX Contracting, LLC
File Number:	F:\Depot\DSMemos\DS4800B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	139-32-405-027			
Zoning Action:	TMP-62358; WVR-62353; WVR-62356; VAC-62357 & VAR-62407			
FEMA Flood Zone	YES	NO	**X**	
Proposed Storm Drain	YES	NO	**X**	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	5/4/2016	5/18/2016	Not Approved	$400.00	442793: $400
2nd Submittal & Supplement	5/26/2016 & 6/15/2016	6/16/2016	See Comments Below	$400.00	445645: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.

1. Private streets must be public drainage easements. Provide a note on the grading plans: Note: All private streets are P.U.E., Public Sewer Easements and Public Drainage Easements to be privately maintained by the HOA.
2. All drainage easements must be public drainage easements to be privately maintained and common lots to be labeled on the grading plans and to be dedicated as such in the final map or by separate document.
3. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section.* Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
ays

T/R/S: T20S/R61E/32
AREA M-32

6 SUMMARY TABLES

Table 1: Basin Summary

Existing Condition			
Basin	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
XON1	0.36	1	1
XON2	2.13	3	6
REF1*	N/A	1	3
REF2*	N/A	10	20
XCP	N/A	15	30

Ultimate Condition			
Basin	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
DON1	0.36	1	1
DON2	1.06	1	3
DON3	1.07	1	2
REF1*	N/A	1	3
REF2*	N/A	10	20
DCP	N/A	14	29

* FLOW REFERENCED FROM DRAINAGE STUDY DS 4430.

Table 2: Cross Section Summary

Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
A - 30 FT PRIVATE DR 100YR-DV	REF1 + DON1	4	1.29	0.32	2.30	0.74
A - 30 FT PRIVATE DR 10YR-DV	REF1 + DON2	2	1.29	0.27	1.99	0.54
B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV	REF1+DON1+DON2+DO N3	9	0.87	0.25	3.00	0.75
C - 10 FT VALLEY GUTTER 100YR-DV	DCP	29	0.37	1.12	4.64	5.20
D - 10 FT VALLEY GUTTER 100YR-DV	REF2*	20	0.23	1.06	3.54	3.75

7 CONCLUSIONS AND RECOMMENDATIONS

As detailed in this study, the Hastings and Campbell Residential Development is in compliance with the *HC&DDM*. No adverse effects are expected either upstream or downstream of the subject site. Street and drainage easement criteria will be met. Proposed finished floor elevations are adequately protected and are set a minimum of 18" above the adjacent top of curb elevation.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Taney Engineering
6030 S. Jones, Suite #100
Las Vegas, NV 89118

PROJECT NO. : DXC-16-058 **PROJECT: Hastings & Campbell**

FILE : STD_FRM4 **CALCULATED BY: NID** **DATE : 05/02/16**

Sub-Basin Data					Initial/Overland Time (T_i)			Travel Time (T_t)					T_c	T_c Check (Urbanized Basins)		Final T_c	T_{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi^2)	LENGTH (ft)	SLOPE (%)	T_i (min)	LENGTH (ft)	SLOPE (%)	V_1 (fps)	V_2 (fps)	T_t (min)	$T_c=T_i+T_t$ (min)	TOTAL (ft)	T_c (min)	T_c (min)	T_{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
EXISTING CONDITION																		
XON1	94.0	0.851	0.36	0.0006	20	1.0	2.0	360	1.0	1.48	N/A	4.1	6.1	N/A	N/A	6.06	0.100	
XON2	94.0	0.851	2.13	0.0033	50	1.0	3.2	366	0.9	1.40	N/A	4.3	7.5	N/A	N/A	7.52	0.100	
DEVELOPED CONDITION																		
DON1	91.0	0.811	0.36	0.0006	20	1.0	2.3	360	1.0	2.02	N/A	3.0	5.3	380.0	12.1	5.3	0.053	
DON2	85.0	0.732	1.06	0.0017	20	1.0	3.0	240	1.1	2.15	N/A	1.9	4.8	260.0	11.4	4.8	0.050	
DON3	84.0	0.719	1.07	0.0017	20	1.0	3.0	290	0.4	1.23	N/A	3.9	7.0	310.0	11.7	7.0	0.070	

$T_i=(1.8(1.1-K)L^{(1/2)})/(S^{1/3})$

$T_c=T_i+T_t$

$K=0.0132(CN)-.39$

$T_{lag}=0.6T_c$

For the travel time (T_t) calculations,
V_1 applies to the first 500 feet of travel distance;
V_2 applies to the remaining travel distance.

Travel Time Velocity Formulas

Existing	Developed
$V_1 = 14.8*(S/100)^{1/2}$	$V_1 = 20.2*(S/100)^{1/2}$
$V_2 = 29.4*(S/100)^{1/2}$	$V_2 = 30.6*(S/100)^{1/2}$

All basins over one square mile are calculated by the equation $T_{lag}=20Kn(L*L_c/S^{0.5})^{0.33}$ and denoted by shaded gray (See Worksheet).

REFERENCE: **CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL**

STANDARD FORM 4

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   27APR16  TIME  08:37:39  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*       609 SECOND STREET              *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X  X           X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID
    2         ID      <>>>>>>>>>>>>>>>>>>>>>>
    3         ID        HASTINGS & CAMPBELL
    4         ID        HYDROLOGIC MODEL
    5         ID        ------------------------
    6         ID
    7         ID        10-YR AND 100-YR STORM EVENT
    8         ID        ------------------------
    9         ID        TANEY ENGINEERING
   10         ID        EXISTING CONDITION
   11         ID        FILE: EX10.DAT
   12         ID        PROJECT No: DXC-16-058
   13         ID        DATE:  APRIL 2016
   14         ID      <<<<<<<<<<<<<<<<<<<<<<<
   15         ID
   16         ID       ---> 6-HOUR / SDN 3 <---
   17         ID
   18         IT      5       0       0     300
   19         IO      5
   20         IN      5
   21         JR    PREC    0.57
              *
   22         KK    XON1
   23         BA   .0006
   24         PB    2.77
   25         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   26         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   27         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   28         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   29         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   30         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   31         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   32         PC    .998    .999   1.00
   33         LS     0      98
   34         UD    .050
              *
   35         KK   REF1*
   36         KM    REFERENCED FLOW FROM DS-4430
   37         BA   .0001
   38         BF      1
   39         LS      0      63
   40         UD     .6
              *
   41         KK   REF2*
   42         KM    REFERENCED FLOW FROM DS-4430
   43         BA   .0001
   44         BF     10
   45         LS      0      63
   46         UD     .6
              *
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   47         KK    XON2
   48         BA   .0033
   49         BF      0
   50         LS      0      94
   51         UD    .100
              *
   52         KK     XCP
   53         KM   COMBINES XON2, REF1*, REF2*, XON1
   54         HC      4
              *
   55         ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   22        XON1
             .
             .
   35        .       REF1*
             .         .
             .         .
   41        .         .       REF2*
             .         .         .
             .         .         .
   47        .         .         .         XON2
             .         .         .           .
             .         .         .           .
   52        XCP.....................................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*                                      *
****************************************
```

```
*          VERSION 4.1              *
*                                   *
*  RUN DATE   27APR16  TIME  08:37:39   *
*                                   *
*************************************
```


```
*        609 SECOND STREET          *
*     DAVIS, CALIFORNIA 95616       *
*          (916) 756-1104           *
*                                   *
*************************************
```


```
                          <><><><><><><><><><><><><><><><><><><>
                           HASTINGS & CAMPBELL
                           HYDROLOGIC MODEL
                           ----------------------------

                           10-YR AND 100-YR STORM EVENT
                           ----------------------------
                           TANEY ENGINEERING
                           EXISTING CONDITION
                           FILE: EX10.DAT
                           PROJECT NO: DXC-16-058
                           DATE:  APRIL 2016
                          <><><><><><><><><><><><><><><><><><><>

                          ---> 6-HOUR / SDN 3 <---


   19 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN          5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1   0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2   0  ENDING DATE
                      NDTIME        0055  ENDING TIME
                      ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                        TOTAL TIME BASE   24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .57
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                              FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                          TIME TO PEAK IN HOURS
                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN                 RATIO 1
                                                             .57

 HYDROGRAPH AT
+                  XON1        .00     1   FLOW              1.
                                           TIME            3.50

 HYDROGRAPH AT
+                  REF1*       .00     1   FLOW              1.
                                           TIME            5.08

 HYDROGRAPH AT
+                  REF2*       .00     1   FLOW             10.
                                           TIME            5.08

 HYDROGRAPH AT
+                  XON2        .00     1   FLOW              3.
                                           TIME            3.50

   4 COMBINED AT
+                   XCP        .00     1   FLOW             15.
                                           TIME            3.50

 *** NORMAL END OF HEC-1 ***
```

```
1*****************************************
*                                       *
*    FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*                JUN  1998              *
*             VERSION 4.1               *
*                                       *
*  RUN DATE   27APR16  TIME  08:42:04   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID
    2         ID      <><><><><><><><><><><><><><><><><><><><>
    3         ID        HASTINGS & CAMPBELL
    4         ID        HYDROLOGIC MODEL
    5         ID        -------------------------
    6         ID
    7         ID        10-YR AND 100-YR STORM EVENT
    8         ID        -------------------------
    9         ID        TANEY ENGINEERING
   10         ID        EXISTING CONDITION
   11         ID        FILE: EX100.DAT
   12         ID        PROJECT No: DXC-16-058
   13         ID        DATE:  APRIL 2016
   14         ID      <><><><><><><><><><><><><><><><><><><><>
   15         ID
   16         ID       ---> 6-HOUR / SDN 3 <---
   17         ID
   18         IT      5       0       0     300
   19         IO      5
   20         IN      5
   21         JR    PREC    1.00
              *
   22         KK    XON1
   23         BA    .0006
   24         PB    2.77
   25         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   26         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   27         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   28         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   29         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   30         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   31         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   32         PC    .998    .999   1.00
   33         LS      0      98
   34         UD    .005
              *
   35         KK   REF1*
   36         KM    REFERENCED FLOW FROM DS-4430
   37         BA   .0001
   38         BF       3
   39         LS       0      63
   40         UD      .6
              *
   41         KK   REF2*
   42         KM    REFERENCED FLOW FROM DS-4430
   43         BA   .0001
   44         BF      20
   45         LS       0      63
   46         UD      .6
              *
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   47         KK    XON2
   48         BA   .0033
   49         BF       0
   50         LS       0      94
   51         UD    .100
              *
   52         KK     XCP
   53         KM   COMBINES XON2, REF1*, REF2*, XON1
   54         HC       4
              *
   55         ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   22        XON1
              .
   35           .       REF1*
              .           .
   41           .         .       REF2*
              .           .         .
   47           .         .         .       XON2
              .           .         .         .
   52        XCP.....................................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************                    *****************************************
*                                       *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS        *
*               JUN  1998               *                    *   HYDROLOGIC ENGINEERING CENTER       *
```

```
*          VERSION 4.1              *
*                                   *
*  RUN DATE   27APR16  TIME  08:42:04  *
*                                   *
*************************************
```


```
*         609 SECOND STREET         *
*      DAVIS, CALIFORNIA 95616      *
*           (916) 756-1104          *
*                                   *
*************************************
```


```
                          <><><><><><><><><><><><><><><><><><><>
                           HASTINGS & CAMPBELL
                           HYDROLOGIC MODEL
                           ---------------------------

                           10-YR AND 100-YR STORM EVENT
                           ----------------------------
                           TANEY ENGINEERING
                           EXISTING CONDITION
                           FILE: EX100.DAT
                           PROJECT NO: DXC-16-058
                           DATE:  APRIL 2016
                          <><><><><><><><><><><><><><><><><><><>

                          ---> 6-HOUR / SDN 3 <---


  19 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                      NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1    0  STARTING DATE
                     ITIME        0000  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     2    0  ENDING DATE
                    NDTIME        0055  ENDING TIME
                     ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                            FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                TIME TO PEAK IN HOURS
                                                                  RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN          RATIO 1
                                                       1.00

 HYDROGRAPH AT
+                  XON1        .00     1   FLOW          1.
                                           TIME       3.50

 HYDROGRAPH AT
+                  REF1*       .00     1   FLOW          3.
                                           TIME       4.08

 HYDROGRAPH AT
+                  REF2*       .00     1   FLOW         20.
                                           TIME       4.08

 HYDROGRAPH AT
+                  XON2        .00     1   FLOW          6.
                                           TIME       3.50

   4 COMBINED AT
+                  XCP         .00     1   FLOW         30.
                                           TIME       3.50


