



**PROJECT NEON
 PHASE 1 Revised 3/1/11
 30 % SUBMITTAL REVIEW COMMENTS 2/28/11
 DRAINAGE REPORT RECEIVED 1/11**

DISCIPLINE: Hydraulics

WORK ORDER NO.: 1291-73457

PERMIT NO.:

REVIEWER: NDOT Hydraulics - B. Wilson/E. Yount

PROJECT LEVEL: 30%

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0	PLANS	All	Obtain CCRFCD & City LV concurrence on proposed modifications to Flood Control Facilities and to the Access control points to those Facilities.		Both the City of Las Vegas and CCRFCD have received plans and drainage studies concurrently with the NDOT submittals. City of Las Vegas comments have been received and addressed within this matrix.
0B	PLANS	D7&D8	Onsite construction Note 5 should be to construct concrete lined V-Ditch instead of the earthen V-Ditch. This substitution would minimize maintenance, help hold grade, and minimize weeds and sedimentation in the ditch.		Onsite note 5 (sheet D7 & D8) as well as section E-E on Sheet DD3 have been revised to indicate concrete lining.
1	PLANS	D8	Offsite Notes 8 (south of Wyoming) & 5 refer to a double 14'x6' RCB connecting into a 8' wide channel. Is this correct? This is not apparent from plan.		The keynotes have been revised to correctly indicate the proposed drainage facilities.
1B	PLANS	D8	North of Wyoming Offsite Note 8 does not appear to fit circumstances.		The keynote has been revised to correctly indicate the proposed drainage facilities.
2	PLANS	D8A	Offsite Note 5 refers to a "W=1.00' min". Should this instead be "H" ?		The keynote has been revised to correctly indicate H=1.00'

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3	PLANS	D9 & D29	The new? Right of Way limit is not apparent near the new access structure between offsite note 8 and onsite note 10.		Updated R/W linework now depicts new right of way that encompasses this access structure. Note also, the structure has been moved to the north to facilitate property access to Desert Lane.
4	PLANS	D9A	It appears that the offsite note 1 references the wrong reference number?		The keynote reference has been corrected.
5	PLANS	D9A	It appears that the offsite note 3 references the wrong reference number?		The keynote reference has been corrected.
6	PLANS	D10	From a constructability point of view, how will the new triple wide RCB be constructed across I-15?		The existing Wall Street Bridge will remain in place during removal and replacement of the RCB. The bridge will be demolished and roadway embankment will be placed after this storm drain construction is complete.
7	PLANS	D10	Is alignment "OC" the short stub entering the confluence structure Near the NW corner of Wall Street & Western Ave.?		Alignment "OC" is the storm drain realignment in Oakey Blvd, that ties into the confluence structure at the NW corner of Oakey and I-15. The alignment leader has been corrected on sheet D8. Removal and construction notes for the Western Avenue stub ("WC") have been added.
8	PLANS	D10	The new Right of Way limit does not appear to extend far enough to handle the work at Offsite Note 2?		This structure is located within an area bounded by existing NDOT R/W (along the existing west curb line on Western) and within existing street R/W for Wall Street and Western.
8B	PLANS	D12	Offsite Note 2 referring to inlet to the RCB appears to outside of the R/W limits.		The RCB headwall/inlet is located within existing street R/W for Martin Luther King BLVD.

