

APPENDIX 'B'



TECHNICAL DRAINAGE STUDY UPDATE

VEGAS DRIVE IMPROVEMENTS SHADOW MOUNTAIN PLACE TO RANCHO DRIVE

PDG PROJECT No. 05333-C

PREPARED FOR:

**CITY OF LAS VEGAS
DEPARTMENT OF PUBLIC WORKS**

September 22, 2008

PREPARED BY:

**POGEMEYER DESIGN GROUP, INC.
ENGINEERS – PLANNERS – SURVEYORS – LANDSCAPE ARCHITECTS
6960 SMOKE RANCH ROAD, SUITE 110
LAS VEGAS, NEVADA 89128
(702) 255-8100 (702) 255-8375 FAX
ContactUs@poggemeyer.com**

TABLE OF CONTENTS

Standard Form 1 – Drainage Study Information Form

**City of Las Vegas – Flood Control Section
Review Comments/Responses**

**Clark County Regional Flood Control District
Review Comments/Responses**

**City of Las Vegas – Collection System Planning
Review Comments/Responses**

**City of Las Vegas – Survey
Review Comments/Responses**

Figure 3.3 – Proposed Peak Flow Summary

LIST OF APPENDICES

APPENDIX A through C – Not a part of this Study

APPENDIX D – Hydrology

See “70% Technical Drainage Study” Dated May 30, 2008

APPENDIX E – Hydraulics

- E-1.1 Street Capacity Summary (10-Year Event)
- E-1.2 Street Capacity Summary (100-Year Event)
- E-1.3 Existing Condition Street Capacity Summary (10-Year Event)
- E-1.4 Existing Condition Street Capacity Summary (100-Year Event)
- E-2.1 Drop Inlet Calculations, Interim Condition Flow Rates (10-YR & 100-YR Events)
- E-2.2 Drop Inlet Calculations, Ultimate Condition Flow Rates (10-YR & 100-YR Events)
- E-3.1 Storm Drain Lateral HGL Calculations
- E-4.1 WSPGW Model, VD455.wsw, 455 cfs (Design Condition)
- E-4.2 WSPGW Model, VD101.wsw 10-YR Flows (Interim Condition)
- E-4.3 WSPGW Model, VD100I.wsw 100-YR Flows (Interim Condition)
- E-4.4 WSPGW Model, VD100U.wsw 100-YR Flows (Ultimate Condition)
- E-4.5 WSPGW Model, SD3.wsw 100-YR Flows (Interim Condition)
- E-4.6 WSPGW Model, SD3.wsw 100-YR Flows (Ultimate Condition)

APPENDIX F – 90% Storm Drain Plan and Profile

“See Separate Vegas Drive Improvements 90% Plan Set”

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Vegas Drive Improvements - ShadowDate: September 22, 2008Location of Development: Mountain Place to Rancho Drivea) Descriptive (Cross Streets) North/South Vegas DriveEast/West Shadow Mtn Plc /24, 25,Rancho Drb) Sect. 19, 20, 29, 30 Twn. 20SRng. 60E & 61EName of Owner: City of Las VegasAssessors Parcel No: Portions of 139-301-01-001 & 002Telephone No: (702) 292-2143

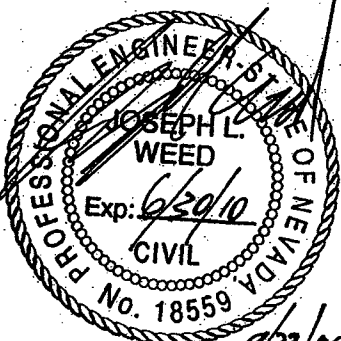
Facsimile No: _____

Address: 731 S. 4th StreetLas Vegas, NV 89101Contact Person-Name: Joseph L. Weed, P.E.Telephone No: (702) 255-8100Firm: Poggemeyer Design GroupAddress: 6960 Smoke Ranch Road, Suite 110, Las Vegas, NV 89128

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	Storm Drain & Road Improvements	

1. Total Owned Land Area: At Site: 12.3 +/- Acres Being Developed/Disturbed: 12.3 +/- Acres
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.)? Public Storm Drain & Roadway Improvements
5. Approximate upstream land area which drains to the subject site? 1.6 +/- sq-mi
6. Has the site drainage been evaluated in the past? YES ☒ NO ☐ If yes, please identify documentation:
Regional Drainage Facility Alternatives Study - Vegas Drive by Poggemeyer Design Group, 5/07; 2002 Master Plan Update by PBS&J;
Vegas Dr/Owens Ave Roadway Improvements by Kimley-Horn, 6/01
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
Connects to an existing 84" RCP just west of the Vegas & Rancho Intersection
8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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.

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

Local Entity File No. _____

Revision

Date

REFERENCE:

STANDARD FORM 1

City of Las Vegas Flood Control Section

Review Comments/Responses

September 22, 2008



**POGGEMEYER
DESIGN GROUP**

Mr. Peter Jackson, C.F.M.
Flood Control Section
City of Las Vegas
Department of Public Works
731 S. 4th Street
Las Vegas, NV 89101

Re: Vegas Drive Improvements – Shadow Mountain Place to Rancho Drive – 70% Design
Submittal – (DS4211, Hansen #11554)
Response to Comments Dated July 14, 2008
PDG #05333-D

Dear Mr. Jackson:

Below are the comments submitted by you regarding the above mentioned 70% Design Submittal and design plans. These are followed by our responses.