 *** NORMAL END OF HEC-1 ***
```

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998             *
*          VERSION 4.1              *
*                                   *
*  RUN DATE   27APR16  TIME  08:54:05   *
*                                   *
*************************************
```


```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616       *
*           (916) 756-1104            *
*                                   *
*************************************
```


```
X    X  XXXXXXX   XXXXX          X
X    X  X        X     X        XX
X    X  X        X              X
XXXXXXX  XXXX    X        XXXXX  X
X    X  X        X              X
X    X  X        X     X        X
X    X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

                        *DIAGRAM
             1          ID
             2          ID      <><><><><><><><><><><><><><><><><><><>
             3          ID        HASTINGS & CAMPBELL
             4          ID        HYDROLOGIC MODEL
             5          ID        --------------------------
             6          ID
             7          ID        10-YR AND 100-YR STORM EVENT
             8          ID        --------------------------
             9          ID        TANEY ENGINEERING
            10          ID        DEVELOPED CONDITION
            11          ID        FILE: DEV10.DAT
            12          ID        PROJECT NO: DXC-16-058
            13          ID        DATE:  APRIL 2016
            14          ID      <><><><><><><><><><><><><><><><><><><>
            15          ID
            16          ID      ---> 6-HOUR / SDN 3 <---
            17          ID
            18          IT       5       0       0     300
            19          IO       5
            20          IN       5
            21          JR    PREC    0.57
                        *
            22          KK    DON1
            23          BA    .0006
            24          PB    2.77
            25          PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
            26          PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
            27          PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
            28          PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
            29          PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
            30          PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
            31          PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
            32          PC    .998    .999   1.00
            33          LS       0      98
            34          UD    .050
                        *
            35          KK    REF1*
            36          KM     REFERENCED FLOW FROM DS-4430
            37          BA    .0001
            38          BF        1
            39          LS        0      63
            40          UD       .6
                        *
            41          KK     DON2
            42          BA    .0017
            43          BF        0
            44          LS        0      85
            45          UD    .050
                        *
```

1 HEC-1 INPUT PAGE 2

```
          LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

            46          KK    REF2*
            47          KM     REFERENCED FLOW FROM DS-4430
            48          BA    .0001
            49          BF       10
            50          LS        0      63
            51          UD       .6
                        *
            52          KK     DON3
            53          BA    .0017
            54          BF        0
            55          LS        0      84
            56          UD    .070
                        *
            57          KK      DCP
            58          KM    COMBINES DON3, DON2, REF1*, REF2*, DON1
            59          HC        5
                        *
            60          ZZ
```

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   22        DON1
              .
              .
   35         .       REF1*
              .         .
              .         .
   41         .         .       DON2
              .         .         .
              .         .         .
   46         .         .         .       REF2*
              .         .         .         .
              .         .         .         .
```

```
   52          .          .          .          .          DON3
               .          .          .          .          .
               .          .          .          .          .
   57        DCP.....................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998             *
*          VERSION 4.1               *
*                                    *
*  RUN DATE   27APR16  TIME  08:54:05   *
*                                    *
**************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*            (916) 756-1104          *
*                                    *
**************************************
```

```
                          ◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇
                          HASTINGS & CAMPBELL
                          HYDROLOGIC MODEL
                          ----------------------------

                          10-YR AND 100-YR STORM EVENT
                          ----------------------------
                          TANEY ENGINEERING
                          DEVELOPED CONDITION
                          FILE: DEV10.DAT
                          PROJECT No: DXC-16-058
                          DATE:  APRIL 2016
                         ◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇

                          ---> 6-HOUR / SDN 3 <---

 19 IO         OUTPUT CONTROL VARIABLES
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                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT         HYDROGRAPH TIME DATA
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                   IDATE     1     0  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     2     0  ENDING DATE
                  NDTIME        0055  ENDING TIME
                   ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                     TOTAL TIME BASE    24.92 HOURS

       ENGLISH UNITS
            DRAINAGE AREA         SQUARE MILES
            PRECIPITATION DEPTH   INCHES
            LENGTH, ELEVATION     FEET
            FLOW                  CUBIC FEET PER SECOND
            STORAGE VOLUME        ACRE-FEET
            SURFACE AREA          ACRES
            TEMPERATURE           DEGREES FAHRENHEIT

    JP          MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                  RATIOS OF PRECIPITATION
                  .57
1

                PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                        FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                  TIME TO PEAK IN HOURS

                                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN                 RATIO 1
                                                             .57

 HYDROGRAPH AT
+                  DON1        .00     1   FLOW              1.
                                           TIME            3.50

 HYDROGRAPH AT
+                  REF1*       .00     1   FLOW              1.
                                           TIME            5.08

 HYDROGRAPH AT
+                  DON2        .00     1   FLOW              1.
                                           TIME            3.50

 HYDROGRAPH AT
+                  REF2*       .00     1   FLOW             10.
                                           TIME            5.08

 HYDROGRAPH AT
+                  DON3        .00     1   FLOW              1.
                                           TIME            3.50

   5 COMBINED AT
+                  DCP         .00     1   FLOW             14.
                                           TIME            3.50


 *** NORMAL END OF HEC-1 ***
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1*************************************
 *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN  1998             *
 *           VERSION 4.1             *
 *                                   *
 *  RUN DATE   27APR16  TIME  08:57:16   *
 *                                   *
 *************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*            (916) 756-1104         *
*                                   *
*************************************
```

```
X    X  XXXXXXX   XXXXX          X
X    X  X        X     X        XX
X    X  X        X              X
XXXXXXX  XXXX    X        XXXXX  X
X    X  X        X              X
X    X  X        X     X        X
X    X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *DIAGRAM
    1         ID
    2         ID      <><><><><><><><><><><><><><><><><><><>
    3         ID       HASTINGS & CAMPBELL
    4         ID       HYDROLOGIC MODEL
    5         ID       -------------------------
    6         ID
    7         ID       10-YR AND 100-YR STORM EVENT
    8         ID       -------------------------
    9         ID       TANEY ENGINEERING
   10         ID       DEVELOPED CONDITION
   11         ID       FILE: DEV100.DAT
   12         ID       PROJECT No: DXC-16-058
   13         ID       DATE:  APRIL 2016
   14         ID      <><><><><><><><><><><><><><><><><><><>
   15         ID
   16         ID       ---> 6-HOUR / SDN 3 <---
   17         ID
   18         IT     5       0       0     300
   19         IO     5
   20         IN     5
   21         JR   PREC    1.00
              *
   22         KK   DON1
   23         BA   .0006
   24         PB    2.77
   25         PC    .000    .020    .057    .070    .087    .108    .124    .130    .130    .130
   26         PC    .130    .130    .130    .133    .140    .142    .148    .158    .172    .181
   27         PC    .190    .197    .199    .200    .201    .204    .214    .229    .241    .249
   28         PC    .251    .256    .270    .278    .281    .283    .295    .322    .352    .409
   29         PC    .499    .590    .710    .744    .781    .812    .819    .835    .851    .856
   30         PC    .860    .868    .876    .888    .910    .926    .937    .950    .970    .976
   31         PC    .982    .985    .987    .989    .990    .993    .993    .994    .995    .998
   32         PC    .998    .999   1.00
   33         LS      0      98
   34         UD    .050
              *
   35         KK   REF1*
   36         KM    REFERENCED FLOW FROM DS-4430
   37         BA   .0001
   38         BF       3
   39         LS       0      63
   40         UD      .6
              *
   41         KK    DON2
   42         BA   .0017
   43         BF       0
   44         LS       0      85
   45         UD    .050
              *
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   46         KK   REF2*
   47         KM    REFERENCED FLOW FROM DS-4430
   48         BA   .0001
   49         BF      20
   50         LS       0      63
   51         UD      .6
              *
   52         KK    DON3
   53         BA   .0017
   54         BF       0
   55         LS       0      84
   56         UD    .070
              *
   57         KK     DCP
   58         KM   COMBINES DON3, DON2, REF1*, REF2*, DON1
   59         HC       5
              *
   60         ZZ
```

1 SCHEDULE OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   22       DON1
              .
              .
   35         .       REF1*
              .         .
              .         .
   41         .         .       DON2
              .         .         .
              .         .         .
   46         .         .         .       REF2*
              .         .         .         .
              .         .         .         .
```

```
   52          .          .          .          .        DON3
               .          .          .          .          .
               .          .          .          .          .
   57        DCP..........................................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998             *
*          VERSION 4.1               *
*                                    *
*  RUN DATE   27APR16  TIME  08:57:16   *
*                                    *
**************************************
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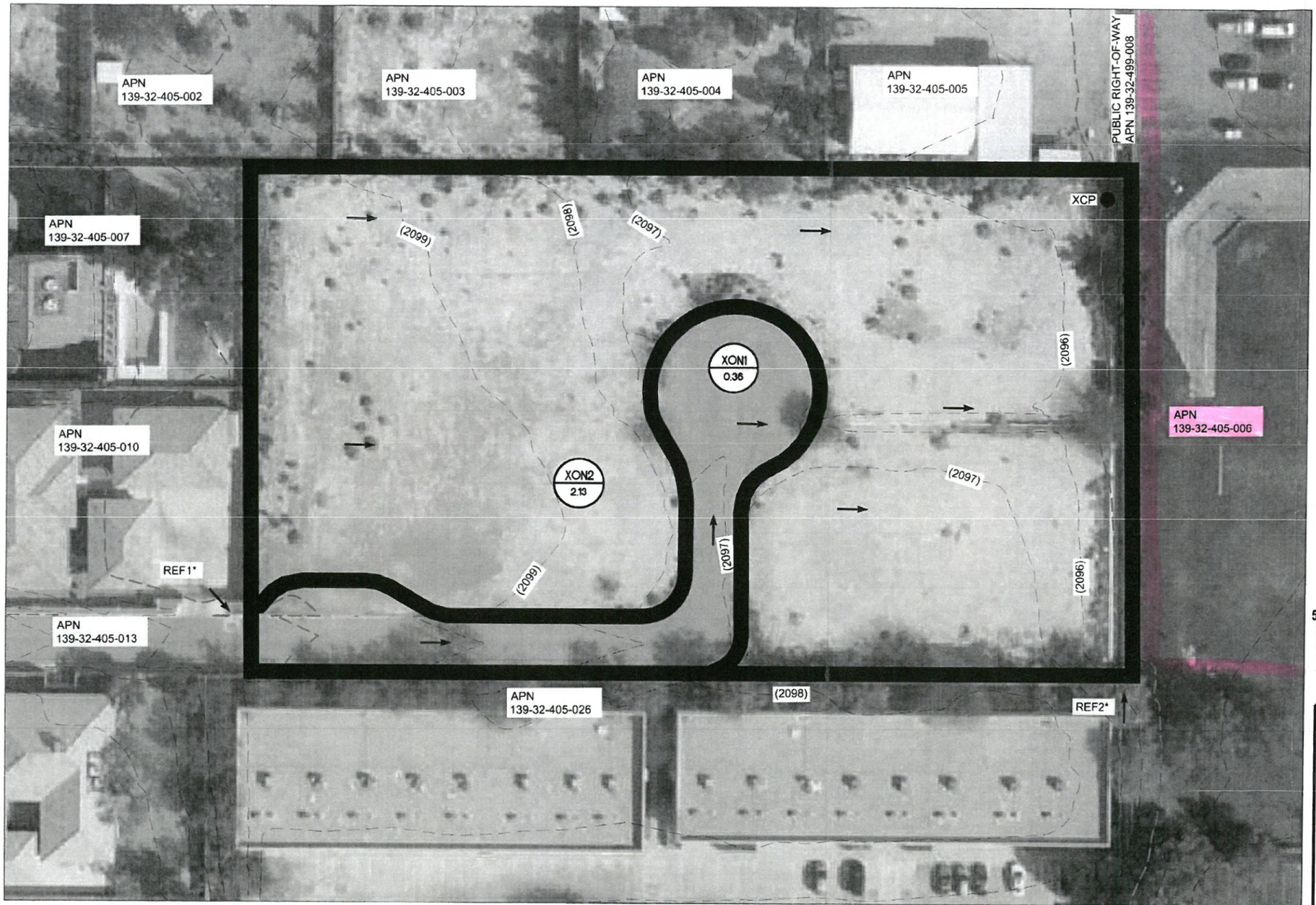
```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*            (916) 756-1104          *
*                                    *
**************************************
```

```
                    <><><><><><><><><><><><><><><><><><><>
                     HASTINGS & CAMPBELL
                     HYDROLOGIC MODEL
                     ---------------------------

                     10-YR AND 100-YR STORM EVENT
                     ---------------------------
                     TANEY ENGINEERING
                     DEVELOPED CONDITION
                     FILE: DEV100.DAT
                     PROJECT No: DXC-16-058
                     DATE:  APRIL 2016
                    <><><><><><><><><><><><><><><><><><><>

                     ---> 6-HOUR / SDN 3 <---

 19 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME         0000  STARTING TIME
                        NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2   0  ENDING DATE
                    NDTIME         0055  ENDING TIME
                     ICENT           19  CENTURY MARK

                   COMPUTATION INTERVAL      .08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT

    JP          MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00
 1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1
HYDROGRAPH AT					1.00
+	DON1	.00	1	FLOW	1.
				TIME	3.50
HYDROGRAPH AT					
+	REF1*	.00	1	FLOW	3.
				TIME	4.08
HYDROGRAPH AT					
+	DON2	.00	1	FLOW	3.
				TIME	3.50
HYDROGRAPH AT					
+	REF2*	.00	1	FLOW	20.
				TIME	4.08
HYDROGRAPH AT					
+	DON3	.00	1	FLOW	2.
				TIME	3.50
5 COMBINED AT					
+	DCP	.00	1	FLOW	29.
				TIME	3.50

*** NORMAL END OF HEC-1 ***



Existing Condition			
Basin	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
XON1	0.36	1	1
XON2	2.13	3	6
REF1*	N/A	1	3
REF2*	N/A	10	20
XCP	N/A	15	30

50 0 25 50 100

(IN FEET)
1 inch = 50 ft.