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9	PLANS	D27	As the Old Wall Street R/W will be abandoned? Should the new R/W to the NE of Offsite Note 1 be squared off instead of following the curvature of the cul-de-sac?, and is an easement necessary for the project?		The R/W linework has been updated. The proposed offsite facility (1) will be located within a larger parcel assemblage R/W acquisition, between Western and the UPRR.
10	PLANS	D27	The new? Right of Way limit is not apparent near the area near the intersection of the new "SJ" alignment and the old Wall Street.		The R/W linework has been updated. The proposed roadway improvements will be located within a larger parcel assemblage R/W acquisition, between Western and the UPRR.
11	PLANS	D28	The new? Right of Way limit is not apparent near the area near the SE intersection of Grand Central Parkway and Iron Horse Drive where the new sidewalk is proposed.		R/W linework in this area has been revised to clarify R/W limits.
12	PLANS	D30	The new Right of Way limit does not appear to extend far enough to handle the new triple RCB work near "CH4: Sta 788		The linework shown is proposed control of access (corresponding to the proposed retaining wall alignment). The existing right of way boundary is on the west side of the existing Martin Luther King Blvd roadway This fully encompasses the triple box alignment.
13	PLANS	D30	Does the work for the new stub into the confluence chamber NW of the intersection of Wall Street & Western Ave, require an Intergovernmental Agreement to handle the Temporary Construction Easement of the NDOT work on City of LV R/W ?		Ongoing coordination between NDOT, CCRFCD, and CLV will continue as the project advances.
14	PLANS	DD1	Filter Fabric under Rip Rap?		The channel details on sheet DD1 have changed since the conceptual 30% R/W Setting plan set. Riprap sizing, riprap bedding, and geotextile fabric are shown on applicable details in the 60% plans.
15	PLANS	DD1	Granular drainage layer under reinforced concrete channel floor slab?		The channel details on sheet DD1 have changed since the conceptual 30% R/W Setting plan set. Granular backfill layer is anticipated to be required under concrete slabs. Subgrade drainage will be provided (if required) at later stages of design, in conjunction with structural design and geotechnical recommendations.

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16	PLANS	DD5	Construction sequence, install 18" RCP to minimize traffic delays?		The 18" laterals crossing the "AR" alignments can be installed in conjunction with the access road construction. The concept of parallel trunk lines (one along the "AR1"/"AR2" alignment and one along the "MN1" alignment) is proposed to facilitate constructability of the retaining wall by minimizing wall penetration locations.
17	PLANS	DP5	Any special design provisions for hydraulic jump occurring near Sta 67?		Plan sheets and HGLs have been revised for the 60% submittal. Anticipate thickened slab in vicinity of hydraulic jumps if necessary, which will be coordinated with structural design at a later stage of design.
18	PLANS	DP17	Should MH at "MN" Sta 786+45 be moved so that MH Rim elevation be raised to higher ground so that when downstream RCB surcharges no backflow rises up thru manhole and floods out road "AR"?		The "AR" profile has been revised, and is approximately 6' higher and the low point has been moved east to Western. This system may continue to be surcharged with existing condition hydrology (prior to completion of the upstream MPU facilities), however overland flows along Western will also inundate the roadway. Both of these conditions will be mitigated by completion of upstream MPU facilities.
19	DRAINAGE REPORT	B.2.2	Can the WSPG analysis be provided with the digital input and output files so that review can be further facilitated?		Source files for the WSPG analysis have been provided on a CD for further review.
20	DRAINAGE REPORT	B.2.2	Can the new windows based version of WSPG be used so that review can be further facilitated?		The analysis was performed using WSPGW by Civil Design. Additional information, beyond the input and output files that have been included with the 60% submittal, can be provide to assist with review as requested.
21	DRAINAGE REPORT	B.3.3	Can the digital spreadsheet files of the weir overtopping analysis be provided so that review can be further facilitated?		The spreadsheet files for the preliminary analysis can be provided for further review. However, the analysis of this area of the project was suspended pending roadway design decisions for the UPRR flyover. As a