- 1) The 2008 MPU has identified future facilities to relieve the capacity problems downstream in the Vegas/Owens system. This proposed future MPU facility will convey about 650 cfs north in the Decatur alignment and then east into the Carey/Lake Mead Detention Basin.
Response #1: Understood.
- 2) The inlet capacities appear reasonable for compliance with the CCRFCD drainage criteria based upon provided calculations. Provide updated calculations based upon 90% design submittal.
Response #2: Drop inlet calculations have been updated and included with this submittal.
- 3) Provide easement recommendations for those facilities at the edge of existing public right-of-way that may impact the adjacent private property. The construction of the SID improvements including sidewalk should require Authorization to Enter Property (AEP's) to construct the proposed roadway improvements. The AEP's must be acquired prior to requesting construction funding from CCRFCD.
Response #3: Proposed AEP's have been identified in the plans set.
- 4) The storm drain plans must identify the existing pan driveway locations. Revise the storm drain lateral and inlets at Laurelhurst Drive & Vegas Drive and on Vegas Drive near Station 34+01 to accommodate the existing driveways. Review and revise the inlet locations and lateral accordingly.
Response #4: Driveway locations have been identified on plans and drop inlets have been adjusted as need to avoid driveways.
- 5) Provide detailed grading for the area around the Shadow Mountain Place storm drain inlet structures. Include the roadway, driveway, walls and access information for the existing homes along the east side of the street adjacent to the proposed storm drain inlet structures. Connect the existing area drain inlet the proposed inlet system at the low point in Shadow Mountain Place.
Response #5: Additional information has been provided as requested along Shadow Mountain Place. The proposed storm drain lateral has been adjusted to connect the existing area drain in Shadow Mountain Place.
- 6) Coordinate the location of the inlet on the west side of Decatur Boulevard south of Vegas Drive with the Decatur-Vegas Project, currently under design. The existing pan driveway located where the inlet is proposed, will be eliminated with future development. Coordinate with Traffic Engineering to see if the driveway can be removed with this project.
Response #6: Coordination is ongoing.

- 7) Review the storm drain lateral profiles to reduce the inlet depths where practical.
Response #7: Inlet depths have been reduced where practical.
- 8) Provide a typical trench detail for the areas of shallow cover. The detail on Sheet CD-1 shows a minimum of 3-feet of cover above the top of pipe while the storm drain profiles show less than 3-feet of cover in numerous locations.
Response #8: Typical trench detail for shallow cover has been added to the plans.
- 9) Connect the existing 18-inch RCP storm drain into the proposed inlet near Station 5+88 in lieu of replacing the 18-inch storm drain.
Response #9: Revised on plans.
- 10) Identify the needed traffic signal modifications due to the proposed storm drain facility construction at the Michael Way & Decatur Boulevard intersections with Vegas Drive.
Response #10: Traffic signal facilities at Michael Way are located outside of conflicts with the storm drain and are intended to be protect-in-place. Traffic signal modifications at Decatur Blvd have been included in the plans.
- 11) Provide a copy of the Section 8 Environmental Screening approval by the CCRFCD. The Section 8 analysis must be approved prior to requesting construction funding.
Response #11: The CCRFCD has accepted the Facility-Specific Environmental Analysis (Section 8) on March 25, 2008.
- 12) Provide plan and profiles for any identified relocations necessary for sewer and /or water lines with the 90% submittal. Include water line profiles for the relocated main lines shown on Sheets UT-1 & UT-2.
Response #12: Water line and sewer profiles have been included in the 90% plan set.
- 13) The plans need to address the removal and/or abandonment of the existing storm drain facilities. The plans are not clear on the limits of the pipe removal and/or those portions to be abandoned.
Response #13: Removal and abandonment of existing storm drain facilities has been clarified in the 90% plan set.
- 14) The proposed improvement plans show drainage facilities of a size that must be reviewed for Maintenance and Access concerns. Streets & Sanitation review and approval must be secured prior to final approval.
Response #14: Understood.
- 15) Portions of the proposed improvements are within Clark County jurisdiction. Coordinate necessary approvals and permits with the County.
Response #15: Understood. 90% plans are being submitted to Clark County.
- 16) Provide an updated cost estimate that includes the funding source breakdowns with the 90% submittal.
Response #16: Cost estimate will be provided following the 90% submittal as a separate item.
- 17) The concrete fill used in the transition structures shown on the structural details needs to be covered in the specifications. Provide a reference note to the specs.
Response #17: Concrete fill used in the transition structures is considered incidental to the construction cost of the structure as mentioned in Section 502 in the Special Provisions.



Mr. Peter Jackson, CFM
City of Las Vegas
Department of Public Works
September 22, 2008
Page 3 of 3

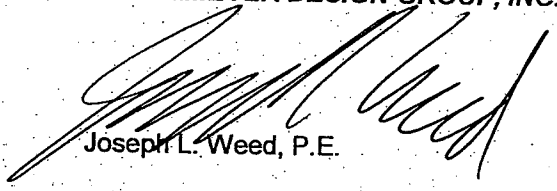


- 18) Review and revise the manhole locations based upon the attached marked up plans.
Response #18: Manhole locations have been revised as requested.
- 19) Add a note on the Storm Drain Plans to see the Horizontal Control Plans for the City and County limits.
Response #19: City and County boundary has been added to Storm Drain plans.
- 20) Additional minor comments are shown on the attached 30% storm drain plans.
Response #20: Additional comments addressed on plans.