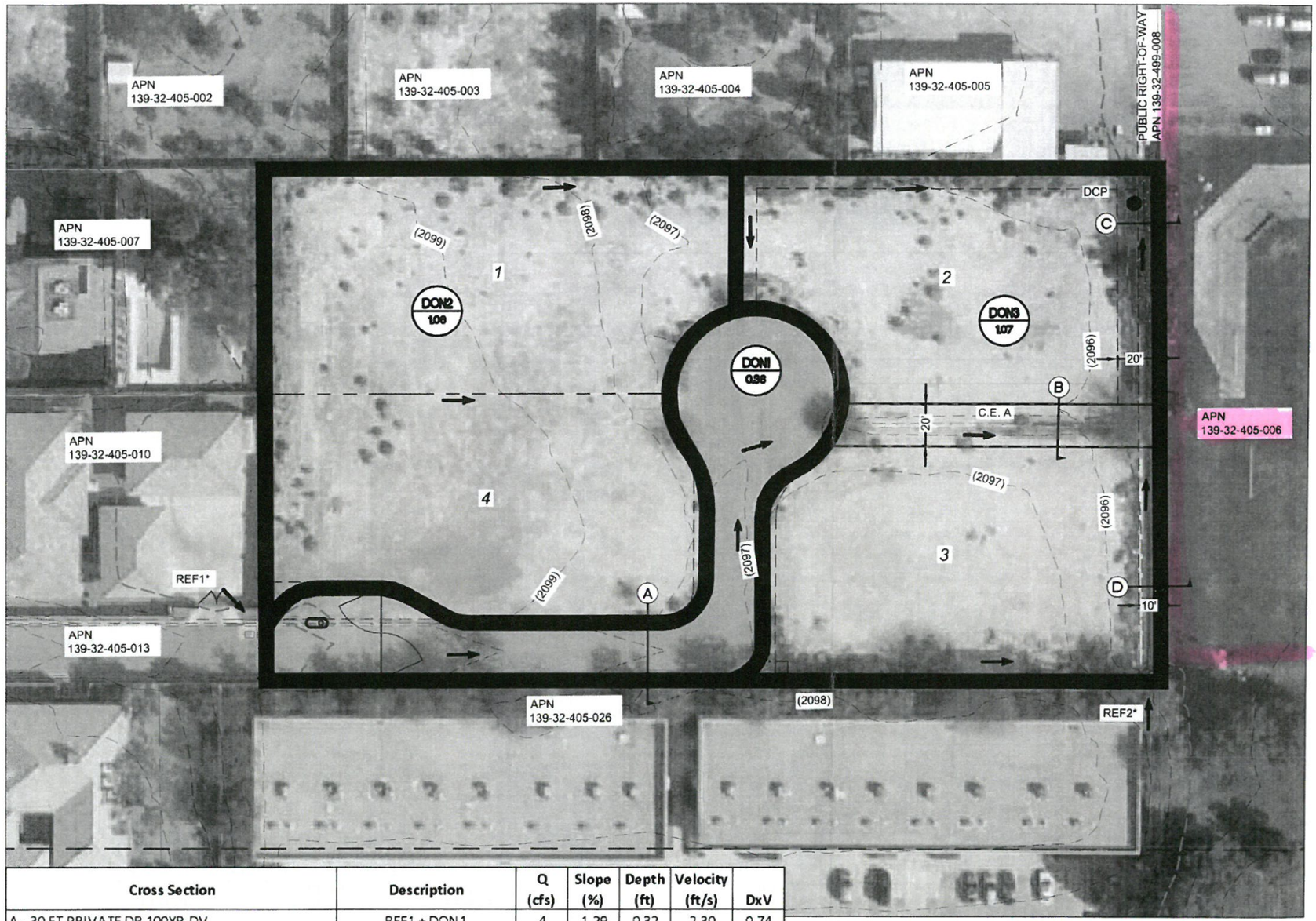
DRAINAGE LEGEND

DON1 / XXX	BASIN IDENTIFICATION
	BASIN AREA (ACRES)
	BASIN BOUNDARY
	SUB-BASIN BOUNDARY
● C1	CONCENTRATION POINT
→	FLOW PATH
A	CROSS SECTION
XX/XXX	10-YR/100-YR FLOW (CFS)
(XX/XXX)	REFERENCE FLOW (CFS)

REF1* AND REF2* ARE FLOWS REFERENCED FROM
DRAINAGE STUDY DS 4430

TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 8
EXISTING CONDITION BASIN MAP
HASTINGS & CAMPBELL



Ultimate Condition			
Basin	Area (acres)	Q_{10} (cfs)	Q_{100} (cfs)
DON1	0.36	1	1
DON2	1.06	1	3
DON3	1.07	1	2
REF1*	N/A	1	3
REF2*	N/A	10	20
DCP	N/A	14	29

REF1* AND REF2* ARE FLOWS REFERENCED FROM DRAINAGE STUDY DS 4430

50 0 25 50 100

(IN FEET)
1 inch = 50 ft.

DRAINAGE LEGEND	
DONI xxx	BASIN IDENTIFICATION BASIN AREA (ACRES)
	BASIN BOUNDARY
	SUB-BASIN BOUNDARY
● C1	CONCENTRATION POINT
	FLOW PATH
A	CROSS SECTION
XX/XXX	10-YR/100-YR FLOW (CFS)
(XX/XXX)	REFERENCE FLOW (CFS)

Cross Section	Description	Q (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
A - 30 FT PRIVATE DR 100YR-DV	REF1 + DON1	4	1.29	0.32	2.30	0.74
A - 30 FT PRIVATE DR 10YR-DV	REF1 + DON2	2	1.29	0.27	1.99	0.54
B - 20 FT PRIVATE DRAINAGE EASEMENT 100YR-DV	REF1+DON1+DON2+DON3	9	0.87	0.25	3.00	0.75
C - 10 FT VALLEY GUTTER 100YR-DV	DCP	29	0.37	1.12	4.64	5.20
D - 10 FT VALLEY GUTTER 100YR-DV	REF2*	20	0.23	1.06	3.54	3.75

TANEY ENGINEERING
6030 S. JONES BLVD STE#100
LAS VEGAS, NV 89118
(702) 362-8844 FAX: (702) 362-5233

FIGURE 9
DEVELOPED CONDITION BASIN MAP
HASTINGS & CAMPBELL

ATKINS

Technical Drainage Study
for
Wasden Elementary School
2831 Palomino Lane
Las Vegas, Nevada

APN: 139-32-405-006

Prepared by:
Atkins
2270 Corporate Circle, #200
Henderson, NV 89074
(702) 551-0365

Prepared for:
Clark County School District
Real Property Mgt.
1180 Military Tribute Pl.
Henderson, NV 89074
(702) 799-5214

ATKINS

Atkins North America, Inc.
2270 Corporate Circle, Suite 200
Henderson, Nevada 89074-7755
Telephone: +1.702.263.7275
Fax: +1.702.263.7200
www.atkinsglobal.com/northamerica

February 6, 2018

Mr. Yuk (Albert) Sung, P.E., CFM
City of Las Vegas Public Works Department
333 N. Rancho Dr., 7th floor
Las Vegas, NV 89106

RE: TECHNICAL DRAINAGE STUDY FOR WASDEN ELEMENTARY SCHOOL
ATKINS PROJECT NO: 100062041

Dear Mr. Sung:

Transmitted herewith is the Technical Drainage Study for Wasden Elementary School.

Please contact Atkins at 702-551-0365 if you have any question regarding this submittal.

Sincerely,

Atkins,

PROFESSIONAL ENGINEER-STATE OF NEVADA
JANELLE L. KLEIN
EXP. 10/30/19
CIVIL
No. 17313

Molly Anderson, P.E.
Senior Engineer
Water Resources

Janelle Klein, P.E.
Senior Engineer
Land Development

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Sections		Page
1.	Introduction	5
2.	Site Description and Location	5
3.	FEMA Floodplain Status	9
4.	Clark County Regional Flood Control Facilities and MAP	9
5.	City of Las Vegas Flood Control Master Plan	9
6.	Previous and/or Related Drainage Studies	9
7.	Topography Data and Survey	16
8.	Hydrologic Analysis and Parameterization	16
9.	Existing Condition Drainage Patterns and Hydrologic Analysis	21
10.	Interim Condition Drainage Patterns and Hydrologic Analysis	23
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Table 5: Ultimate Condition Flow Summary

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Figure 4: Effective FEMA Map
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Figure 5b: 2013 CCRFCD Master Plan Update Facility Inventory Summary Table
Figure 6: 2008 CCRFCD Master Plan Update Facility Hydrologic Summary Map
Figure 7A: 2005 CLV Central Neighborhood Flood Control Master Plan Map Existing Condition
Figure 7B: 2005 CLV Central Neighborhood Flood Control Master Plan Map Future Condition
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Figure 10: Ultimate Condition Subbasin Map
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- Appendix A-1: Existing Condition Hydrologic Parameters
- Appendix A-2: Existing Condition Hydrologic Model
- Appendix A-3: Interim Condition Hydrologic Parameters
- Appendix A-4: Interim Condition Hydrologic Model
- Appendix A-5: Ultimate Condition Hydrologic Parameters
- Appendix A-6: Ultimate Condition Hydrologic Model
- Appendix A-7: Normal Depth Calculations
- Appendix A-8: Storm Drain System Hydraulic Model

Appendix B. Drainage Study Appendix

- Appendix B-1: Improvement Plans

Appendix C. Reference Material

- Appendix C-1: Salvation Army Community Center
- Appendix C-2: Westbay at Charleston
- Appendix C-3: Update to Hastings & Campbell

Appendix D. Electronic CD

1. Introduction

The Clark County School District is proposing to replace the existing Wasden Elementary School buildings and site equipment with new buildings and equipment. This report has been prepared as a Technical Drainage Study to present a detailed hydrologic and hydraulic analysis for the existing, interim, and ultimate onsite and offsite conditions, and determine adequate protection for the project from offsite and onsite flows. The following tasks were performed in the preparation of this report:

- Identify previous drainage studies for the project site and surrounding areas.
- Identify the FEMA floodplain designation for the site.
- Identify existing and proposed regional and city drainage facilities adjacent to the site.
- Estimate runoff generated for the peak 10-year and 100-year return period storm events.
- Recommend drainage facilities to protect the site from storm runoff.

2. Site Description and Location

The project site is located at 2831 Palomino Lane, Las Vegas, Nevada. The parcel is within Section 32, Township 20 South, Range 61 East. The Assessor's Parcel Number is 139-32-405-006. The site is bordered on the north by Palomino Lane, on the west by existing Residence Estates District (R-E) and Ranch Acres District (R-A) lots, on the south by Professional Offices and Parking (P-R), on the east by existing Residence Estates District (R-E) lots. Refer to **Figure 1: Vicinity Map** and **Figure 2: Assessor's Parcel Map** for the project's location. The existing site is a 9.09-acre Civic District (C-V) lot with an elementary school that was construction in 1953. The project site generally drains northeast. The Clark County School District is proposing to proceed with school replacement to open in the fall of 2020. School replacement consists of demolition of existing buildings, parking and onsite improvements; re-grading the site and constructing new buildings, parking, drive aisles, and site improvements. Refer to **Figure 3: Proposed Site Plan** for the layout of the new site improvements.

Figure 1. Vicinity Map

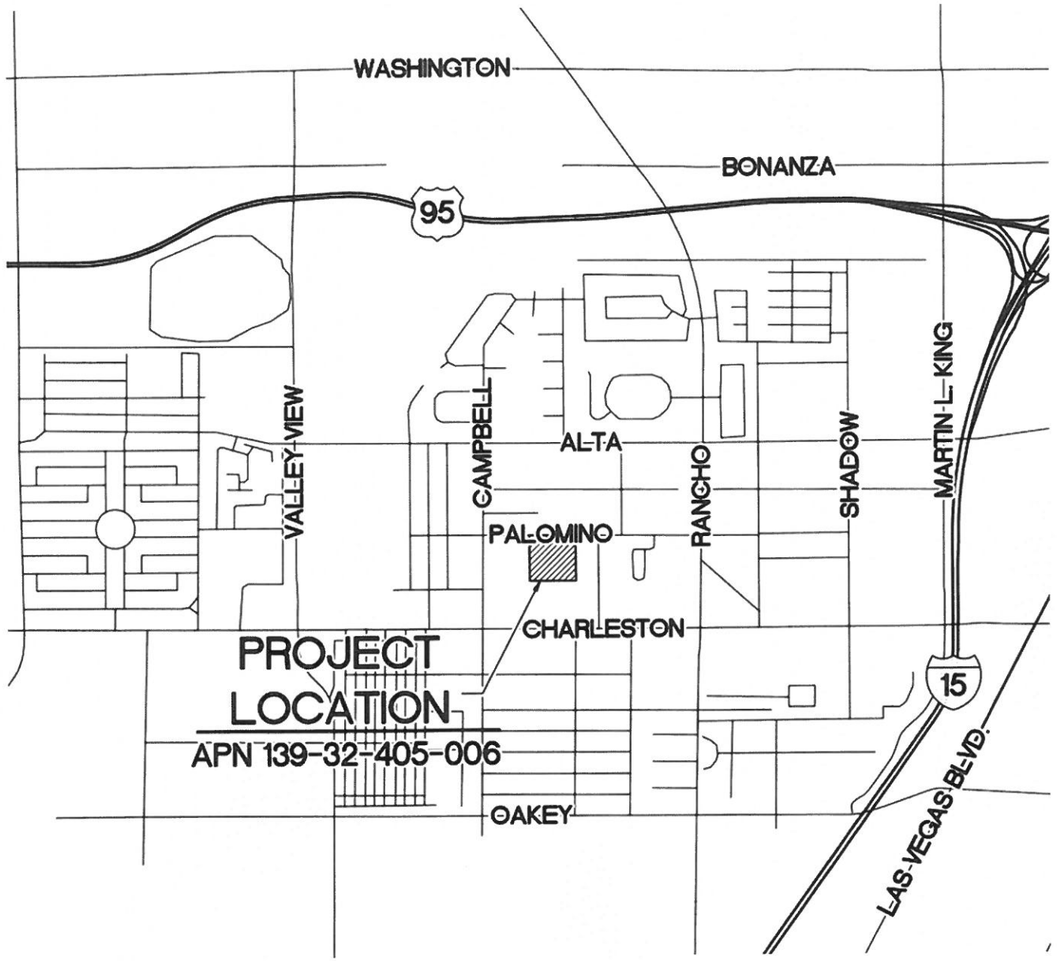


Figure 2. Assessor's Parcel Map

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data deliniated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

