

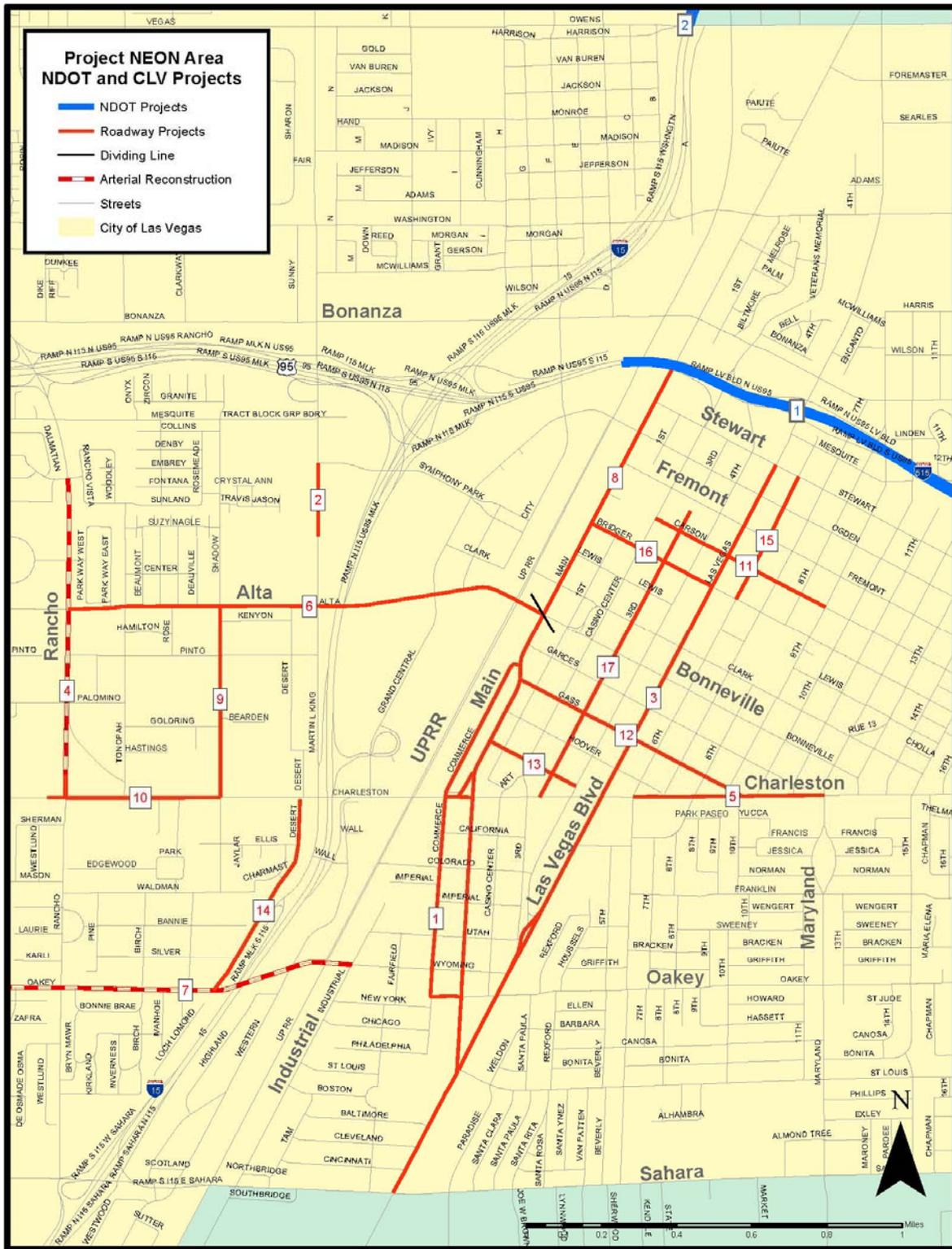
ATTACHMENT 01-1
TENTATIVE LIST OF CONCURRENT PROJECTS ADJACENT TO
THE PROJECT

This page intentionally left blank.