We hope that all of your comments and concerns have been adequately addressed. If you have any question, please do not hesitate to call me at 255-8100.

Very truly yours,

POGGEMEYER DESIGN GROUP, INC.


Joseph L. Weed, P.E.



Memorandum

City of Las Vegas
Department of Public Works
Engineering Planning

To: Joe Christensen, P.E.
Engineering Project Manager

From: Peter Jackson, CFM
Flood Control Section 

Date: July 14, 2008

Re: Vegas Drive Improvements – Shadow Mountain Place to Rancho Drive – 70%
Design Submittal (DS4211, Hansen #11554)

Flood Control has reviewed the 70% Design Submittal for the Vegas Drive Improvements (Shadow Mountain Place to Rancho Drive) and is offering the following comments:

The City of Las Vegas in conjunction with the Clark County Regional Flood Control District (CCRFCDD) have agreed that the storm drain system proposed within Vegas Drive – Shadow Mountain Place to Rancho Drive be designed to maximize the existing system capacity (455 cfs) at Vegas & Rancho.

1. The 2008 MPU has identified future facilities to relieve the capacity problems downstream in the Vegas/Owens system. This proposed future MPU facility will convey about 650 cfs north in the Decatur alignment and then east into the Carey/Lake Mead Detention Basin.
2. The inlet capacities appear reasonable for compliance with the CCRFCDD drainage criteria based upon provided calculations. Provide updated calculations based upon 90% design submittal.
3. Provide easement recommendations for those facilities at the edge of existing public right-of-way that may impact the adjacent private property. The construction of the SID improvements including sidewalk should require Authorization to Enter Property (AEP's) to construct the proposed roadway improvements. The AEP's must be acquired prior to requesting construction funding from CCRFCDD.
4. The storm drain plans must identify the existing pan driveway locations. Revise the storm drain lateral and inlets at Laurelhurst Drive & Vegas Drive and on Vegas Drive near Station 34+01 to accommodate the existing driveways. Review and revise the inlet locations and laterals accordingly.
5. Provide detailed grading for the area around the Shadow Mountain Place storm drain inlet structures. Include the roadway, driveway, walls and access information for the existing homes along the east side of the street adjacent to the proposed storm drain inlet structures. Connect the existing area drain inlet into the proposed inlet system at the low point in Shadow Mountain Place.

Clark County Regional Flood Control District

Review Comments/Responses

September 22, 2008



**POGEMEYER
DESIGN GROUP**

Mr. Todd L. Myers, P.E.
Engineering Project Manager
Clark County Regional Flood Control District
600 Grand Central Parkway, Suite 300
Las Vegas, NV 89106

Re: Vegas Drive Improvements – Shadow Mountain Place to Rancho Drive
70% Design Submittal – (LAS19C05)
PDG #05333-D

Dear Mr. Myers:

Below are the comments submitted by you regarding the above mentioned 70% Design Submittal and design plans. These are followed by our responses.

- 1) Several segments of this project are proposed within Clark County (CC) right-of-way. Encroachment permit submittals and traffic control plans will be reviewed and approved through Clark County Development Services (CCDS). Submit copies of 90% submittal package to CCDS and Clark County Public Works (CCPW) for review. Begin coordination with CCDS as soon as practical to avoid costly delays.
Response #1: Understood. Coordination with Clark County is ongoing.
- 2) Provide complete copy of project special provisions with next submittal.
Response #2: Special provisions are being provided with this submittal.
- 3) District accepted Facility-Specific Environmental Analysis (Section 8) for subject project on March 25, 2008. It was determined that proposed project is a storm drain under an existing roadway through a developed and highly disturbed urban area; it does not impact any "waters of the United States" with a defined bed and bank and therefore does not require a 404 Permit. The District's Policies and Procedures regarding environmental permitting as a pre-requisite for construction funding eligibility have been satisfied.
Response #3: Understood.
- 4) Provide construction cost estimate that includes a cost share breakdown of all funding sources. The cost comparison of a conceptual 10-year storm drain facility and an interim 100-year storm drain facility is not necessary. It has been determined that this will not be a full Regional Transportation Commission of Southern Nevada (RTC) street rehabilitation project. Therefore, District will fund 100% of proposed storm drain facilities.
Response #4: Understood. Cost estimate will be provided following the 90% submittal as a separate item.
- 5) Identify all Authorizations to Enter Property (AEP) necessary to construct facility and street improvements. Provide status of all right-of-way and AEP acquisitions. All rights of entry must be obtained prior to City's request for construction funding.
Response #5: Proposed ROW takes and AEP's are identified in the plans. All acquisitions of ROW and AEP's are being coordinated through the CLV.

Hydrology

- 6) District takes no exception to hydrologic analyses presented in TDS.
Response #6: Understood.





Hydraulics

- 7) District takes no exception to "Ultimate Condition" WSPGW analysis and drop inlet capacity calculations presented in TDS. If significant revisions are made to storm drain and/or drop inlet design for 90% submittal, provide revised calculations.

Response #7: Due to minor adjustments in the storm drain design, Appendix E "Hydraulics" has been revised and resubmitted with this 90% submittal. Minor storm drain design adjustments include the profile of the storm drain trunk line, storm drain lateral connection locations and profiles, and two additional 20-ft drop inlets west of Michael Wy (additional DI's located on North side and South side along Vegas Drive). *Figure 3.3 – Proposed Peak Flow Summary* has been updated and included with this 90% submittal. The calculations provided in this Technical Drainage Study Update are intended to supercede those provided in Appendix E of the previous 70% *Technical Drainage Study, Vegas Drive Improvements – Shadow Mountain Place to Ranch Drive*, Dated May 30, 2008.