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					result, the preliminary hydraulic design data for the Western Avenue overland flow analysis is not included in the 60% Phase I study.
22	DRAINAGE REPORT	B.3.3	Possible compare side weir overflow analysis with the Side-Diversion Analysis computer program from the Univ. of Texas at Austin. http://www.cwrw.utexas.edu/reports/2002/rpt02-3.shtml		Currently the UPRR side weir is preliminarily modeled in HEC-RAS. The latest version of HEC-RAS contains a side weir module. HEC-RAS performs the calculations using a similar methodology to the Univ. of Texas at Austin program (which relies on HEC-1 and HEC-2 for additional hydraulic input).
23	DRAINAGE REPORT	B.3.4.	It is noted that high Froude number supercritical flow conditions exist at the upstream starting point. Is this realistic?		The boundary conditions used for the analysis have been revised since the 30% submittal. However, the analysis has not been included with the Phase I 60% submittal pending UPRR flyover design changes.
24	DRAINAGE REPORT	B.4.2.	Should HY8 Culvert analysis also be performed at the inlet to the proposed 42" storm drain, to compute the headwater depth at the entrance?, (Inlet control depth) and verify that upstream rectangular channel has adequate depth to contain flows.		The roadway configuration has been changed so that the existing channel is now maintained in the existing configuration at this location.
24B	DRAINAGE REPORT	B.4.2	Should an adequate transition length (of High Wall Height) be used at the outlet end of the 42" pipe (where it discharges to the 1' high rectangular ditch), to keep the flow within the channel wall height?		The roadway configuration has been changed so that the existing channel is now maintained in the existing configuration at this location.
25	DRAINAGE REPORT	C.3.	Columns 16 & 17 assume constant cross slope to the gutter. If a compound slope with different gutter and pavement cross slope exists, or is proposed to minimize spread (assuming safety characteristics of barrier rail is maintained) , are these two formulas still reasonable accurate?		The calculations used for this design are based on a constant cross slope which is consistent with the proposed freeway design in which the roadway shoulder drains directly against the edge of barrier rail. Composite gutter calculations (based of FWHA methodology) would be utilized for model a composite gutter section if it is consistent with proposed roadway design at a later time.

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1			<p>The Clark County Regional Flood Control District’s Master Plan facilities provide the required protection for Project Neon. Phase I of Project Neon includes relocation of a portion of the existing Mater Plan Facilities while maintaining the existing overland flow patterns without negatively impacting the adjacent properties. This allows for the phased development of Project NEON and allows for the planning sequence needed to determine the timing of Clark County Region al Flood Control District’s Master Plan facilities that provide the ultimate drainage protection for Project NEON. The critical drainage impacts to Phase I are along the Western Avenue Corridor on the east side of I-15 between I-15 and the UPRR from Oakey Boulevard north to Charleston Boulevard.</p>		<p>This is a statement by the CLV regarding the project. No response is provided.</p>
2			<p>The City requests an exhibit and cost estimate that identifies the Project NEON storm drain facilities that could be eliminated with the construction of the CCRFCD Sahara Storm Drain Project that were identified within the Draft Project Management Plan.</p>		<p>Offsite drainage improvements proposed with Phase I have been designed to perpetuate existing condition drainage patterns and to geometrically accommodate the roadway footprint. With the exception of the overland flows along Western Avenue, Phase I offsite improvements would be required regardless of completion of the CCRFCD Sahara Storm Drain Project. The CCRFCD Sahara project would potentially eliminate overland flows in Western Avenue and eliminate the need for the ditch grading along the UPRR (as was shown on the 30% plans, Sheet D26, Offsite Note 1). Costs associated with this earthen graded ditch are negligible with respect to the overall costs of phase I drainage improvements.</p>

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3			It is believed that the Sahara MPU facility and/or other design alternative facilities will need to be constructed before the widening of I-15 south of Oakey boulevard. Provide a detailed explanation of the implementation of these facilities.		The subject Phase 1 drainage design is not dependant on the Sahara MPU facility (as discussed above). Future phases of Project NEON will require mitigation of offsite flows such that ultimate condition 2008 MPU flows are established. A detailed discussion of project phasing –vs- MPU build out requirements can be provided.
4			The Provided 30% design proposed improvements that will modify the existing drainage patterns. The concept design will provide grading mitigation adjacent to the railroad north of Oakey toward Charleston to offset the reduced flow area due to the Phase I improvements. The preliminary HEC-RAS analysis supports this design concept.		This is a statement by the CLV regarding the proposed drainage design. No response is provided.
5			The analysis presented is “comparative” in nature and is acceptable in concept for the 30% review. The HEC-RAS analysis must be updated with the next design phase. The HEC-RAS analysis needs to include the topographic mapping used for design and cross sections. A detailed HEC-RAS analysis is needed to support the more detailed design information required for the next Phase I design submittal. Provide an electronic copy of the HEC-RAS analysis for review.		The HEC-RAS cross sections were developed based on mapping and DTM data provided by NDOT. HEC-RAS analysis of the Western corridor was updated since the 30% submittal and discussed with the CLV. The analysis, however, was put on hold pending roadway design decisions regarding the UPRR flyover and, therefore, has not been included with the current 60% Phase I study.
6			The report discusses that flow within the Western Avenue corridor overtops the railroad in the existing conditions. The report proposes to revise the location of the overtopping flows. The next design submittal needs to provide a detailed analysis of the overtopping flows and the impacts to the parcels to the east. Flood Control recommends that the overtopping flow patterns remain the same. Any Changes to the location of the overtopping flows will have a negative impact to the east and these proposed changes would also require UPRR review and approval.		Hydraulic analysis has been updated since the 30% submittal and discussed with the CLV. The analysis, however, was put on hold pending roadway design decisions regarding the UPRR flyover and, therefore, has not been included with the current 60% Phase I study.