0 100 200 400 600 800

MAP LEGEND

ASSESSOR'S PARCELS - CLARK CO., NV.
Michele W. Shafe - Assessor

PARCEL BOUNDARY
SUB BOUNDARY
PM/LD BOUNDARY
ROAD EASEMENT
MATCH / LEADER LINE
HISTORIC LOT LINE
HISTORIC SUB BOUNDARY
HISTORIC PM/LD BOUNDARY
SECTION LINE

CONDOMINIUM UNIT
AIR SPACE PCL
RIGHT OF WAY PCL
SUB-SURFACE PCL

001 ROAD PARCEL NUMBER
001 PARCEL NUMER
1.00 ACREAGE
202 PARCEL SUB/SEQ NUMBER
PB 24-45 PLAT RECORDING NUMBER
5 BLOCK NUMBER
5 LOT NUMBER
GL5 GOV. LOT NUMBER

BOOK T20S R61E

26	125	124	123
37	138	139	140
64	163	162	161
75	176	177	178

SEC. 32

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

MAP S 2 SW 4

8	4	8	4
5	1	5	1
6	2	6	2
7	3	7	3
8	4	8	4
5	1	5	1

139-32-4

CLARK COUNTY ASSESSOR MAPPING DIVISION NEVADA

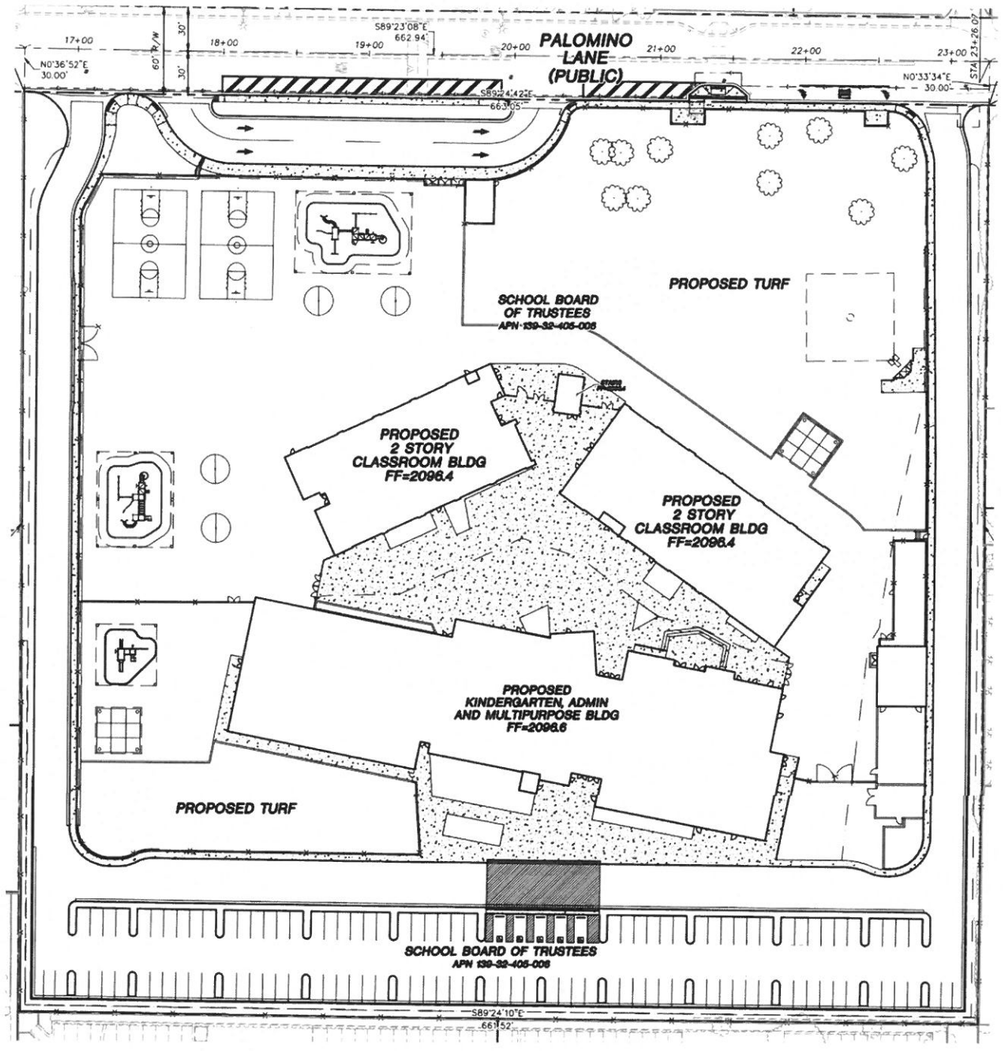
Scale: 1" = 200'

Rev: 6/30/2017

PALOMINO LN
LACY LN
KENNY WAY
HASTINGS DR
CASHMAN DR
CAMPBELL DR
WEXLER CT
CHARLESTON BLVD
MOUNTAIN VIEW
TRACT NO 1
PM 33-62
805 CAMPBELL
PM 41-36
PB 3-23
PM 90-49
PB 153-100
QUAIL PARK IV A
QUAIL PARK IV B
PB 29-31
PB 28-44
PM 6-44
401
402
403
404
405
410
411
412
413
213
200

TAX DIST 200

Figure 3. Proposed Site Plan



3. FEMA Floodplain Status

Figure 4: Effective FEMA Map is a reproduction of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Clark County (Community Number 32003C), panel 2170F, dated November 16, 2011. As shown on **Figure 4**, the project site lies within a FEMA designated Zone X. Areas in a Zone X are defined as being areas of minimal flood hazard.

4. Clark County Regional Flood Control Facilities and Map

Figures 5A and **5B** are a reproduction of Figure F-31 and associated facilities summary table from the 2013 Las Vegas Valley Flood Control Master Plan Update (MPU). As shown on **Figure 5A**, there are no existing or proposed CCRFCD Facilities through or in the vicinity of the project site. In addition, **Figure 6** is a reproduction of Figure H-31 Hydrologic Summary from the 2008 MPU.

5. City of Las Vegas Flood Control Master Plan

Figure 7A is a reproduction of Figure E-9 Existing Drainage Conditions**, Figure 7B** is a reproduction of Figure F-9 Future Drainage Conditions from the 2005 City of Las Vegas Central Neighborhood Flood Control Master Plan. As shown on **Figures 7A** and **7B**, there are no existing or proposed City Facilities in or adjacent to the project site. Based on Figure E-9 the project site is within sub-basin CH18, and the contributing basin is CH20. The Existing and Future flows within the adjacent Palomino Lane remain the same in both conditions. At the intersection of Palomino Lane and Campbell Drive, approximately 630 ft upstream of the project site, the street flow is 15 cfs in the 10-year storm and 32 cfs in the 100-year storm.

6. Previous and/or Related Drainage Studies

Based on the City of Las Vegas Central Neighborhood Master Plan, the existing upstream tributary watershed is fully developed.

The referenced hydrologic models and associated subbasin maps are provided in **Appendix C**.

- **Storm Drainage Report for Westbay at Charleston**, S.H.A. Engineers, CLV #1615, July 1995.
- **Hydrology Study for The Salvation Army Community Center,** Baughman & Turner, Inc., CLV #544, December 1998.
- **Drainage Study for 750 & 800 Wexler Court – Update to Hastings & Campbell,** Byron Anderson, CLV #4937, December 2017.

Figure 4. Effective FEMA Map

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

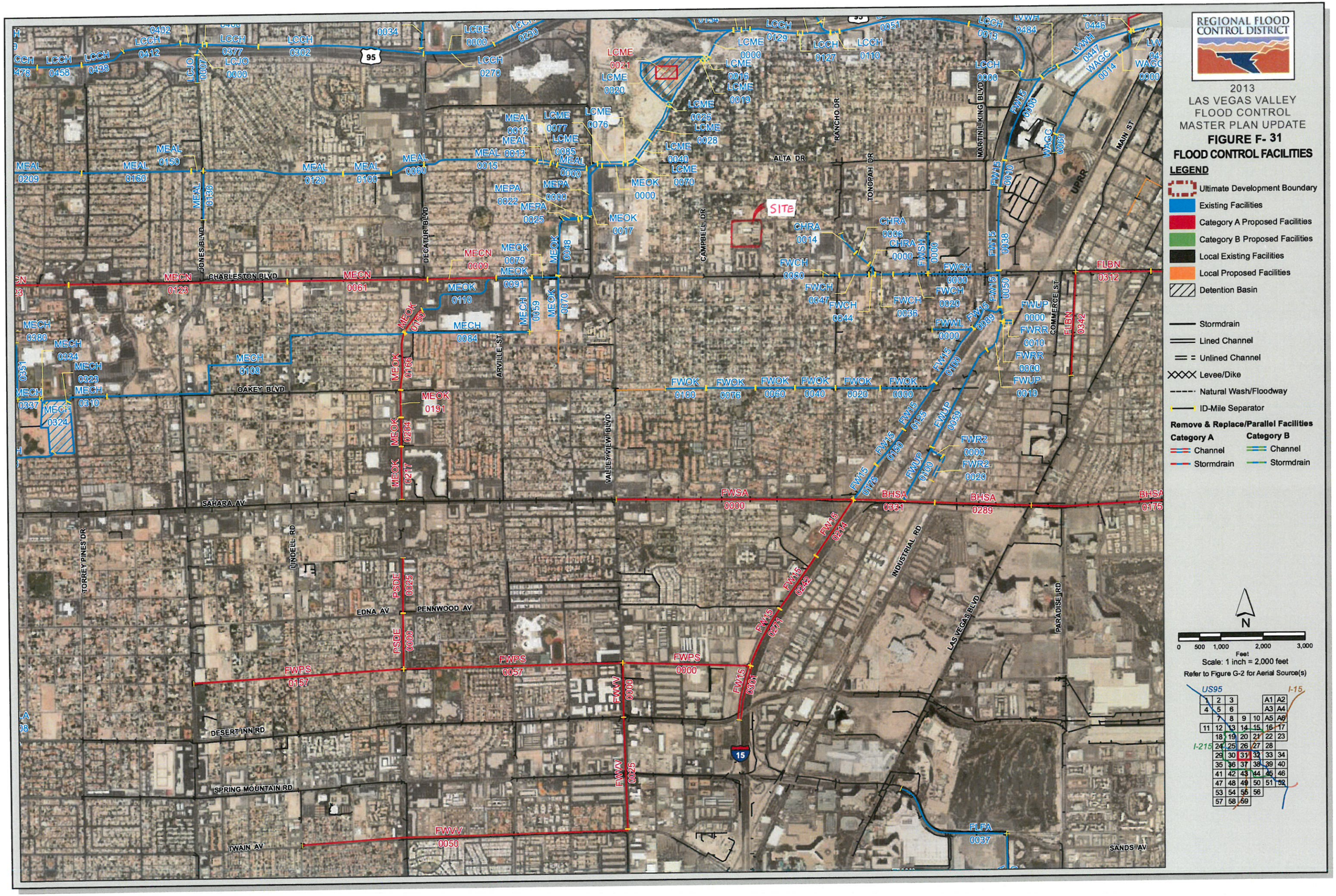
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/3/2018 at 3:58:48 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 5A.