Improvement Plans

- 8) Sheet G-1: Revise cover to list Jorge Cervantes, P.E., PTOE as Director of Public Works. Coordinate with City for acting City Engineer.

Response #8: Revised on plans.

- 9) Sheet G-3: Coordinate with CCPW and CCDS to determine if Clark County General Notes are required for proposed construction within Clark County right-of-way. Revise accordingly.

Response #9: 90% Plans are being submitted to Clark County and coordination with CCPW and CCDS is ongoing.

- 10) Sheet G-4: Revise line types shown in "Legend" to match improvement plans.

Response #10: Revised on plans.

- 11) Sheet SD-1: Check all drop inlet (DI) locations to insure they are not at existing driveway locations. Typical all sheets. Provide and revise Construction Note No.34 to reference detail. Provide instructions to contractor regarding existing 4-inch gas line within 72-inch RCP alignment. Provide ultimate conditions hydraulic grade line (HGL) on profile. Provide instructions to contractor regarding existing 18-inch storm drain crossing facility near Station 9+40.00 and provide clear limits to storm drain removals. Complete detail reference in Construction Note No. 35. Revise plans accordingly.

Response #11: Drop inlet locations have been revised as needed. Construction Notes No. 34 & 35 have been revised. Instructions for existing utilities have been provided.

The ultimate condition HGL has been provided for the Vegas Drive trunk line storm drain East of Decatur Blvd. A future storm drain facility (not a part of this study) is assumed to convey the amount of flow exceeding the Design flowrate of 455cfs that originates west of Decatur Blvd, North along Decatur Blvd and into the Lake Mead Detention Basin.

- 12) Sheet SD-2: Consider using precast manhole (MH) tees at non junction MH locations on tangent line and grade. Identify double dashed lines located south of proposed RCP and include on "Legend" on Sheet G-4. What does "ec" represent (electrical conduit)? Include in "Abbreviations" on Sheet G-4. Show "ec" crossings on profile view if these are underground lines. Provide instructions to contractor regarding existing 18-inch SD east of proposed DI#5. Provide extents of SD removals at Laurelhurst Drive intersection and instructions for 18-inch SD abandonment (slurry fill?). Provide additional MH near Station 44+20.00.

Response #12: Precast manhole tees provided were applicable. Lines have been identified in the plans and labeled in the plans Legend. "ec" has been revised to "ue" for





existing underground electrical conduit. Instructions for existing utilities have been provided.

- 13) Sheet SD-4: Label size and material of existing waterline west of Station 46+90. Adjust DI locations out of existing driveways at Decatur Boulevard intersection. Provide instructions to contractor and extents of waterline removal within RCBC alignment near Station 47+00.00. Provide 'Caution' note for high pressure gas line south of proposed facility and overhead power lines. Provide instructions to contractor regarding all existing utilities crossing above RCBC. Typical all plan and profile sheets.

Response #13: Existing utilities material and sizes have been identified on plans as necessary. DI have been adjusted out of existing driveways. Instructions for existing utilities have been clarified on plans. "Caution" note for high pressure gas lines have been included on plans.

- 14) Sheet SD-5 through SD-8: Where feasible, revise lateral invert elevations to connect below mainline HGL to reduce losses through junctions.

Response #14: Laterals have been revised where practical and hydraulically evaluated.

- 15) Sheet SD-10: Extend SD to west to connect to existing area drain near Station 8+70.00. According to CCPW, the area drain is currently blocked off and has no outlet. Show existing walls and driveways. Consider using precast MH tees at non junction MH locations on tangent line and grade. Revise plans accordingly.

Response #15: Proposed SD has been extended to connect into the existing area drain. Precast MH tees are proposed where practical.

- 16) Sheet SD-11: Provide instructions to contractor regarding existing SD removal at Shadow Mountain Place intersection. Is it intended to tie existing SD in to SDMH#40? It doesn't appear to line up properly. The existing 6-inch ACP waterline crossing facility near Station 19+65.00 will likely require relocation. Generally, ACP waterlines cannot be supported during construction activities. Confirm with Las Vegas Valley Water District. Construction Note No. 31 refers to Detail 1/CD-6. This requires a special DI/Transition design as shown on Sheet S-6. Provide all necessary structural details to construct this facility. Revise accordingly.

Response #16: Proposed relocations for ACP waterline mains in conflict or crossing above 24" RCP SD and larger SD pipes have been revised per LVVWD instructions. Laterals have been revised where practical and hydraulically evaluated. Instructions to contractor for existing utilities have been added to plans.

- 17) Sheet SD-12: The existing 8-inch ACP waterline crossing Lateral 2 will likely require relocation (See Comment No.16). If this is the case indicate on plans and revise 30-inch x 19-inch HERCP to 24-inch RCP.

Response #17: Proposed relocations for ACP waterline mains in conflict or crossing above 24" RCP SD and larger SD pipes have been revised per LVVWD instructions. Proposed elliptical pipe has been replaced with equivalent round pipe as practical.

- 18) Sheet SD-13: Provide instructions to contractor regarding existing 4-inch gas line and existing 8-inch waterline crossing Lateral 7. Also, label material type for existing 8-inch waterline. See Comment No.16 regarding ACP waterlines.