Technical Provisions – Attachment 01-1
Tentative List of Concurrent Projects Adjacent to the Project

Tentative List of Concurrent Projects Adjacent to the Project *			
No.	Project	Estimated Construction Start	Estimated Construction Complete
NDOT			
1	EA 73796 I-15 North Seismic Retrofits (CL44.13-48.43)	2015Q3	2016Q3
2	EA 73797 I-515 Downtown Viaduct Seismic Retrofit and Bridge Deck Rehab (CL74.35-76.67)	2016Q1	2018Q2
3	PIN 73796 Project No.: NHP-015-1(154) I 15 No. Las Vegas Seismic Retrofit & Rehabilitation (H-948, G-949, G-953, and I-956)	2015Q3	2016Q3
City of Las Vegas			
Roadway Projects			
1	Main Commerce One-Way Couplet – Las Vegas Boulevard to Bonneville	2014Q2	2015Q2
2	Martin L. King Boulevard Improvements – Costco to Metro Headquarters	2013Q3	2015Q3
3	Las Vegas Boulevard Improvements – Sahara to Stewart	2015Q2	2016Q2
4	Rancho Drive Pavement Overlay Mesquite to Charleston	2020	2021
5	Charleston Boulevard Landscaped Median Improvements – 6th to Maryland	2013Q3	2015Q4
6	Alta Drive Complete Street Improvements – Rancho to Main	2017	2018
7	Oakey Avenue Bicycle Lanes – Rainbow to Industrial	2014Q1	2015Q4
8	Main Street Complete Street Improvements – Bonneville to I-515	2013Q4	2015Q3
9	Shadow Lane Complete Street Improvements – Charleston to Alta	2015Q2	2016Q1
10	Charleston Boulevard Complete Street Improvements – Rancho to Shadow	2016Q2	2017Q1
11	Carson Street Bicycle & Pedestrian Improvements – Casino Center to 9th	2015Q4	2016Q3
12	Gass Avenue Bicycle & Pedestrian Improvements – Main to Charleston	2015Q4	2016Q3
13	Coolidge Street Bicycle & Pedestrian Improvements – Main to 4th	2015Q4	2016Q3
14	Martin L. King Boulevard Relocation with Project Neon – Oakey to Charleston	2016	2017
15	6th Street Bicycle & Pedestrian Improvements – Bridger to Stewart	2015Q4	2016Q3
16	Bridger Street Bicycle & Pedestrian Improvements – Main to Las Vegas Boulevard	2013Q2	2015Q2
17	3rd Street Bicycle & Pedestrian Improvements – Charleston to Fremont	2014Q4	2015Q3
Regional Transportation Commission (RTC)			
Area-wide Major Projects – City of Las Vegas			
	No RTC projects identified at this time.		
* Additional projects could be added to the list pending each agency's prioritization and funding availability.			

Technical Provisions – Attachment 01-1
 Tentative List of Concurrent Projects Adjacent to the Project



H:\pavement\RWPGIS\NEON\Proj Neon Integ Plan.mxd

ATTACHMENT 01-2
SAFETY AND HEALTH – SAFETY PLAN

This page intentionally left blank.

1 SAFETY AND HEALTH REQUIREMENTS

Design-Builder shall perform all Work in the Contract in a skillful manner with due regard to the safety and health of its Employees and of the public, and in compliance with all applicable Laws. Design-Builder shall comply with 29 *Code of Federal Regulations* (CFR) Part 1926 regarding the safety and protection of persons employed in construction and demolition Work.

1.1 Occupational Safety and Health

In accordance with Occupational Safety and Health Administration (OSHA) regulations, Design-Builder's employees shall be required to wear protective helmets (hard hats) when there is a possible danger of head injury from impact, from falling or flying objects, or from electrical shock and burns. Additionally, all employees working within an active highway right-of-way (ROW) must wear protective helmets at all times. Helmets are not required for employees within a completely enclosed cab constructed of a steel frame and glass or inside an automobile. Helmets must meet current OSHA standards for impact, electrical shock, and burn protection. Design-Builder's employees will be considered to include everyone on its payroll, as well as employees of Subcontractors, Suppliers, and other personnel on the Site under the direction of Design-Builder.