REGIONAL FLOOD CONTROL DISTRICT
2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE
FIGURE F- 31
FLOOD CONTROL FACILITIES
LEGEND
Ultimate Development Boundary
Existing Facilities
Category A Proposed Facilities
Category B Proposed Facilities
Local Existing Facilities
Local Proposed Facilities
Detention Basin
Stormdrain
Lined Channel
Unlined Channel
Levee/Dike
Natural Wash/Floodway
ID-Mile Separator
Remove & Replace/Parallel Facilities
Category A
Channel
Stormdrain
Category B
Channel
Stormdrain
N
0 500 1,000 2,000 3,000
Feet
Scale: 1 inch = 2,000 feet
Refer to Figure G-2 for Aerial Source(s)
SITE
CHARLESTON BLVD
OAKEY BLVD
SAHARA AV
DESERT INN RD
SPRING MOUNTAIN RD
TWAIN AV
EDNA AV
PENNWOOD AV
SANDS AV
ALTA DR
JONES BLVD
DECATUR BLVD
ARVILLE ST
VALLEY VIEW BLVD
CAMPBELL DR
RANCHO DR
TONOPAH DR
MARTIN LUTHER KING BLVD
COMMERCE ST
MAIN ST
TORREY PINES DR
LINDELL RD
INDUSTRIAL RD
LAS VEGAS BLVD
PARADISE RD
UPRR
US95
I-15
I-215

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BHSA		**BOULDER HIGHWAY SAHARA AVENUE**						
0175	P1	14' X 14' RCB	6000	3837	CSA13	SW3	7.93	0.67
0289	P1	14' X 12' RCB	2300	3566	CSA11	SW3	7.55	0.87
0331	P1	14' X 11' RCB	2000	3232	CSA10-1	SW3	7.15	1.00
CHRA		**WEST CHARLESTON DRAINS - RANCHO**						
0000	E	6' X 5' RCB	310	286	CAL95	SW3	0.62	1.92
0006	E	5' X 5' RCB	420	286	CAL95	SW3	0.62	1.00
0014	E	5' X 4' RCB	600	286	CAL95	SW3	0.62	1.50
FLBN		**FLAMINGO - BOULDER HIGHWAY NORTH**						
0281	P1	10' X 7' RCB	1300	1259	CCH56	SW3	1.64	1.33
0312	P1	7' X 4' RCB	1800	555	CCH52	SW3	0.55	4.20
0342	P1	7' X 4' RCB	2500	555	CCH52	SW3	0.55	4.20
FLFA		**FLAMINGO - FASHION**						
0000	E	12' X 5' RCB	2050	747	CFW17N	FLAM3A	0.72	0.28
0037	E	8' X 5' RCB	3060	526	FW14	FLAM3A	0.44	0.45
FW15		**FREEWAY CHANNEL FROM DESERT INN TO EXPRESSWAY**						
0000	E	3: 12' X 10' RCB	2170	3728	CAL93	SW4	10.63	0.17
0010	E	3: 12' X 10' RCB	677	3403	CAL96	SW4	10.10	0.17
0038	E	3: 12' X 10' RCB	1945	3344	CCCH22	SW4	9.92	0.17
0050	E	3: 12' X 10' RCB	870	2613	CCH50	SW4	8.54	0.17
0089	E	3: 12' X 10' RCB	980	2448	CCWAL2	SW4	8.28	0.17
0100	E	3: 12' X 9' RCB	1575	2295	COK11C	SW3	7.83	0.17
0125	E	2: 10' X 8' RCB	1350	1450	DCCSA08	SW3	6.67	0.80
0150	E	2: 10' X 8' RCB	1067	1450	DCCSA08	SW3	6.67	0.80
0175	E	2: 10' X 8' RCB	985	1450	DCCSA08	SW3	6.67	0.75
0214	P1	2: 12' X 10' RCB	1610	4104	CED10-C	SW3	6.25	0.73
0242	P1	2: 12' X 9' RCB	1500	3968	CCPS08	SW3	6.03	0.93
0271	P1	2: 12' X 10' RCB	1520	3674	CPS08	SW3	5.59	0.59
0301	P1	Conc Chnl 12'W 4'D 2:1 SS	1300	433	CCE3FD-C	SW3	0.54	0.42
FWCH		**WEST CHARLESTON DRAIN**						
0000	E	10' X 7' RCB	1710	1008	CCH22	SW3	1.38	0.74
0020	E	10' X 7' RCB	840	783	CCCH18-C	SW3	1.15	0.40
0036	E	9' X 7' RCB	425	783	CCCH18-C	SW3	1.15	0.40
0044	E	9' X 7' RCB	145	538	CCH18-C	SW3	0.53	0.40
0047	E	7' X 5' RCB	710	538	CCH18-C	SW3	0.53	2.05
0060	E	5' X 4' RCB	400	538	CCH18-C	SW3	0.53	0.40
FWOK		**OAKEY DRAIN**						
0000	E	10' X 8' RCB	1350	928	1COK11C	SW3	1.16	0.62
0020	E	10' X 8' RCB	1025	928	1COK11C	SW3	1.16	0.60
0040	E	8' X 8' RCB	960	721	COK10	SW3	0.85	1.00
0060	E	5' X 5' RCB	970	453	COK09-C	SW3	0.55	1.50
0076	E	6' X 6' RCB	1175	453	COK09-C	SW3	0.55	9.40
0100	E	6' X 6' RCB	980	453	COK09-C	SW3	0.55	1.98
FWPS		**PALMYRA / SIRIUS DRAIN**						
0000	P1	12' X 11' RCB	3000	3240	CCPS06	SW3	4.88	1.50
0057	P1	10' X 10' RCB	5220	1941	CPS06	SW3	2.78	1.28
0157	P1	2: 66" RCP	5100	521	CPS03	SW3	0.60	1.15
FWR2		**FREEWAY CHANNEL - RAILROAD CHANNEL**						
0000	E	5' X 5' RCB	377					1.60
0020	E	Earth Chnl 10'W 4'D 2:1 SS	650					0.50
FWRR		**FREEWAY CHANNEL BYPASS FACILITY RR BRANCH**						
0000	E	48" RCP	70					1.22
0010	E	Conc Chnl 4'W 4'D 0:1 SS	220					1.22
FWSA		**FREEWAY CHANNEL - SAHARA**						
0000	P1	7' X 5' RCB	5700	486	CSA08	SW3	0.42	1.49
FWSH		**SHADOW LANE DRAIN**						
0000	E	7' X 4' RCB	950	253	CH22-C	SW3	0.23	0.20

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
FWUP		**FREEWAY CHANNEL BYPASS FACILITY**						
0000	E	10' X 9' RCB	350	242	CH50	SW3	0.26	0.37
0010	E	10' X 8' RCB	804	242	CH50	SW3	0.26	0.37
0059	E	10' X 6' RCB	2680	242	CH50	SW3	0.26	0.40
0100	E	8' X 4' RCB	1440	242	CH50	SW3	0.26	0.47
FWVV		**VALLEY VIEW DRAIN**						
0000	P1	12' X 11' RCB	1320	1475	CCE3FA	SW3	2.67	0.30
0025	P1	10' X 10' RCB	2665	1006	CR4C1	SW3	1.74	0.30
0050	P1	8' X 6' RCB	7785	712	DFW5	SW3	1.34	1.50
FWWL		**FREEWAY CHANNEL-WALDMAN AVENUE**						
0000	E	6' X 6' RCB	1000	418	CWAL2	SW3	0.45	0.20
LCCH		**LAS VEGAS CREEK CHANNEL**						
0000	E	2: 12' X 7' RCB	730	2894	CLC20-C	MEADOWS4	9.68	1.28
0013	E	2: 12' X 6' RCB	2035	2894	CLC20-C	MEADOWS4	9.68	0.82
0051	E	2:14' X 7' RCB	3113	2894	CLC20-C	MEADOWS4	9.68	0.60
0110	E	Transition Structure	220	2798	CCLC16-C	MEADOWS4	9.51	
0114	E	2: 14' X 7' RCB	670	2329	CRMEDET	MEADOWS4	8.25	0.80
0127	E	Transition Structure	110	2329	CRMEDET	MEADOWS4	8.25	
0129	E	2: 14' X 7' RCB	1130	2329	CRMEDET	MEADOWS4	8.25	0.50
0150	E	2: 13' X 7' RCB	200	2329	CRMEDET	MEADOWS4	8.25	0.95
0154	E	Transition Structure	190	2329	CRMEDET	MEADOWS4	8.25	
0157	E	2: 12' X 6' RCB	1650	1631	CCLC14-C	SW3	2.99	1.06
0230	E	12' X 6' RCB	2140	1381	CLC14-C	SW3	2.54	1.74
0270	E	12' X 6' RCB	1705	774	CCWA02-C	SW3	1.84	0.54
0302	E	8' X 6' RCB	3940	774	CCWA02-C	SW3	1.84	2.49
0377	E	10' X 7' RCB	1226	774	CCWA02-C	SW3	1.84	0.74
0400	E	Transition Structure	110	437	CWA02-C	SW3	1.47	0.49
0402	E	8' X 6' RCB @ Jones	535	437	CWA02-C	SW3	1.47	0.49
0412	E	60" RCP	1370	437	CWA02-C	SW3	1.47	1.08
0438	E	60" RCP	1090	162	CLC01-C	SW3	1.20	1.60
0458	E	60" RCP	1060	162	CLC01-C	SW3	1.20	1.60
0478	E	60" RCP	1110	162	CLC01-C	SW3	1.20	0.55
LCDE		**LAS VEGAS CREEK - DECATUR**						
0000	E	6' X 5' RCB	1800	404	LC11-C	SW3	0.38	1.26
0034	E	72" RCP	700	404	LC11-C	SW3	0.38	0.50
LCJO		**LAS VEGAS CREEK - JONES**						
0000	E	6' X 6' RCB	380	358	AL01B-C	SW3	0.37	0.50
0007	E	6' X 5' RCB	675	358	AL01B-C	SW3	0.37	0.62
LCME		**LAS VEGAS CREEK - MEADOWS**						
0000	E	14' X 8' RCB	895	1423	MEADOWDB	SW3SC	5.67	0.72
0016	E	Stilling Basin	140	1423	MEADOWDB	SW3SC	5.67	0.21
0017	E	3,300 cfs Spillway (Replace w/ LCME0018)		3300	MEADOWIN	SW3SC	5.67	
0018	P1	Modify Spillway, raise height by 1' (Replaces LCME0017)		3300	MEADOWIN	SW3SC	5.67	
0019	E	1: 11' X 5' RCB and 1: 11.5' X 5' RCB	110	1423	MEADOWDB	SW3SC	5.67	0.81
0020	E	213 ac-ft Meadows Detention Basin		4713	MEADOWIN	SW3SC	5.67	
0021	P1	Upgrade to 235 ac-ft Meadows Detention Basin		4713	MEADOWIN	SW3SC	5.67	
0026	E	Energy Dissipator	110	4713	MEADOWIN	SW3SC	5.67	2.94
0028	E	Conc Chnl 42'W 9'D 0:1 SS	922	4713	MEADOWIN	SW3SC	5.67	0.40
0040	E	Conc Chnl 40'W 10'D 0:1 SS	525	4593	CAL90-C	SW3SC	5.44	0.40
0070	E	Conc Chnl 40'W 8.5'D 0:1 SS	255	4593	CAL90-C	SW3SC	5.44	0.40
0076	E	Free Span Bridge 18'W 8'D @ Alta	100	4441	CCAL16	SW3SC	5.27	1.89
0077	E	Conc Chnl 18'W 8'D 1:1 SS	618	4441	CCAL16	SW3SC	5.27	1.89
0085	E	10' X 6' RCBC @ Valley View	275	1661	1CAL16	SW3	2.09	1.89
LCRA		**LAS VEGAS CREEK - RANCHO**						
0000	E	12' X 8' RCB	380	783	CLC16-C	SW3	1.71	0.60
0004	E	12' X 6' RCB	2367	783	CLC16-C	SW3	1.71	0.77
LVOE		**OWENS AVENUE - EAST**						
0345	P1	13' X 11' RCB	1685	2369	DLVOE	SW5	22.79	0.60