Response #18: Proposed relocations for ACP waterline mains in conflict or crossing above 24" RCP SD and larger SD pipes have been revised per LVVWD instructions. Laterals have been revised where practical and hydraulically evaluated. Instructions to contractor for existing utilities have been added to plans.





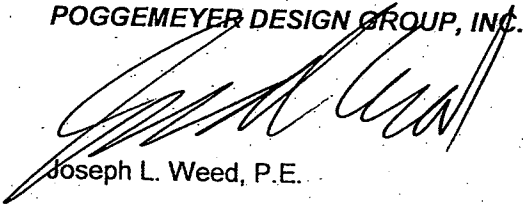
POGGEMEYER
DESIGN GROUP

- 19) Sheet SD-14: Provide instructions to contractor regarding all existing utilities crossing proposed laterals. See Comment No.14 regarding lateral connections to junction structures.
Response #19: Proposed relocations for ACP waterline mains in conflict or crossing above 24" RCP SD and larger SD pipes have been revised per LVVWD instructions. Laterals have been revised where practical and hydraulically evaluated. Instructions to contractor for existing utilities have been added to plans.
- 20) Sheet SD-15: See Comment No.16 and Comment No.14 regarding ACP waterlines and lateral invert elevations, respectively. Revise laterals and provide instructions to contractor accordingly.
Response #20: Proposed relocations for ACP waterline mains in conflict or crossing above 24" RCP SD and larger SD pipes have been revised per LVVWD instructions. Laterals have been revised where practical and hydraulically evaluated. Instructions to contractor for existing utilities have been added to plans.
- 21) Sheet UT-2: Provide instructions for removal of existing 12-inch waterline at Decatur Boulevard intersection.
Response #21: Instructions to contractor for existing utilities have been clarified on plans.
- 22) Sheet CD-1: Revise Excavation Note No.1 to provide recommendations from the Geotechnical Report, and remove reference to Geotechnical Report. Geotechnical Report is not a part of contract. Determine if 'Select' or 'Granular' fill is acceptable for backfill within pipe zone and revise notes accordingly.
Response #22: Excavation Note No. 1 has been revised and reference to the Geotechnical Report has been remove. Per the Geotechnical Report, Type II is recommended and specified for backfill within the pipe zone.
- 23) Sheet S-6: Provide embedment depths and dowel requirements on "Drop Inlet to RCB Detail"(Detail 3/S-6). Is RCBC to be cast-in-place at these locations? If so, provide construction details for RCBC. Include connection details for cast-in-place to pre-cast RCBC sections. If the intent is to use pre-cast RCBC sections at these locations, address how they will be constructed. Verify with pre-cast manufacturers that it is feasible. Provide structural details for Transition Structure shown on Details 2/S-6 and A/S-6. The section call-out on the "Foundation Plan" and "Top Plan" refer to section B/S-6. This is not correct. Provide and refer to appropriate sections.
Response #23: Proposed RCBC is intended to be precast. Structural Details have been revised on plans.

We hope that all of your comments and concerns have been adequately addressed. If you have any question, please do not hesitate to call me at 255-8100.

Very truly yours,

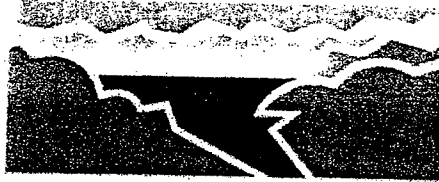
POGGEMEYER DESIGN GROUP, INC.



Joseph L. Weed, P.E.



REGIONAL FLOOD CONTROL DISTRICT



August 8, 2008

Mr. Joe Christensen, P.E.
City of Las Vegas Department of Public Works
Engineering Design
400 Stewart Avenue
Las Vegas, NV 89101

**RE: Vegas Drive Improvements (Owens Avenue System) – Shadow Mountain
Place to Rancho Drive – LAS19C05**

Dear Mr. Christensen:

Clark County Regional Flood Control District (District) reviewed 70% Technical Drainage Study (TDS) and improvement plans for *Vegas Drive Improvements – Shadow Mountain Place to Rancho Drive*, dated May 30, 2008 prepared for the City of Las Vegas (City) by Poggemeyer Design Group Inc. Improvements include approximately 1.7 miles of underground storm water conveyance system and appurtenant facilities. This structure is labeled LVOW 0241 in District's 2002 Master Plan Update (MPU). The following comments are offered for your consideration as the project proceeds:

General

1. Several segments of this project are proposed within Clark County (CC) right-of-way. Encroachment permit submittals and traffic control plans will be reviewed and approved through Clark County Development Services (CCDS). Submit copies of 90% submittal package to CCDS and Clark County Public Works (CCPW) for review. Begin coordination with CCDS as soon as practical to avoid costly delays.
2. Provide complete copy of project special provisions with next submittal.
3. District accepted Facility-Specific Environmental Analysis (Section 8) for subject project on March 25, 2008. It was determined that proposed project is a storm drain under an existing roadway through a developed and highly disturbed urban area; it does not impact any "waters of the United States" with a defined bed and bank and therefore does not require a 404 Permit. The District's Policies and Procedures regarding environmental permitting as a pre-requisite for construction funding eligibility have been satisfied.

Gale Wm. Fraser, II, P.E.
General Manager/Chief
Engineer

BOARD OF DIRECTORS

Larry Brown
Chairman
City of Las Vegas

Chip Maxfield
Vice-Chairman
Clark County

David Bennett
City of Mesquite

Robert L. Eliason
City of North Las Vegas

Mayor Oscar Goodman
City of Las Vegas

Andy Hafen
City of Henderson

Mayor Roger Tobler
City of Boulder City

Bruce L. Woodbury
Clark County



Mr. Joe Christensen, P.E.