Design-Builder shall be responsible for performing all necessary planning, supervision, and training activities to ensure that all of the requirements of 29 CFR Part 1926 are fully met for all workers employed in the Work of the Project. Design-Builder shall provide satisfactory evidence to the Department that all current requirements of 29 CFR Part 1926 will be adequately addressed before the start of Work.

1.2 Safety and Protection

1. Design-Builder shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Design-Builder shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to, the following:
 - a. All employees employed in the Construction Work and other persons who may be affected thereby.
 - b. All Work and all equipment and material to be incorporated therein, whether in storage on or off the Site.
 - c. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and Utilities, except as designated for relocation, removal, or replacement as part of the Work.
2. Design-Builder shall take immediate action after an accident to correct the Construction Work methods and conditions that are the apparent cause of the accident.
3. Design-Builder's duties and responsibilities for the safety and protection of the Construction Work shall continue until Final Acceptance, provided, however, that Design-Builder shall retain responsibility for safety and protection related to the Work during the Operating Period as specified in the Contract Documents. Design-Builder shall coordinate the Work with the Department's safety staff.

4. Design-Builder shall comply with the following:
 - a. Perform the Work with due regard for the protection of public and private property and the health, welfare, mobility, safety, and convenience of the public, particularly with regard to disabled persons and pedestrians.
 - b. When the Work involves use of public ways, provide necessary flaggers and traffic control devices and install and maintain means of reasonable access to all fire hydrants, service stations, warehouses, stores, houses, garages, and other property. Private residential driveways shall be closed only within the specified constraints and requirements for notice contained in the Contract Documents.
 - c. Allow the public's travel over any public highway, street, or sidewalk without obstruction or interference except as specified in the Contract Documents. Do not obstruct drainage in roads or natural or constructed drainage ways.
 - d. Comply with all instructions received from the Department or local authorities regarding protection of public and private property and the health, welfare, mobility, public safety, and convenience of the public.
 - e. Provide reasonable access to the Work area at all times for emergency traffic, such as police, fire, and ambulance units.
 - f. Give notice and describe upcoming construction to agencies, owners, tenants, and residents in accordance with the Contract Documents.

1.3 Design-Builder's Safety Obligations

Design-Builder shall perform all actions necessary for safety and be solely and completely responsible for conditions on the Site, including safety of all persons and property on the Site through Final Acceptance. This requirement shall apply continuously for the duration of the Contract and shall not be limited to normal business hours or other time constraints or be reduced or diminished in any way because Design-Builder is not given sole possession of the Site. Design-Builder is fully responsible for the safety of workers engaged upon the Project and all other persons working at or visiting the Site and the protection of the public in the vicinity.

1.4 Design-Builder's Safety Plan

Design-Builder shall submit a written Project-specific Safety Plan that documents Design-Builder's safety policy and identifies and addresses specific health and safety concerns to be encountered on the Project to the Department for review and approval. Before the Work begins, and at regular periods throughout the Contract, Design-Builder's Project supervision staff shall meet with the Department to review and discuss the status of safety issues on the Project. An appropriate notice shall be posted at the job Site that the Safety Plan is available for examination by any worker employed on the Project.

Design-Builder shall implement, review, and update the Safety Plan and introduce a program for assuring that the Safety Plan is followed at all times. Design-Builder shall coordinate with all authorities and relevant entities as necessary to ensure compliance with the Safety Plan.

The Department will monitor and audit Design-Builder's safety performance. The Safety Plan shall provide for the following:

1. Planning, management, and design to avoid hazards
2. Detection of potential hazards
3. Timely correction of hazards
4. Dedication to the protection of the public and the Workers
5. Active participation of all persons involved with the Contract
6. Dedicated safety staff
7. Liaison with the Department's safety monitoring staff
8. Safety training and safety meetings

Design-Builder shall ensure that all its employees and those of the Subcontractors of any tier (including labor-only) are under an obligation at all times to fully conform to the provisions of the Safety Plan.