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
LVWH		**WASHINGTON AVENUE CHANNEL**						
0431	E	3: 14.33' X 10' RCB	665	2870	DCLC21	SW5	22.79	0.15
0446	E	Junction Structure	69	2870	DCLC21	SW5	22.79	0.15
0447	E	3: 14.33' X 10' RCB	1955	4978	CCAL93	SW5	22.19	0.15
0484	E	Confluence Structure	455	4978	CCAL93	SW5	22.19	0.15
MEAL		**MEADOWS ALTA**						
0000	E	Conc Chnl 8'W 11'D 1:1 SS	700	1207	CAL13-3	SW3	1.48	1.58
0012	E	12' X 6' RCBC @ Red Sky	160	1161	CAL10-C	SW3	1.42	3.03
0013	E	Conc Chnl 8'W 11'D 1:1 SS	320	1161	CAL10-C	SW3	1.42	3.03
0015	E	72" RCP	2500	1126	CAL11-C	SW3	1.38	1.94
0060	E	60" RCP	905	792	CBR3	SW3	1.08	1.00
0100	E	72" RCP	1160	792	CBR3	SW3	1.08	1.00
0120	E	60" RCP	3500	733	CAL05-C	SW3	1.01	1.00
0130	E	6' X 4' RCB	1150	186	AL04-C	SW3	0.18	0.40
0150	E	60" RCP	285	499	CCUS	SW3	0.74	1.40
0160	E	36" RCP	2600	331	CUS	SW3	0.56	1.25
0209	E	48" RCP	2500	150	DCR2	SW3	0.41	1.70
MECH		**EXTENSION OF MEADOWS / CHARLESTON**						
0059	E	36" RCP	1310					0.25
0084	E	30" RCP	2960					1.26
0108	E	30" RCP	8550	32	OAKEYOT	SW3	1.88	1.43
0310	E	24" RCP	1000	32	OAKEYOT	SW3	1.88	1.43
0323	E	15" RCP Outlet	200	32	OAKEYDB	SW3	1.88	
0324	E	201 ac-ft Oakey Detention Basin		1652	OAKEYIN	SW3	1.88	
0334	E	11' X 6' RCB	200	573	C5-OAK-C	SW3	0.56	0.50
0337	E	9' X 6' RCB	520	573	C5-OAK-C	SW3	0.56	0.50
0338	E	10' X 8' RCB	2060	1131	C3A-OAKC	SW3	1.32	1.62
0351	E	90" RCP	1350	573	C5-OAK-C	SW3	0.56	0.50
MECN		**MEADOWS - CHARLESTON**						
0000	P1	9' X 8' RCB	1570	1105	CCH10	SW3	1.00	1.09
0061	P1	8' X 7' RCB	3300	1105	CCH10	SW3	1.00	1.82
0123	P1	8' X 6' RCB	5200	821	CCH09-C	SW3	0.72	1.64
0223	P1	6' X 5' RCB	2700	422	CCH05-C	SW3	0.34	2.04
MEOK		**OAKEY MEADOWS STORMDRAIN**						
0000	E	19' X 7' RCB	900	2718	COK13	SW3SC	2.94	0.91
0017	E	19' X 8' RCB	1550	2718	COK13	SW3SC	2.94	0.80
0048	E	18' X 9' RCB	1700	2718	COK13	SW3SC	2.94	0.50
0070	E	7' X 6' RCB	1320	226	CH14B	SW3	0.22	0.44
0079	E	18' X 8' RCB	630	2450	COK12	SW3SC	2.62	0.50
0091	E	18' X 8' RCB	850	2450	COK12	SW3SC	2.62	0.50
0110	E	12' X 8' RCB	2304	1491	COK08	SW3	1.58	0.77
0150	P3	12' X 8' RCB	642	1491	COK08	SW3	1.58	0.77
0166	P3	12' X 9' RCB	1350	1491	COK08	SW3	1.58	0.45
0191	P3	12' X 7' RCB	660	957	COK07	SW3	0.93	0.71
0204	P3	12' X 6' RCB	655	957	COK07	SW3	0.93	0.71
0217	P3	12' X 5' RCB	1276	556	CSA06	SW3	0.52	0.44
MEPA		**MEADOWS PARALLEL**						
0000	E	10' X 6' RCB	1370	259	CCH14A	SW3	0.25	0.50
0022	E	6' X 5' RCB	200	259	CCH14A	SW3	0.25	1.45
0025	E	78" RCP	470	259	CCH14A	SW3	0.25	1.16
PSDE		**PALMYRA / SIRIUS DRAIN - DECATUR LATERAL**						
0000	P1	12' X 8' RCB	1330	1018	CED02	SW3	1.21	0.38
0025	P1	10' X 8' RCB	1320	598	CED13	SW3	0.65	0.25
WAGC		**WASHINGTON AVENUE CHANNEL - GRAND CENTRAL**						
0000	E	2: 12' X 4' RCB	700	557	LC21	SW3	0.60	0.20
0014	E	1: 12' X 4' RCB and 1: 11' X 4' RCB	2440	557	LC21	SW3	0.60	0.20
0060	E	12' X 4' RCB	455	557	LC21	SW3	0.60	0.20

** The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow from routing.*

*** As-built or design slopes were used when available. All other slopes are based on existing topography. The user should verify the facility slope listed prior to performing any facility specific analysis.*

^ For parallel facilities, the existing facility flow equals its normal depth capacity, and the proposed parallel facility flow equals the remaining flow (i.e., HEC-1 Node flow = existing facility normal depth capacity + proposed parallel facility flow).

REGIONAL FLOOD CONTROL DISTRICT

2013 LAS VEGAS VALLEY FLOOD CONTROL MASTER PLAN UPDATE

FACILITY INVENTORY FIGURE F - 31

LEGEND

ID (Facility Identifier) AABB
Parent Stream Name
Stream Name
River Mile 0000
Distance Above Confluence with Parent Stream (Miles)
Miles in Hundredths

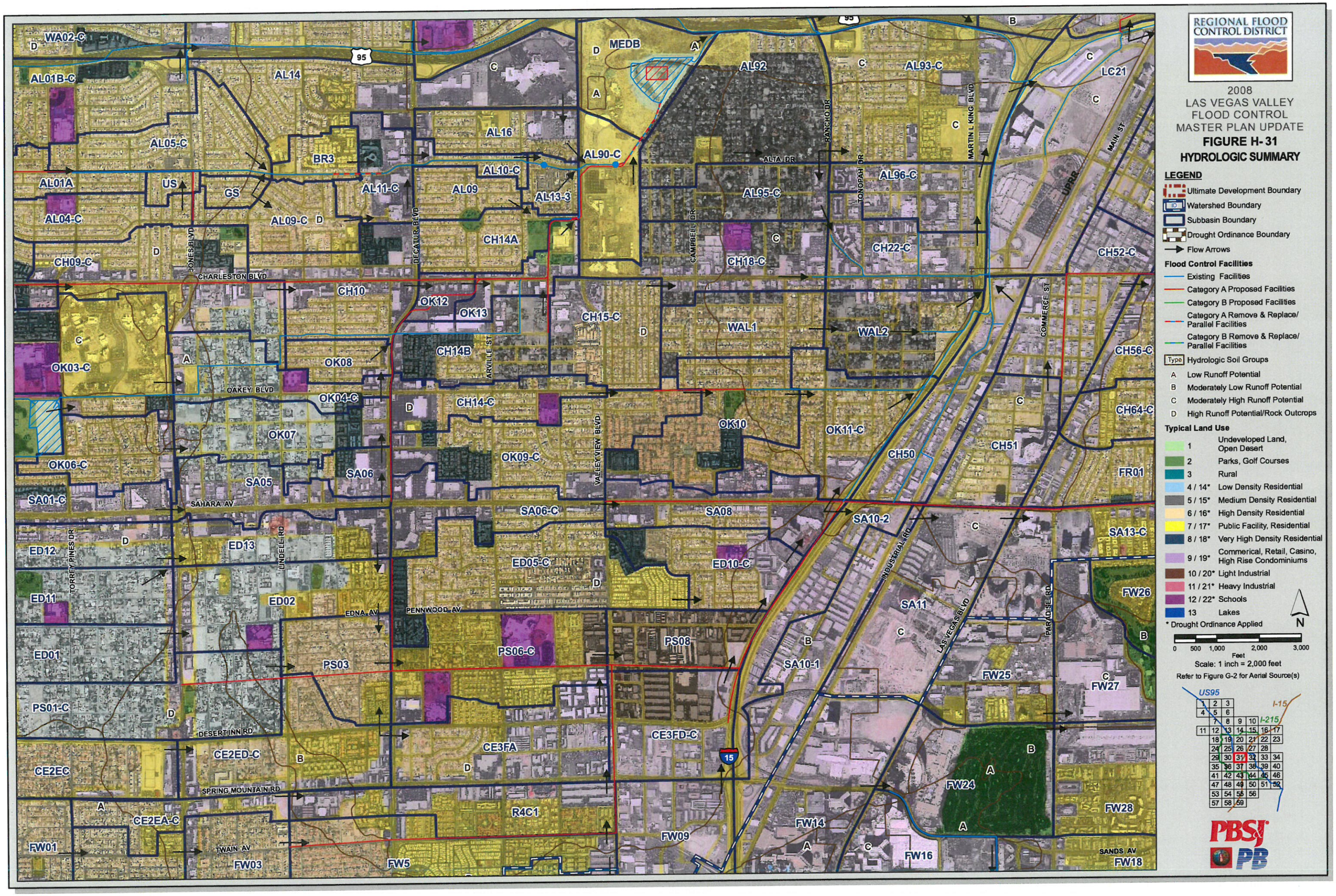
Existing Facility.....E
Proposed or Modified Facility.....P
Contingency Level
Category B.....P0
Master Plan.....P1
Preliminary Design.....P2
Design.....P3

Bottom Width.....W
Depth.....D
Side Slope, H:V.....SS

Construction Features

Cast in Place Concrete Pipe.....CIPCP
Corrugated Metal Arch Pipe Culvert.....CMAP
Corrugated Metal Pipe Culvert.....CMPC
High Density Polyethylene.....HDPE
Horizontal Elliptical Reinforced Concrete Pipe.....HERCP
Reinforced Concrete Arch Pipe.....RCAP
Reinforced Concrete Arch Culvert.....RCAC
Reinforced Concrete Box.....RCB
Reinforced Concrete Box Culvert.....RCBC
Reinforced Concrete Pipe.....RCP
Reinforced Concrete Pipe Culvert.....RCPC
Storm Sewer Pipe.....SSP

Figure 6.



REGIONAL FLOOD CONTROL DISTRICT

2008
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE H- 31
HYDROLOGIC SUMMARY

LEGEND

- Ultimate Development Boundary
- Watershed Boundary
- Subbasin Boundary
- Drought Ordinance Boundary
- Flow Arrows

Flood Control Facilities

- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Category A Remove & Replace/ Parallel Facilities
- Category B Remove & Replace/ Parallel Facilities

Type Hydrologic Soil Groups

- A Low Runoff Potential
- B Moderately Low Runoff Potential
- C Moderately High Runoff Potential
- D High Runoff Potential/Rock Outcrops

Typical Land Use

1	Undeveloped Land, Open Desert
2	Parks, Golf Courses
3	Rural
4 / 14*	Low Density Residential
5 / 15*	Medium Density Residential
6 / 16*	High Density Residential
7 / 17*	Public Facility, Residential
8 / 18*	Very High Density Residential
9 / 19*	Commerical, Retail, Casino, High Rise Condominiums
10 / 20*	Light Industrial
11 / 21*	Heavy Industrial
12 / 22*	Schools
13	Lakes

* Drought Ordinance Applied

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure G-2 for Aerial Source(s)

US95 I-15 I-215

1	2	3										
4	5	6										
		7	8	9	10							
11	12	13	14	15	16	17						
		18	19	20	21	22	23					
		24	25	26	27	28						
		29	30	31	32	33	34					
		35	36	37	38	39	40					
		41	42	43	44	45	46					
		47	48	49	50	51	52					
		53	54	55	56							
		57	58	59								

PBS&J PB

Figure 7A.

City of Las Vegas

CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

LEGEND

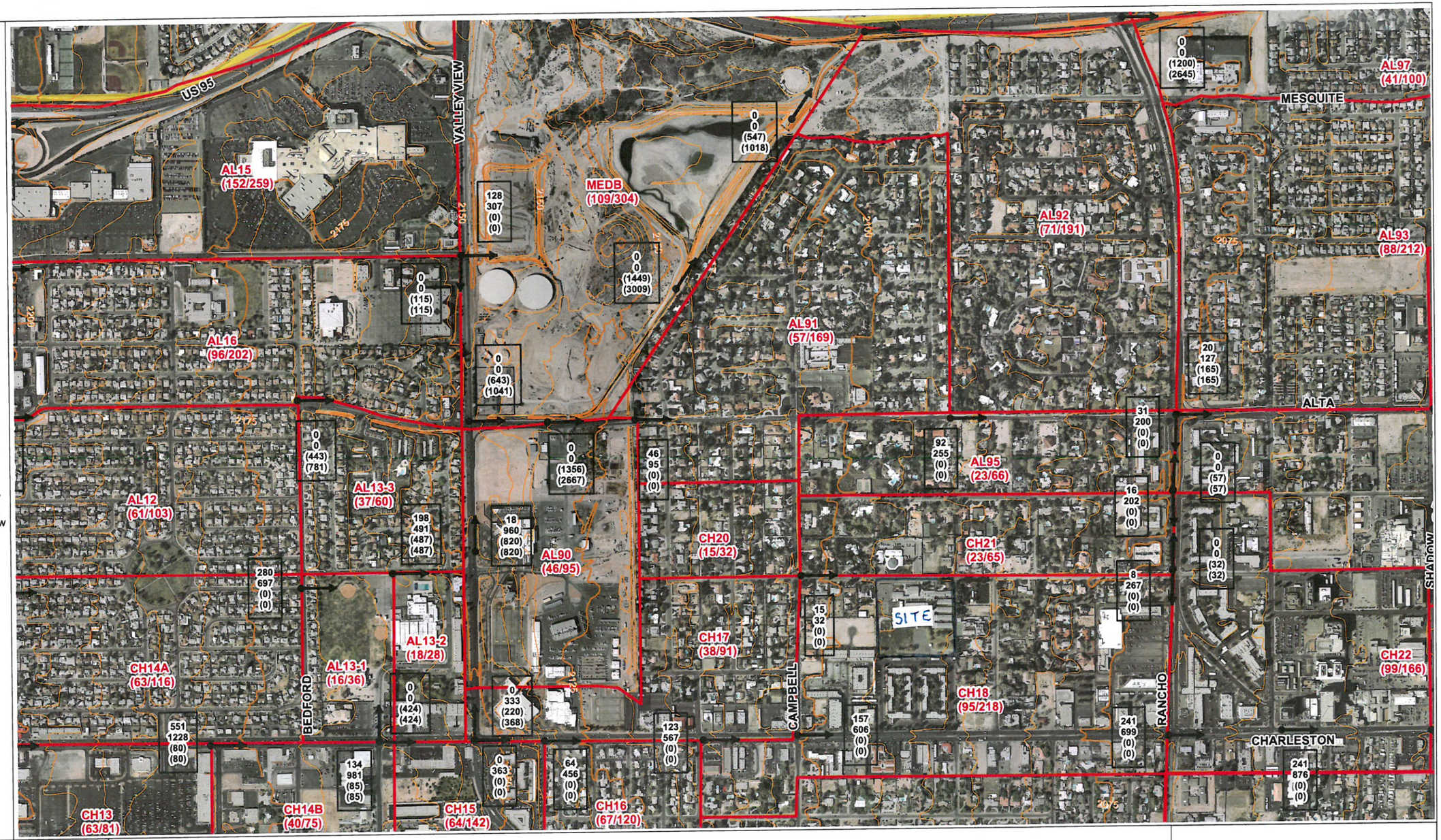
- Sub-basin Boundary
- LV12 — Basin ID
- (10yr./100yr.) — Contributing flow from the basin (cfs)
- Flow Arrow
- 250 / 500 / (300) / (800) — 10-Year Street Flow / 100-Year Street Flow / 10-Year Facility Flow / 100-Year Facility Flow