August 8, 2008

Page 3

regarding existing 18-inch storm drain crossing facility near Station 9+40.00 and provide clear limits of storm drain removals. Complete detail reference in Construction Note No. 35. Revise plans accordingly.

12. Sheet SD-2: Consider using precast manhole (MH) tees at non junction MH locations on tangent line and grade. Identify double dashed lines located south of proposed RCP and include on "Legend" on Sheet G-4. What does "ec" represent (electrical conduit)? Include in "Abbreviations" on Sheet G-4. Show "ec" crossings on profile view if these are underground lines. Provide instructions to contractor regarding existing 18-inch SD east of proposed DI#5. Provide extents of SD removals at Laurelhurst Drive intersection and instructions for 18-inch SD abandonment (slurry fill?). Provide additional MH near Station 44+20.00.
13. Sheet SD-4: Label size and material of existing waterline west of Station 46+90. Adjust DI locations out of existing driveways at Decatur Boulevard intersection. Provide instructions to contractor and extents of waterline removal within RCBC alignment near Station 47+00.00. Provide 'Caution' note for high pressure gas line south of proposed facility and overhead power lines. Provide instructions to contractor regarding all existing utilities crossing above RCBC. Typical all plan and profile sheets.
14. Sheet SD-5 through SD-8: Where feasible, revise lateral invert elevations to connect below mainline HGL to reduce losses through junctions.
15. Sheet SD-10: Extend SD to west to connect to existing area drain near Station 8+70.00. According to CCPW, the area drain is currently blocked off and has no outlet. Show existing walls and driveways. Consider using precast MH tees at non junction MH locations on tangent line and grade. Revise plans accordingly.
16. Sheet SD-11: Provide instructions to contractor regarding existing SD removal at Shadow Mountain Place intersection. Is it intended to tie existing SD in to SDMH#40? It doesn't appear to line up properly. The existing 6-inch ACP waterline crossing facility near Station 19+65.00 will likely require relocation. Generally, ACP waterlines cannot be supported during construction activities. Confirm with Las Vegas Valley Water District. Construction Note No. 31 refers to Detail 1/CD-6. This requires a special DI/Transition design as shown on Sheet S-6. Provide all necessary structural details to construct this facility. Revise accordingly.



Mr. Joe Christensen, P.E.

August 8, 2008

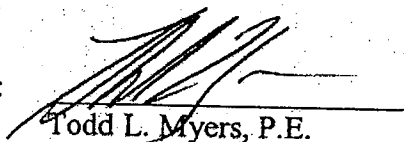
Page 5

If you have any questions please give me a call.

Gale Wm. Fraser, II, P.E.

General Manager/Chief Engineer

BY:



Todd L. Myers, P.E.
Engineering Project Manager

TLM:ylm

c: Joiner Lagpacan, P.E., Poggemeyer Design Group
Steve Roberts, P.E., RFCD
Robert Welch, P.E., CLV
Lorrie Dunford, P.E., C.E.M., CLV

City of Las Vegas

Collection System Planning

Review Comments/Responses

DESIGN REVIEW COMMENTS

PROJECT NAME: Vegas Drive Improvements

REVIEWER'S NAME: Collection System Planning

DATE 7/3/08

REVIEW STAGE

30% ☐

70% ☒

90% ☐

100% ☐

OTHER ☐

PAGE 1 **of** 1

COMMENT NO.	PAGE/SHEET NO.	REVIEWER'S COMMENTS	DESIGNER RESPONSE
1	C-1	Label ssmh to adjust at approx sta 12+10	Completed on plans
2	C-1	Note 5, adjust ssmh per SD-3B, not 408A (typ)	See Construction Note 14
3	C-3	Label ssmh to adjust at approx sta 32+10	Completed on plans
4	C-4	Label ssmh to adjust at approx sta 47+40	Completed on plans
5	C-5	Label ssmh to adjust at approx sta 55+25	Completed on plans
6	SD-1	Refer to CLV #307V994 to include all sewer laterals (typ)	Sewer laterals added to plans
7	SD-1	Add note to abandon ex sewer/ssmh per DCSWCS 3.14	Note added to UT-1
8	SD-1	No plan and profile for sewer diversion west of Shadow Mtn	Sewer profile added
9	SD-1	Where is lateral for apn -030 connected to?	Connected to Ex 10" VCP SS within Vegas Drive
10	SD-1	Verify that no laterals connected to ex 8" to be abandoned	Verified
11	SD-4	Protect-in-place or DCSWCS SD-19 for lateral crossing at approx sta 54+25	Protect-in-place with SD-21
12	SD-5	See comment 11 for approx sta 64+10	Protect-in-place
13	SD-6	See comment 11 for approx sta 66+50	Protect-in-place
14	SD-8	See comment 11 for approx sta 86+90 and 88+00	Protect-in-place
15	SD-9	Show all ex lateral crossings (typ)	Sewer laterals added to plans
16	SD-9	crossing at approx sta 98+75 per DCSWCS SD-20	Crossing labeled per SD-21
17	SD-9	Show existing lateral for apn -007 per 307-V346A	Sewer laterals added to plans
18	SD-10	North arrow wrong	Revised on plans
19	SD-11	Protect-in-place ex 10" sewer	Added on plans
20	UT-3	Laterals not offered to apn -403-008 or -811-002	Lateral offering to apn -403-008 to be verified with CLV SID. No lateral offered to apn -811-002 due to lot located within Clark County.
21	UT-3	Fix note for lateral at approx sta 56+40 per comment 13	Protect-in-place with SD-21
22	UT-4	Is lateral shown to apn -052 proposed? No record for existing	Ex lateral shown per 307V994
23	UT-5	Show existing lateral per 107-V2796	Sewer laterals added to plans
24	SS-1	Michael Wy, no stub info and no profile provided lowering ex 18" sewer as required	Sewer improvements at Michael Wy included in plans
25	SS-1	Fairhaven St, 60" ssmh and add 48" ssmh at end	Added to plans
26	SS-1	Valley Dr, use ex stub and provide min 6" clear under water and change stub material to C900	Revised on plans
27	SS-1	Note 91, concrete collar ssmh per SD-3B (typ)	Revised on plans
28	SS-2	Mountain Trl, match crowns and use C900 for stub and add 48" ssmh at end	Revised on plans
29	SS-2	Sunset Dr, move stub to 5' off centerline and add mh at end	Revised on plans
30	SS-2	East Ln, add ssmh at end, match crowns, provide 6" min clear under water, and use C900, which may not require note 94	Revised on plans
31	CD-1	Where did excavation note 3 come from?	Note remove from plans