1.4.1 Content of the Safety Plan

The Safety Plan shall be comprehensive and include all required actions, activities, rules, and mitigation relative to the safety of the Work. The Safety Plan shall include an Emergency Plan and an Incident Management Plan as described in Section 6.5.6 (*Emergency, Unforeseen Utility Disruptions, Hazardous Conditions, Traffic Emergencies, Security, and Loss-of-Access Notifications*) of these Technical Provisions. The Safety Plan shall include, at a minimum, the following items:

1. Policy statement indicating Design-Builder's commitment to safety, goals stated as maximum lost hours, and no loss of life goals
2. Identification of Design-Builder's safety officers, including responsibility definitions, an organization chart, reporting procedures, safety inspection procedures, and audit programs
3. References to all applicable Laws
4. An education and training plan for required training for all Workers, including a separate program and Hazardous Materials communications plan for Workers involved with hazardous and contaminated substances remediation, required toolbox meetings, and required posting of information
5. Procedures to address Project health and safety concerns, including housekeeping, material handling and storage, personal protective equipment, wall and floor openings, scaffolds, ladders, welding, flame cutting, electrical equipment, lock-out or tag-out, motor vehicles, heavy equipment, small tools, concrete forms, steel erection, cranes and hoisting, Work platforms, fire prevention and protection, sanitation, confined space entry, blasting and explosives, and other items
6. Industrial hygiene, including respiratory protection, noise, Hazardous Materials, Material Safety Data Sheets, and lists of hazardous chemicals present

Technical Provisions – Attachment 01-2
Safety and Health – Safety Plan

7. Fire protection and prevention
8. Emergency and rescue procedures, including detailed procedures for all types of emergencies, such as, medical, fire, chemical spill, property damage, bomb threat, severe weather, flooding, explosion, and earthquakes
9. Incident investigation, reporting, and record-keeping
10. Policy for substance abuse
11. Security provisions
12. Safety requirements and procedures for surveyors and engineering personnel conducting Site investigations and verification sampling and testing
13. Procedures for compelling worker compliance with health and safety requirements
14. Emergency phone numbers

The Safety Plan shall contain a list of the detailed safety procedures to be followed.

1.4.2 Submittal of the Safety Plan

Before the start of any field Work or construction, Design-Builder shall submit a Safety Plan to the Department in accordance with the requirements of the Contract Documents. Upon receipt of approval, Design-Builder shall issue the complete Safety Plan, which will be based on the safety information contained in the preliminary project management plan in Design-Builder's Proposal along with the incorporated comments of the Department and any other required updating. The Safety Plan shall be a controlled document to be issued by Design-Builder to, at least, the following persons:

1. The Department
2. Design-Builder's Project Manager
3. Design-Builder's Safety Manager
4. Design-Builder's Design Manager
5. Design-Builder's Quality Manager
6. Design-Builder's Construction Quality Manager
7. Design-Builder's Design Quality Manager
8. DB-Related Entities

Other controlled copies shall be distributed as determined by Design-Builder and the Department. Uncontrolled copies shall be issued as considered necessary by Design-Builder.

Design-Builder shall maintain a traceable record of the issuance of the controlled copies, including numbering and acknowledgement of receipt. Revisions to the Safety Plan shall be subject to the provisions of Section 2.1.1 of the Contract and upon approval by the Department, shall be issued to all recipients of the controlled copies and managed in the same way as the controlled copies.

Submission of the required Safety Plan by Design-Builder and its approval by the Department shall not be construed to imply approval of any particular method or sequence for addressing health and safety concerns or to relieve Design-Builder from the responsibility to adequately protect the health and safety of all workers involved in the Project as well as any members of the public who are affected by the Project.

1.4.3 Revisions to the Safety Plan and Procedures

The Department may require a revision to the Safety Plan or any safety procedure in order to ensure compliance with the Contract. Following discussion with the Department, Design-Builder shall issue such revision within 30 Days of receipt of the instruction.

Design-Builder shall review the Safety Plan and any safety procedure in order to revise it in accordance with activities and experiences on the Site. Such revision, from time to time, shall enhance the standards of safety being implemented on the Site. At the very least, procedures shall be reviewed and new procedures issued whenever the character or extent of any activity is changed or a new activity of a different nature is introduced that necessitates such revision.