(Flows in CFS)

- Study Area Limit

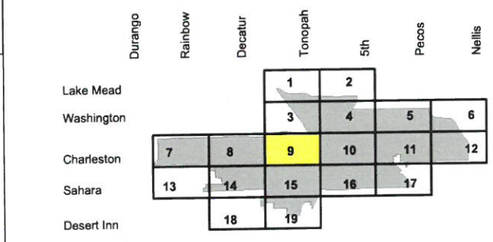
PHOTO DATE: SPRING 2004

FIGURE E-9



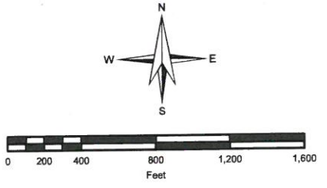
EXISTING DRAINAGE CONDITIONS

PBS&J
2270 Corporate Circle, Suite 100
Henderson, NV 89074
(702) 263-7275
Fax: (702) 263-7200



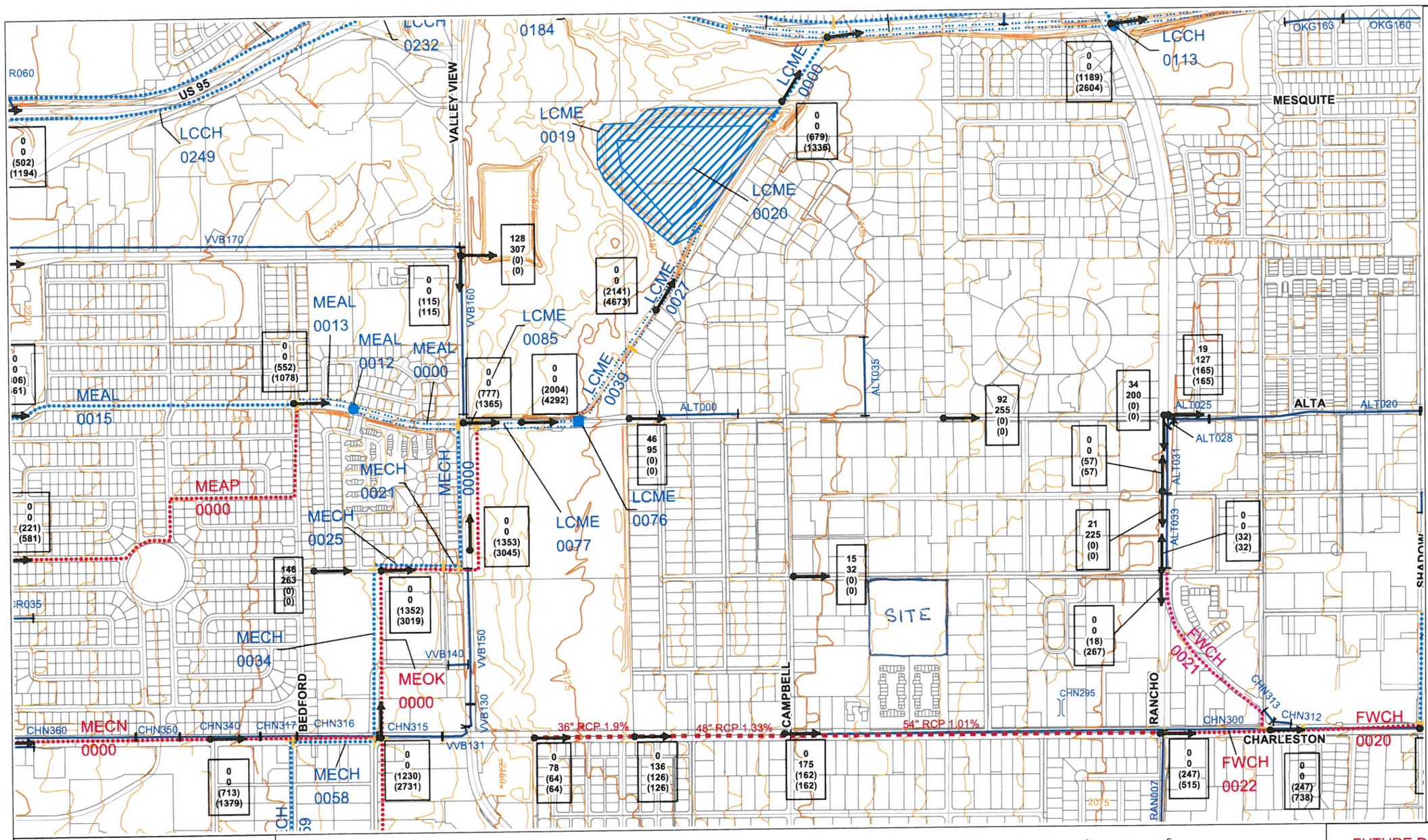
NOTE:
Existing conditions are based on future Curve Number values with only existing local and CCRFCD facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.



SCALE: 1 inch = 800 feet

Figure 7B.



CENTRAL NEIGHBORHOOD FLOOD CONTROL MASTER PLAN

City of Las Vegas

LEGEND

- Existing Regional Facility
- Category A Proposed Regional Facility (2002 MPU)
- Category B Proposed Regional Facility (2002 MPU)
- Category A Proposed Regional Facility (2004 CNFCMP)
- Existing Local Facility
- Proposed Local Facility
- Regional Culvert
- Regional Bridge
- Regional Pipeline
- Regional Channel
- Regional Levee
- Regional Detention Basin
- Local Storm Drain
- Local Culvert
- Proposed Local Storm Drain
- Regional ID-Mile Separator
- Local Facility Separator

FIGURE F-9

N W E S

0 200 400 800 1,200 1,600 Feet

SCALE: 1 inch = 800 feet

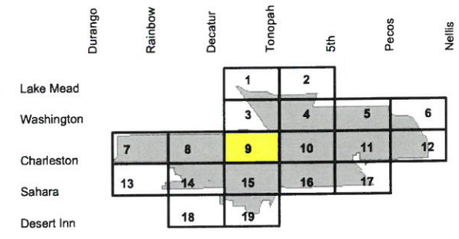
Flow Arrow

250	10-Year Street Flow
500	100-Year Street Flow
(300)	10-Year Facility Flow
(800)	100-Year Facility Flow

(Flows in CFS)

NOTE:
Ultimate drainage conditions are based on future Curve Number values with all flood control facilities in place.

100-Year flows at locations where a 100-Year subbasin concentration point does not exist in the hydrology model were based on an area-weighted ratio of the 100-Year flows from concentration points upstream and downstream of the location. See Volume I for a more detailed explaination.



FUTURE DRAINAGE CONDITIONS

PBS&J
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Henderson, NV 89074
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Fax: (702) 263-7200

7. Topography Data and Survey

The existing topographic information for the project site is based on the following source:

Aerial photography completed by Aerotech Mapping, Inc.; Flight Date: September 18, 2018

The above source utilizes the vertical datum of North American Vertical Datum (NAVD) 88, and English Units.

8. Hydrologic Analysis and Parameterization

The methodology used to develop the existing and ultimate condition hydrologic models, and associated input parameters for the Drainage Study is discussed in detail in the following paragraphs. Supporting documentation for the hydrologic analysis is included in **Appendix A**.

a. Computer Modeling

HEC-1 Version 4.1 (dated June 1998) was used for the hydrologic modeling in order to be consistent with the methodology used for the approved offsite tributary properties. As mentioned previously, all offsite subbasins were directly referenced from their respective approved technical drainage study. The limits of each reference study and print outs of the approved HEC-1 models/subbasin maps are provided in **Appendix C**.

b. Subbasin Delineation

The offsite basins that contribute flow to Palomino Lane downstream of the intersection with Campbell Drive consists of Ranch Acres District residential lots, vacant residential lots, and Professional offices with parking. The offsite basin adjacent to Palomino Lane across from the project site is zoned residential, but developed as a community center and modelled as commercial. For the onsite subbasins, the basin delineation is based on the grading plan for the project site. The existing 1-ft topography and existing conditions were reviewed to ensure that the overall onsite flow patterns are maintained and do not adversely increase the discharge leaving the project site at any of the existing downstream discharge points.

c. Design Storm

The hydrologic analysis was performed for both the 10 and 100-year storm events.

d. Precipitation Depths

All subbasins contributing runoff to the project site are within the McCarran Airport rainfall area as defined in the Design Manual. Therefore, the 10-year and 100-year, 6-hour rainfall depths are 1.58 and 2.77 inches, respectively for all subbasins. The 10-year rainfall depth was input into the HEC-1 model by applying a ratio of 0.57 to the 100-year rainfall depth.

e. Storm Distribution

The rainfall depths discussed in the previous section were distributed over the 6-hour design storm period using the SDN 3 storm distribution. According to established CCRFCD methodology, SDN 3 is used for drainage areas less than eight square miles. All combination points and subbasins have tributary areas less than eight square miles.

f. Depth-Area Reduction Factors

The precipitation depths obtained for the McCarran Airport Rainfall Area from the Design Manual represent rainfall frequency at isolated points. Storms, however, cause rainfall to occur over widespread areas simultaneously, with the most intense rainfall typically occurring near the center of the storm. To account for the rainfall variation, standard precipitation analysis methods require adjusting point precipitation depths downward in order to better represent the average depth of rainfall over the entire storm area. This is done using depth-area reduction curves that relate point precipitation reduction factors to storm area and duration. The reduction factors cause the rainfall depth to decrease as the tributary area increases.

The six-hour depth-area reduction factors (DARFs) from Table 502 in the Design Manual were applied to the rainfall depths in the HEC-1 models at each subbasin and concentration point based on upstream tributary area. Rather than interpolating precise reduction factors at every concentration point, an average DARF value was used for a range of tributary areas. The DARF values applied to the model are shown in **Table 1**:

Table 1. Depth-Area Reduction Factors

Tributary Area (sq mi)	100-year DARF	10-year DARF*
$0 \leq \text{Area} < 0.13$	1.00	0.57
$0.13 \leq \text{Area} < 0.5$	0.98	0.56

*10-year DARF is calculated by multiplying the 100-year DARF by the 10-year precipitation depth ratio of 0.57.

g. Soils

Soils data used for the onsite and adjacent offsite subbasins comes from the Soil Survey of the Las Vegas Valley Area by the National Resource Conservation Service (NRCS), dated July 1985. These soils data were used to be consistent with the 2008 Las Vegas Valley MPU. NRCS methodology divides soils into four hydrological groups, as defined below:

A. High infiltration rate, low runoff potential
B. Moderate infiltration rate, moderately low runoff potential
C. Slow infiltration rate, moderately high runoff potential
D. Very slow infiltration rate, high runoff potential

Each soil map unit number is made up of a certain percentage of hydrologic soil group A, B, C, and D. Curve number calculations for each of the subbasins were based on the individual breakdown of each soil type into the percentages of the minor hydrologic soil group components (A, B, C, or D). For the project site, onsite basins are primarily comprised of Soil Type 390 (99.1% Type C, 0.9% Type D). The upstream subbasins are primarily Soil Type 300 (95.8% Type D, 4.2% Type C).

h. Land Use

The existing condition land use for the entire project site is Civic District (C-V) school. The upstream subbasins are Ranch Acres District (R-A) residential with 0.83 acre lots and Professional Offices and Parking (P-R). The land use data utilized for the Drainage Study hydrologic analysis is shown on **Figures A-1, A-3** and **A-5** included in **Appendix A**. The existing land use is based on the Clark County OpenWeb InfoMapper. The interim condition offsite land uses will remain the same and the onsite will be newly graded, the ultimate condition assumes that all offsite and onsite subbasins are fully developed.

i. Curve Numbers

Rainfall losses due to soil infiltration, depression storage, and other factors are computed using the NRCS curve number (CN) method described in the Design Manual. The curve number method is a function of soil type, land cover, and antecedent moisture condition. Based on the Design Manual, the average antecedent moisture condition (AMC II) is used for computing losses. Curve number information was compiled using GIS polygon processing of subbasin delineations, soil map unit delineations, and land use layers. To calculate a curve number for a given subbasin, the following procedure was used:

1. Base curve numbers are taken from the CCRFCD Design Manual for applicable land cover conditions shown for the applicable Hydrologic Soil Groups.
2. A curve number matrix is compiled to calculate a base curve number for a given combination of soil map unit and land use type.
3. The land use, soils, and subbasin polygons were overlaid in GIS to subdivide each subbasin into polygons (subareas) of unique land use and soil type combinations.
4. The curve number matrix is then used to assign a curve number for each subarea, and an area-weighted composite curve number is calculated for the whole subbasin based on the areas of the subdivided polygons and their associated curve numbers. The curve number and total area of each subbasin are then used in the hydrologic model input files.