City of Las Vegas Survey

Review Comments/Responses

SURVEY SECTION

DESIGN REVIEW COMMENTS

PROJECT NAME: Vegas Drive Improvements

HANSEN# 11554

REVIEWER'S NAME: Nancy Almanzan

DATE 6/17/08

REVIEW STAGE 30% ☐ 70% ☒ 90% ☐ 100% ☐ **OTHER** ☐

REVIEW #:

PAGE 1 of 1

COMMENT NO.	PAGE/SHEET NO.	REVIEWER'S COMMENTS	DESIGNER RESPONSE
1	HC-1	Add Benchmark name to Benchmark statement	Completed on plans
2	HC-1	Label found monument at the intersection of Vegas Drive and Leonard Lane.	Completed on plans
3	HC-2	Add Benchmark name to Benchmark statement	Completed on plans
4	HC-2	At the intersection of Vegas Drive and Decatur, please show monumentation found or set.	Completed on plans
5	HC-3	Add Benchmark name to Benchmark statement	Completed on plans
6	HC-4	Add Benchmark name to Benchmark statement	Completed on plans
7	HC-5	Add Benchmark name to Benchmark statement	Completed on plans
8	HC-6	Add Benchmark name to Benchmark statement	Completed on plans
9	HC-6	Please label monument found at the ¼ corner of sec. 24/sec. 19	Completed on plans
10	HC-6	At the intersection of Vegas Drive and Decatur, please show monumentation found or set.	Completed on plans
11	C-1	Please check grade between "VD" Sta. 5+50 and "VD" Sta. 7+60.10	Verified and completed on plans
12	C-2 & C-3	Please check grade between "VD" Sta. 23+72.15 and "VD" Sta. 26+67.82	Verified and completed on plans
13	C-3 & C-4	Please check grade between PM Sta. 34+00 and BVCS 35+22.40	Verified and completed on plans
14	C-4	There are 2 copies of Sheet C-4. Please remove 1 of the sheets.	Removed duplicate copy from plan set
15	C-6	Please check grade between PM Sta. 55+00 and PM Sta. 56+50	Verified and completed on plans
16	C-9	Please provide stationing information for Sta. 94+25	Completed on plans
17	SD-1	Please check LF between "LVOW" Sta. 21+10 and "LVOW" Sta. 23+15	Verified and completed on plans
18	SD-1 & SD-2	Please check LF between "LVOW" Sta. 23+15 and "LVOW" St. 26+75	Verified and completed on plans
19	SD-10 & SD-11	Please check LF between stations.	Verified and completed on plans

Figure 3.3

Proposed Peak Flow Summary

70% Technical Drainage Study

3.0 DRAINAGE STUDY

3.1 Introduction

This 70% Technical Drainage Study was conducted to analyze and document the 70% storm drain facility design for the Clark County Regional Flood Control District (CCRFCD) Master Plan Facility proposed for Vegas Drive. This Drainage Study is intended to supersede the previous Drainage Study included in Section 3.0 of the *Vegas Drive Improvements Preliminary Design Report* dated July 13, 2007 (Preliminary Design Report) and the *Drainage Study Update to the Preliminary Design Report, Vegas Drive – Shadow Mountain to Rancho Drive*, dated December 2007 (Update to the Preliminary Design Report). The section heading numbers and appendices included in this report correspond to the section or appendix that this report is intended to replace in the Preliminary Design Report. This drainage study was prepared to the CCRFCD, City of Las Vegas (CLV), and Regional Transportation Commission (RTC) standards. All analyses in this study are based on the CCRFCD publication Hydrologic Criteria and Drainage Design Manual (HCDDM).

The general boundaries of the project watershed are the Gowan South Facilities Channel on the west, Rancho Drive on the east, Lake Mead Boulevard on the north, and Washington Avenue on the south. The drainage basins contributing flows to the Vegas Drive project were derived from the CCRFCD 2002 Las Vegas Valley Flood Control Master Plan Update (2002 MPU), 1 foot contours within the project vicinity, and field visit observations. The projected surface runoff from these basins was used to generate the design flow rates in the Vegas Drive storm drain system. The study analyzed both the 10-year and 100-year 6-hour storm events. The final design represents the storm drain facilities required to maximize the existing downstream connecting storm sewer facility capacity of 455cfs located west of Rancho Dr. Drop inlets were designed to meet the 10-year RTC criteria for surface flow and the 100-year CCRFCD and CLV criteria for surface and sub-surface flow.