In addition to such revision, Design-Builder shall conduct a formal review of the Safety Plan once every 6 months on or near the anniversary of NTP. Such formal review shall consider all matters pertaining to safety planning and implementation, including accident reports, inspections, audits, suggestions from meetings, and other sources, such as the Department and hazard analysis reviews. Within 7 Days of finishing this review, Design-Builder shall issue a review report to the Department, giving the conclusions of the review and identifying the revisions to be made to the Safety Plan.

Within 30 Days of the issue of the review report, Design-Builder shall issue a revised Safety Plan for review and approval by the Department in accordance with Section 2.1.1 of the Contract.

1.4.4 Design-Builder's Safety Organization

Design-Builder shall designate a member of the executive team, if it is a corporation or a joint venture, or a principal of the organization who shall be responsible and directly accountable to the Department in all matters concerning safety. Design-Builder shall also require its Project Manager to be responsible and directly accountable to this designated safety board member or principal in all matters concerning safety.

Design-Builder's Project Manager shall be designated as the Emergency Contact Person, with the Deputy Project Manager as an alternate contact. The names of both persons and the telephone numbers at which they can be reached at any time shall be given to the Department and all police agencies in the area. Both individuals shall have full authority and capability to mobilize forces promptly as required to respond to an emergency and protect the public.

Design-Builder's Safety Manager is a Key Personnel and whose Project duties shall be solely connected with the safety aspects of the Project and who shall report directly to the designated safety board member or principal. Such an appointment shall be subject to written acceptance by the Department. The Safety Manager shall meet the minimum qualifications as described in Section 1.6.3 (Key Personnel). The Safety Manager shall implement, maintain, and monitor compliance with the Safety Plan and all safety procedures, and shall be based full-time at the Site.

Design-Builder shall provide and maintain an organizational structure that ensures the effective control of the Project's safety assurance tasks by Design-Builder's safety staff. Such staff shall be engaged solely in safety assurance. Responsibilities and task subdivision shall be clearly identified in the Safety Plan, and shall show direct lines of communication and reporting between Design-Builder's Safety Manager and the designated safety board member or principal and between the Design-Builder's Safety Manager and Design-Builder's Project Manager.

Design-Builder shall not remove the appointed Safety Manager without the prior written consent of the Department. Design-Builder shall nominate any replacement at the same time consent is sought.

If the Safety Manager is removed for incompetence or fitness for duty, a suitably qualified and immediately available replacement shall be proposed to the Department within 14 Days of receipt of the notice requiring the removal.

Design-Builder shall provide adequate numbers of supporting personnel for the Safety Manager, including a deputy to act in his/her absence.

Design-Builder shall not begin any Work on the Site until the Safety Manager has been appointed and accepted by the Department and has begun his/her duties on the Site.

Design-Builder shall give authority to the Safety Manager and safety staff to issue "stop Work orders" that instruct employees of Design-Builder and its Subcontractors of any tier, including labor-only Subcontractors, to cease operations and take urgent and appropriate action to make the Site safe and prevent unsafe working practices or other infringements of the Safety Plan or breach of any Laws.

Design-Builder shall require the Safety Manager to verify by inspection that the requirements of Design-Builder's Safety Plan and safety procedures are being strictly complied with. In the event of any noncompliance, the Safety Manager shall forthwith issue an instruction to stop Work until the noncompliance is rectified. Once rectified, Work may resume with approval from the Department.

No Work shall be performed on Site unless Design-Builder's Safety Manager or designated deputy is on Site. Work shall not be performed at the Site unless the specified safety supervisors are on the Site.

1.5 Emergency Plan

Design-Builder's Emergency Plan shall include strategies, techniques, communications, and other plans for responding to Emergencies through Final Acceptance. Design-Builder shall coordinate this approach with the Department. Design-Builder's Emergency Plan at a minimum shall clearly and comprehensively address the following items:

- Communication protocol, process, and contact methods from Design-Builder to the Department describing Design-Builder's plan to respond and act to Emergencies.
- Protocol for communicating information to the emergency service providers regarding access to the Project ROW for emergency vehicles, including Design-Builder's personnel responsibilities for communicating the information.