The curve number calculations utilized for the Master Drainage Study hydrologic analysis are included in **Appendix A**. **Table 2** summaries the land use categories and associated curve numbers utilized for the hydrologic analysis.

Table 2. Land Use Categories and Associated Curve Numbers

Land Use Category	Soil Map Unit #	Hydrologic Soil Group	CN
Natural Desert Landscaping	390	C	85
Open Spaces (grass – good condition)	390	C	74
Newly Graded Areas	390	C	91
Streets and Roads, Buildings, Parking Lots	390	C	98
Residential, 40,000 sq. ft. lots	300	D	84
Newly Graded Areas	300	D	94
Streets and Roads (no curbs)	300	D	93
Commercial and business	300	D	95

j. Lag Time

All subbasins are less than 0.5 square miles. As a result, the time of concentration equation (velocity method) from the Design Manual was utilized to calculate time of concentrations for each onsite subbasins, as well as the contributing offsite subbasin. This method is explained below.

The lag time is related to the time of concentration by the following empirical relationship:

$T_{lag} = 0.6T_c$

Where:

T_{lag} = Lag Time
T_c = Time of concentration

The time of concentration is calculated as follows:

$T_c = T_i + T_t$

Where:

T_c = Time of concentration
T_i = Initial, inlet, or overland flow time
T_t = Travel time in the ditch, gutter, etc.

Initial flow time is calculated as follows:

$T_i = 1.8(1.1 - K)L_o^{1/2}/S^{1/3}$

Where:

T_i = Initial overland flow time (minutes)
K = 0.0132 * CN - 0.39
CN = Curve number
L_o = Length of overland flow (ft, maximum 500 feet)
S = Average basin slope (percent)

Travel time is calculated as follows:

$T_t = 500/(60\ V_1) + (L_t - 500)/(60\ V_2)$

Where:

T_t = Travel time in the ditch, gutter, etc. (minutes)
L_t = Travel length (feet)
V_1 = Average velocity of flow for the first 500 feet of travel distance (feet/second)
V_2 = Average velocity of flow for the remaining travel distance (feet/second)

V_1 and V_2 are calculated as follows:

$V_1 = C_1 * (S/100)^{1/2}$
$V_2 = C_2 * (S/100)^{1/2}$

Where:

C_1 = 20.2 for developed areas
C_2 = 30.6 for developed areas
S = Average slope for the flow path (percent)

In urbanized areas, the time of concentration calculated above should not exceed the time of concentration calculated by the following equation:

$T_c = (L / 180) + 10$

Where:

T_c = Time of concentration
L = Watershed length (feet)

Minimum T_c for any watershed and should not be less than 5 minutes for developed basins or 10 minutes for undeveloped basins. Standard Form 4 from the Design Manual was used to compute lag times for the Drainage Study and is included in **Appendix A**. Note that all T_c values for the offsite subbasins are referenced from the applicable approved drainage study.

k. Routing

No routing was utilized for the onsite subbasins. No revisions were made to the approved offsite routes.

l. Concentration Points

Subbasins were combined using concentration points. These concentration points were inserted into the HEC-1 model to obtain peak flow rates. Several concentration points were located at the intersections of the proposed storm drain alignment and at the outlet to the street in order obtain peak flows.

9. Existing Condition Drainage Patterns and Hydrologic Analysis

As established in the City of Las Vegas Central Neighborhood Master Drainage Study, there are no existing storm drain facilities immediately downstream that collect runoff from the area. In the existing condition, the tributary watershed includes offsite subbasins RA, XCP, and PAL-1 (Refer to **Figure 8: Existing Condition Subbasin Map**). Subbasins SA and PAL-2 are adjacent to the site and contribute to the downstream concentration point.

In the existing condition, the offsite tributary watersheds are mostly developed except for 4 residential lots southwest of the site (XCP). The project site is flanked by existing street improvements and existing development with CMU walls along the boundary. The downstream limit of the proposed project is the existing Palomino Lane.

The CN and time of concentration calculations for all onsite subbasins are provided in **Appendix A**. Print-outs from the applicable reference studies are provided in **Appendix C**. The existing condition HEC-1 model covers the project site and subbasins immediately upstream. The results of the existing condition HEC-1 model is provided in **Appendix A**. **Table 3** summaries the results of the HEC-1 model for all subbasins and combination points.

Table 3. Existing Condition Flow Summary

HEC-1 Node	Tributary Area (acres)	Tributary Area (mi^2)	10-year Discharge (cfs)	100-year Discharge (cfs)
RA	4.36	0.0068	3	8
XCP*	*	*	15*	30*
CH20**	**	**	15**	32**
PAL-1	0.87	0.0014	1	3
EX-ON1	1.62	0.0025	2	4
CP-1	-	-	36[1]	76[1]
EX-ON2	4.15	0.0065	2	6
EX-ON3	3.32	0.0052	4	8
SA	2.72	0.0043	4	7
PAL-2	0.91	0.0014	2	3
CP-2	-	-	46[1]	99[1]

*Referenced from the Technical Drainage Study 750 & 800 Wexler Court - Update to Hastings & Campbell, by Byron Anderson, PE

**Referenced from the City of Las Vegas Central Neighborhood Flood Control Master Plan.

[1]Includes referenced offsite flow from XCP and CH20.

Figure 8. Existing Condition Subbasin Map

10. Interim Condition Drainage Patterns and Hydrologic Analysis

Refer to **Figure 9: Interim Condition Subbasin Map**. The proposed interim grading has been designed to ensure that the existing drainage patterns are maintained in the interim condition and none of the existing downstream facilities are adversely affected by the proposed improvements. As established in the existing condition hydrologic analysis, there is one downstream discharge point for the site.
The interim condition HEC-1 model and all associated hydrologic parameter calculations for the Improvements is provided in **Appendix A**. The proposed Improvement Plans are provided in **Appendix B**. Applicable reference material is provided in **Appendix C**. Interim condition hydrologic analysis results are summarized in **Table 4** and shown on **Figure 9: Interim Condition Subbasin Map**.

The offsite drainage patterns are maintained in the existing condition throughout this area. The onsite basins will be newly graded and all onsite improvements and vegetation will be removed.

c. Interim Condition Hydrologic Results Summary

The HEC-1 results from the Drainage Study ultimate condition model are summarized in **Table 4** below and provided in **Appendix A**.

Table 4. Interim Condition Flow Summary

HEC-1 Node	Tributary Area (acres)	Tributary Area (mi^2)	10-year Discharge (cfs)	100-year Discharge (cfs)
RA	4.36	0.0068	3	8
XCP*	*	*	15*	30*
CH20**	**	**	15**	32**
PAL-1	0.87	0.0014	1	3
INT-ON1	3.03	0.0047	3	7
CP-1	-	-	37+	80+
INT-ON2	6.06	0.0095	7	14
SA	2.72	0.0043	4	8
PAL-2	0.91	0.0014	2	3
CP-2	-	-	49+	104+

*Referenced from the Technical Drainage Study 750 & 800 Wexler Court - Update to Hastings & Campbell, by Byron Anderson, PE

**Referenced from the City of Las Vegas Central Neighborhood Flood Control Master Plan.

+Includes referenced flow

Figure 9. Interim Condition Subbasin Map

11. Ultimate Condition Drainage Patterns and Hydrologic Analysis

Ultimate Condition Subbasins DCP, and CH20 were directly referenced from their respective approved Drainage Studies. The ultimate condition HEC-1 model and associated hydrologic parameters are provided in **Appendix A**. **Table 5** below summarizes the hydrologic results of the ultimate condition HEC-1 model:

The difference between the existing and ultimate condition is the re-development of the onsite subbasins (ultimate condition) and the construction of the proposed upstream residential lots near the southwest corner of the site. The overall existing drainage patterns and downstream discharge points were maintained in the ultimate condition for the Drainage Study. The onsite subbasins and associated peak discharges for the ultimate condition are shown on **Figure 10: Ultimate Condition Subbasin and Map.**

a. Upstream Residential Subbasins

The subbasin along Palomino is same as in the existing condition; the properties drain to the existing Palomino Lane without curb and gutter. The lots on Wexler Court are assumed to be developed; the properties drain to the existing Palomino Lane via the existing concrete valley gutter. The overall existing drainage patterns are maintained in the ultimate condition throughout this area.

b. Palomino Lane

Predominantly the same as in the existing condition, with the exception of the relocation of onsite driveways and bus pull out area. The overall existing drainage patterns are maintained in the ultimate condition through this area.

d. Upstream Commercial Subbasin

The same as in the existing and interim condition; the property drains to the existing Palomino Lane via a concrete valley gutter in the drainage easement adjacent to the west property line of the subject site. The overall existing drainage patterns are maintained in the existing condition throughout this area.

e. Onsite Subbasins

The onsite basins have been delineated based on the proposed grading plan, with drainage to Palomino Lane via the proposed driveways. Onsite storm drain system will split roof drain flows and courtyard drop inlet flows east to the landscape area adjacent to the east drive aisle where it will be allowed to discharge before draining into the street and north to a manifold outlet through the cub into the gutter of Palomino Lane just downstream of the bus pull-out area.

f. Ultimate Condition Hydrologic Results Summary

The HEC-1 results from the Drainage Study ultimate condition model are summarized in **Table 5** below and provided in **Appendix A**.

Table 5. Ultimate Condition Flow Summary

HEC-1 Node	Tributary Area (acres)	Tributary Area (mi^2)	10-year Discharge (cfs)	100-year Discharge (cfs)
RA	4.36	0.0068	3	8
DCP*	*	*	14	29
CH20**	**	**	15	32
PAL-1	0.87	0.0014	1	3
U-ON1	2.71	0.0042	5	9
CP-1	-	-	38[+]	80[+]
U-ON2	4.79	0.0075	4	11
U-ON3	2.12	0.0033	4	7
SA	2.72	0.0043	4	8
PAL-2	0.91	0.0014	2	3
CP-2	-	-	52[+]	109[+]

*Referenced from the Technical Drainage Study 750 & 800 Wexler Court - Update to Hastings & Campbell, by Byron Anderson, PE

**Referenced from the City of Las Vegas Central Neighborhood Flood Control Master Plan.

[+]Includes referenced flow

Figure 10. Ultimate Condition Subbasin Map

12. Ultimate Condition Storm Water Facility Plan

The following subsection includes information about the hydraulic analysis performed as part of the Drainage Study to establish an overall storm water facility plan for the anticipated ultimate condition for the project site (Refer to **Figure 11: Proposed Onsite Storm Water Facility Plan**). Note that the facilities sizes and layout shown on **Figure 11** are for planning purposes and may be adjusted in the final construction plans.

a. Design Considerations

The following are the design considerations that were utilized to develop a storm water facility master plan for the proposed project site.

Normal depth was used to size the onsite storm drain inlets and outlets for the estimated ultimate condition 100-year discharge. Print-outs of the normal depth calculations are provided in **Appendix A**.

b. Courtyard

The proposed drainage facility in the central courtyard of the school incorporates several laterals draining out under the paved play area at the northeast corner and daylighting in the landscaping adjacent to the drive aisle on the east side of the site.

13. Hydraulic Analysis

a. *Street Flow Calculations*

The computer program Bentley FlowMaster V8i was utilized to perform normal depth calculations for the adjacent street, proposed onsite drive aisles, drop inlets, and swales. These normal depth calculations were utilized to ensure that the proposed storm drain facilities are adequately designed and that flow depth and velocity in the street are not increased.

i. Existing Condition

For the existing condition, a total of three cross-sections were analyzed. **Figure 8: Existing Condition Subbasin Map** shows the location of each of the normal depth cross-sections. The cross-section locations were utilized to ensure that flow depth and velocity in the street are not increased.

ii. Interim Condition

For the interim condition, a total of five cross-sections were analyzed. **Figure 9: Interim Condition Subbasin Map** shows the location of each of the normal depth cross-sections. The street cross-section locations are identical to those utilized for the existing condition analysis. The cross-section locations were utilized to ensure that flow depth and velocity in the street are not increased. Additional sections for interim swales were analyzed to ensure non-erosive velocities.

iii. Ultimate Condition

For the ultimate condition, a total of seven cross-sections and seven drop inlets were analyzed. The street cross-section locations are identical to those utilized for the existing and interim condition analysis. **Figure 10: Ultimate Condition Subbasin Map** shows the location of each of the normal depth cross-sections, as well as the proposed drop inlet and roof drain locations for the storm drain analysis. There is a landscaped swale around the south and east sides of the site that accept a portion of the storm drain flow as well as flow from the parking lot and drive aisles. Based on the HCDDM, the site is classified as a Large development with more than 1 acre of parking lot. More than 75% of the parking lot will drain to the adjacent landscaped swale. The landscaped swale acts as a BMP to treat the runoff before it is discharged offsite. The slope of the swale is less than 0.5% to maximize settlement of sediment. The length of the swale after the curb openings to accept the parking lot run off is more than 200-feet.

All normal depth calculations are provided in **Appendix A-7**.

b. *Storm Drain System Modeling*

The proposed storm drain system was modeled using Water Surface Pressure Gradient (WSPG) 2010. Flow from roof drains and on-grade drop inlets is collected at depicted locations within the courtyard and routed out to Palomino Lane to the north and the landscaped swale on the east side of the east drive aisle.

All storm drain hydraulic calculations are provided in **Appendix A-8.**

Figure 11. Proposed Onsite Storm Water Facility Plan