The proposed storm drain facilities discharge into an existing CCRFCD master planned storm drain system approximately 300 ft west of Rancho Drive. The existing facility is an 84" RCP and does not have the capacity to convey the current 100-year event flow rates from Vegas Drive, west of Rancho Drive. The capacity of the existing downstream connecting storm drain facility is approximately 455cfs and is undersized by approximately 683cfs needed to convey the total flow rate of 1,138cfs at the intersection of Vegas Drive and Rancho Drive. Four alternative drainage

alignments were proposed to alleviate the existing downstream conveyance capacity deficit in the previously submitted "*Final Regional Drainage Alternatives Study, Vegas Drive – Shadow Mountain Place to Rancho Drive*" (Alternatives Study) drainage study. However, this study discusses the new storm drain design concept directed to PDG by the CLV and CCRFCD during the August 9, 2007 project meeting. The new storm drain design concept proposes extending the current capacity of 455cfs in the existing downstream facility located at Rancho Drive, upstream along Vegas Drive to the start of the proposed improvements thereby improving the current storm water drainage in this area.

This study assumes for the Ultimate Condition that a future storm drain facility (not a part of this study) will be required to convey a majority of the 100-year event storm water runoff that originates west of the Vegas Drive/Decatur Boulevard intersection, north along Decatur Boulevard to Lake Mead Boulevard then east to the existing Carey-Lake Mead Detention Basin. This will reduce the tributary watershed area and peak flow rate conveyed to the existing 84" RCP at Vegas Drive & Rancho Drive. Approximately 160cfs is assumed to continue east along Vegas Drive at Decatur Blvd in a future parallel system so to maximize the storm sewer capacity downstream near Rancho Drive. Please refer to the "*Final Regional Drainage Alternatives Study, Vegas Drive – Shadow Mountain Place to Rancho Drive*" for additional discussion of the preferred alternative and other alternative designs.

This study analyzes the existing, proposed (interim condition), and future (ultimate condition) drainage patterns along Vegas Drive between Shadow Mountain Place and Rancho Drive. This study attempts to address the following items:

- 1) Determine the 10-year and 100-year peak runoff impacting the project.
- 2) Identify the Federal Emergency Management Agency (FEMA) floodplain status for the project site.
- 3) Design Regional Facilities.
- 4) Recommend necessary flood protection.

3.2 Previous Studies

As part of the engineering services performed, PDG obtained and reviewed previous drainage reports prepared for areas surrounding, tributary to, adjacent to, or affected by this section of Vegas Drive. The existing reports and studies reviewed during the preparation of this analysis are listed below.

Previous Drainage Studies

- 1) *Final Regional Drainage Alternatives Study, Vegas Drive – Shadow Mountain Place to Rancho Drive*, by PDG, May 2007.
- 2) *2002 CCRFCD Master Plan Update of the Las Vegas Valley*, by PBS&J, November 2002.
- 3) *City of Las Vegas Central Neighborhood Flood Control Master Plan*, by PBS&J, March 2005.
- 4) *City of Las Vegas City Wide Hydrology Analysis*, by PBS&J, 1997.
- 5) *Request for Letter of Map Revision U.S. 95 Widening Rancho Roadway Improvements*, by PBS&J, April 2006.
- 6) *Final Storm Drain Design Report for Vegas Drive / Owens Avenue Rancho Drive to Interstate 15*, by Kimley-Horn and Associates, Inc., June 2001.
- 7) *U.S.95 Widening - Final Project 3C Drainage Design Report*, by VTN, April 2004.
- 8) *U.S.95 Widening - Final Overall Project Drainage Design Report*, by VTN, May 2003.
- 9) *Drainage Study for Washington Avenue*, by Pentacore Engineering, Inc., September 2000.
- 10) *Lake Mead Boulevard – Winwood Street to Rancho Drive Design Report*, by SEA, Inc., April 1989.

3.3 Location and Development Description

The project is located along the divide of Sections 24 and 25 of Township 20 South, Range 60 East, and the divide of Sections 19 and 30 of Township 20 South, Range 61 East, **M.D.M.**, Clark County Nevada. The general direction of drainage at the project area is from the west to the east. In addition to the proposed roadway improvements discussed in Section 2.0 of the Preliminary Design Report, a regional flood control facility is being proposed to improve the drainage capacity along the Vegas Drive corridor.

3.4 Flood Hazard Designation

The special flood hazard areas for sections of Clark County, Nevada are outlined on the Federal Emergency (FEMA) Flood Insurance Rate Map (FIRM) dated September 27, 2002. **Figure 3.1-FEMA Flood Zone Map** is a portion of FIRM Panel No. 2155E and shows the project area is located in Flood Zone X. Flood Zone X is an area outside of the 500-Year Flood Zone.

3.5 Clark County Regional Flood Control District Master Plan Facilities

Figure F-12 of the CCRFCD 2002 MPU is provided in Appendix D and shows that there are existing regional facilities located downstream of the project site (**LVOW 0146** – Existing 4,800 ft of 84" RCP in Vegas Drive/Owens Avenue) and proposed regional facilities located upstream of