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7			The City is currently reviewing design alternatives to the construction of the Sahara Avenue MPU facilities to reduce impacts and costs along the Sahara alignment from west of I-15 to the Boulder Highway. These alternatives include the construction of a Detention Basin on the west side of I-15 north of Sahara Avenue. The development of the 30% plans, for Future Phases, needs to review and accommodate the design alternative selected.		It is understood that continued coordination between Project NEON and the City of Las Vegas is required, including any developments in the design of the selected alternative for the Sahara Avenue MPU facility.
8			The Offsite Facility and Flow Exhibits (Appendix B.1) include an existing condition with the Sahara MPU facility in place. If the identified Sahara Avenue MPU facility and/or any other alternative MPU facility is constructed, the Future Phases must clearly identify the facility construction needed with each phase to collect the flow and convey it into the Sahara MPU or other appropriate MPU System for it to correctly function. This must include sufficient collection facilities upstream to make the facility function.		It is understood that phasing of Project NEON (beyond Phase I) is dependant of completion of the Sahara system (or alternative) and adequate interception of flows (either interim or permanent) to convey flows into the Sahara MPU facility. Development of these system requirements, in conjunction with continued development of Project NEON is necessary.
9			The design report needs to address when the various Phases will need the Sahara MPU or other appropriate System to be constructed for the phases to properly function.		Neon Phase I can be constructed without completion of the Sahara MPU facility. Further development of MPU requirements versus phasing is anticipated as the project develops.
10			Section 3.5.5 of the report identified a local 100-year basin contributing flow to the freeway ditch system that did not include the complete flow area impacting this segment of I-15. The area must be expanded as Martin Luther King (MLK) Boulevard drainage has a low point at the basin boundary that impacts the 100-year flow along the freeway ditch. The existing storm drain within MLK is only a local facility and does not contain the 100-year flows at the low point. Review and revise the basin and flows accordingly.		This basin has been re-assessed to include tributary area west of MLK. For analysis, it is conservatively assumed that the entirety of the runoff from this basin will drain overland to the proposed I-15 ditch (Q100=201 cfs). This ditch has been oversized with a 15' wide bottom to accommodate maintenance access and has enough capacity to convey the revised offsite flows.

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11			Section 4.4.3 identifies that the Managed Lane direct connection to Western Avenue will be below grade. It appears that the roadway will be below the top of the RCB's that this road drainage will connect to; creating a ponding condition that will make the roadway unserviceable. Additionally this Managed Lane connection will be impacted by the interim drainage from the Western Avenue corridor. Review and revise the design to make the Managed Lane connections usable.		The "AR" profile has been raised approximately 6-ft and the profile has been modified to eliminate the low point in the alignment and follow the existing ground based on updated aerial mapping. The overland flow in the Western Avenue corridor will not be alleviated until upstream MPU facilities are constructed, however, the revised profile will perpetuate the existing flow conditions in the corridor.
12			Section 4.4.6 identified a low point at the start of the elevated roadway connection between Western and Grand Central Parkway. The next design submittal needs to address the ultimate 100-year flows impacting the low point and convey them into the proposed system.		Additional refinement to the analysis and design associated with the overland flow in the Western corridor will be provided at a later time once the roadway configuration for the UPRR flyover within the corridor is finalized.
13			The plans need to show the Q and HGL on the DP sheets. Label the design storm for each facility.		Q, HGL, and design storm information has been added to profiles.
14			The DP sheets need to reference the corresponding Plan Sheets.		A reference to the corresponding structure numbers, which relate to plan sheet numbers, has been added to the profile sheets.
15			Various Plan and Profile sheets show proposed grades that are creating low points. See Sheets DP-8, DP-14 and DP-17 as examples. These areas must be adequately addressed with future submittals.		Roadway low points along the elevated freeway (isolated from offsite flows) will utilize onsite drainage systems to ensure NDOT/FHWA 25-year criteria are met. The Profile for the Access Road "AR" is discussed in the response to comment 11.