- Communication protocol for notifying stakeholders and the public, including Design-Builder's personnel responsibilities for communicating the information.
- Proposed personnel available and response times for any Emergency condition requiring attention.
- Proposed personnel roles and responsibilities for responding to any Emergency condition requiring attention.
- Description of the proposed contact methods, personnel available, and response times for any Emergency condition requiring attention outside of normal working hours.
- Identification of all essential functions that need to be performed in the event of an Emergency.
- Identification of actions be taken to mitigate the Emergencies and how these actions will be applied to any Emergency.
- Corrective procedures, if applicable, that will be put in place as a result of the Emergency.
- In the event of an Emergency, Design-Builder shall summarize the Emergency protocol and submit a report to the Department within 5 Business Days of the Emergency.

1.6 Incident Management Plan

Design-Builder's Incident Management Plan shall include strategies, techniques, communications, and other approaches for responding to Incidences through Final Acceptance. Design-Builder shall coordinate this approach with the Department and Design-Builder's Traffic Management Plan. Design-Builder's Incident Management Plan shall address the following:

- Communication protocol, process, and contact methods from Design-Builder to the Department describing Design-Builder's plan to respond and act to Incidences.
- Protocol for communicating information to the emergency service providers regarding access to the Project ROW for emergency vehicles, including Design-Builder's personnel responsibilities for communicating the information.
- Communication protocol for notifying stakeholders and the public. Including Design-Builder's personnel responsibilities for communicating the information.
- Proposed personnel available and response times for any Incident condition requiring attention.
- Proposed personnel roles and responsibilities for responding to any Incident condition requiring attention.
- Description of the proposed contact methods, personnel available, and response times for any Incident condition requiring attention outside of normal working hours

- Identification of all essential functions that need to be performed in the event of an Incident.
- Identification of actions be taken to mitigate the Incidences and how these actions will be applied to any Incident.
- Corrective procedures, if applicable, that will be put into place as a result of the Incident.
- In the event of an Incident, Design-Builder shall summarize the Incident protocol and submit a report to the Department within 5 Business Days of the Incident.

1.7 Not Used

1.8 Inspections

Design-Builder shall notify the Department of any Inspections to be conducted on the Project by the U.S. Department of Labor, OSHA, or other health and safety agencies, and of any resulting closing conference, and to the extent possible, provide the Department with the opportunity to be present at such Inspections and closing conference. Design-Builder shall notify the Department in writing of the results of any health and safety Inspections conducted on the Project by representatives of the U.S. Department of Labor, OSHA, or other health and safety agencies, within 1 Business Day of the completion of the closing conference resulting from such Inspections. If any citations are issued for alleged violations, a copy shall be provided to the Department within 1 Business Day of their receipt by Design-Builder, and a copy of the final disposition of such citations shall also be provided to the Department within 1 Business Day of their receipt by Design-Builder. In addition, Design-Builder shall notify the Department within 24 hours of the details relative to any accident or incident occurring at the Site involving any worker employed working at the Site or delivering material, equipment, or supplies to the Project.

1.9 Reports

Design-Builder shall submit a safety report using Form SAF (shown at the end of this attachment) with the monthly Progress Report described in Section 1.6.1.1.4 (*Progress Report*) of these Technical Provisions.

1.10 Explosives

When the use of explosives is necessary for the prosecution of the Work, Design-Builder shall exercise the utmost care not to endanger life or property, including new work. Design-Builder shall be responsible for all damage resulting from the use of explosives.

Design-Builder shall store explosives in a secure manner in compliance with all Laws and shall clearly mark all such storage places. Where no Laws apply, Design-Builder shall provide satisfactory storage and in general not closer than 1,000 feet from the road or from any building or camping area or place of human occupancy.

Design-Builder shall notify each property owner and public utility company having structures or facilities in proximity to the site of the Work of the intention to use explosives. Design-Builder shall give such notice sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property from injury.