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16			Review the storm drain connection to make sure that the lateral connections are less than 90-degrees to the main line.		Laterals have been configured to meet or exceed USACE criteria for lateral connection angles based on pipe size
17			The Outlet Mall on the east side of I-15, north of Charleston, has two multi-story parking garages that are not shown on the plans. Add the structures to verify design impacts, if any.		Aerial Mapping has been updated since the 30% submittal and the parking garages are shown on the plans. The northerly parking structure (near Bonneville) is located approximately 46' from the proposed NDOT R/W line and will not be impacted by proposed drainage improvements. The proposed Freeway Channel RCB improvements end in the vicinity of the existing southerly parking structure and considerations may need to be made for trench stability/shoring/etc to protect the work area and the structure during construction. There are no other drainage improvements anticipated to impact the southerly parking structure.

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1			<p>I do not know if I really like the drainage scuppers in the median barriers – I would prefer inlets to capture the water before it flows across the centerline. Scuppers tend to clog up, and with tight radii and high super there could be some problems during the infrequent storms – Las Vegas freeways get little rain, and it is very slick at the start of any rain event. I would like to hear some feedback from District 1, especially on how the existing ramps at the Spaghetti Bowl work during rain events.</p>		<p>At the 30% design level, it was anticipated that the viaduct might ultimately be striped for two lanes in each direction, leaving a 2’ inside shoulder. Due to this narrow shoulder, very close inlet spacing would have been necessary to maintain acceptable spread. Since this was on a bridge structure, scuppers were proposed to minimize structural and storm drain layout issues, and associated costs.</p> <p>With the 60% design, it has been determined that the viaduct will maintain a single lane in each direction (even in ultimate conditions). This now leaves a 10’ inside shoulder. Revised analysis shows the additional available spread width facilitates more reasonable inlet spacing. With the 60% design, deck drains are proposed and are generally located at pier locations. This significantly simplifies structural design and storm drain discharge systems. The 60% design also provides deck drains along both travel lanes and eliminates onsite flows from crossing the opposing travel lane.</p> <p>Development of 60% striping on US-95 provides a 4’ inside shoulder within the super elevated section of eastbound US-95 (between stations “L” 1165+80 and “L” 1179+99). Due to the close inlet spacing that would be required to meet spread in this area, scuppers are proposed at 15’ spacing along the barrier rail. Here, the scuppers discharge to a center median. Runoff is intercepted by storm drain systems within the median and does not cross the opposing lanes. Since the roadway is elevated above natural ground and is not subject to runoff from offsite flows, it is anticipated that the potential for debris and clogging is low. Based on discussions with NDOT Hydraulics no clogging factor has been used in the sizing of the scuppers. The spread calculations indicate some additional spread capacity is available before onsite flows encroach into the travel lane. (Generally 3.4-feet of spread within a 4-foot shoulder.)</p>

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2			I did not see any mention of UPRR in the Utility matrix, but did see the tracks could be inundated in the Drainage report (and there is a fix for that).	<p>100-year Overtopping of the UPRR occurs in the existing conditions. The proposed drainage design provides a drainage ditch (west of the UPRR R/W boundary), that perpetuates this overtopping condition. Design of this ditch will be refined in more advanced stages of project design to ensure that existing condition flow patterns are maintained and ensure no adverse impacts to the UPRR (in excess of the existing overtopping condition).</p>
3			Drainage Design – comments mentioned earlier, but lots of tricky options are being considered to fit within the ROW. Superelevation and minimum grades are definitely a challenge. We do need to be sure the final design does not create any wet weather safety issues (especially on the long viaduct).	<p>Agreed. Drainage and Roadway have been in close coordination throughout the design process to provide sufficient shoulders and minimize potential problem areas from a drainage perspective. Continued advancement of onsite drainage design will continue throughout the design process to ensure FWHA onsite drainage criteria are met.</p>

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