1.11 Guarding and Protection

Design-Builder shall be responsible for guarding and protecting open and unattended excavations and other potentially hazardous locations in and adjacent to areas lawfully frequented by any person. Such guarding and protection shall consist of any one, or a combination of, the following:

1. A substantial fence or barricade, at least 4 feet high and mounted on satisfactory supports spaced at intervals of not more than 10 feet. Warning signs reading “DANGER – KEEP OUT” shall be mounted on the fence or barricade, as required by the Department, at no more than 100-foot intervals. The signs shall be 24 inches wide by 16 inches high. The lower portion of the sign shall be white and shall bear the words “KEEP OUT” in 5-inch black letters. The upper portion shall be predominantly red with 5-inch white lettering spelling out the word “DANGER.” The lettering shall be enclosed by an approximately elliptical, white ring and the entire sign bordered in black. All barricades and warning signs shall be furnished, erected, relocated, maintained, and removed as required.
2. A 4-foot extension of the trench sheeting above the ground surface adjacent to the excavation.
3. A substantial covering over the excavation. Where it is possible that vehicles will move over such covering, the covering shall be of sufficient strength to withstand the loading.

1.12 Equipment Involving Radioactive Materials

The use of equipment involving radioactive Materials, including, but not limited to, nuclear density gauges, shall adhere to all applicable regulations, including U.S. Nuclear Regulatory Commission (NRC) regulations, related U.S. Department of Transportation (DOT) regulations concerning transportation of radioactive material, and Nevada Revised Statutes (NRS) 459.010 to 459.290, inclusive, and shall be provided in the Safety Plan submitted to the Department. The Safety Plan shall address in detail transportation and storage of the equipment and operating and emergency procedures. Design-Builder shall provide the name and address of the radiation safety officer. A copy of the owner’s license to possess the radiation source shall also be provided. All equipment operators’ equipment shall be certified as having completed training on the safe and proper use of their specific piece of equipment. A copy of the certification shall be provided to the Department for each operator before their Work on the Project begins.

FORM SAF
 Monthly Safety Report Format

Design-Builder's Name: _____

Period Covered (Month and Year): _____

Name of Design-Builder's Safety Manager: _____

Item	Contract Total This Period	Contract Cumulative Total
No. Man-Hours Worked (Construction)		
No. Lost Workday Cases (entire shift lost)		
No. Restricted Workday Cases (partial shift lost or reassigned to "light" duty)		
No. Cases Requiring Medical Attention		
No. Fatalities		
No. On-Site Safety Meetings		
No. On-Site Equipment Accidents		
No. Vehicle Accidents, including off-site accidents by vehicles working on Contract		
No. New Workers on Site During Period		
No. New Worker Safety Orientation		
No. Supervisor/Foreman Safety Sessions		
No. Site Safety Inspections		

1. Describe circumstances surrounding each lost workday and each fatality case.

2. Describe actions taken and/or planned to prevent reoccurrence.

FORM SAF
Monthly Safety Report Format (Continued)

(Signature)

(Signature)

(Printed or typed name) Design-Builder
Executive

(Printed or typed name) Design-Builder's Project
Manager

(Date)

(Date)

This page intentionally left blank.

**ATTACHMENT 01-3
PROJECT MANAGEMENT PLAN**

This page intentionally left blank.

This Attachment 01-3 contains the Project Management Plan (PMP) contents and schedule for provision of the component parts.

Legend:

- A = Submitted by Design-Builder within 30 Days of initial Notice to Proceed (NTP1) and approved by the Department prior to commencement of Design Work and issuance of final Notice to Proceed (NTP2)
- B = Submitted by Design-Builder within 90 Days of NTP1 and approved by the Department prior to commencement of Construction Work
- C = Submitted by Design-Builder within 60 Days of initial Notice to Proceed (NTP1) and approved by the Department prior to commencement of Design Work and issuance of final Notice to Proceed (NTP2)

Part	Section	Contents	Required by
1. Project Administration			
	Organization	Organizational diagram	A
	Personnel	Names and contact details, titles, and job roles	A
	Design-Builder's	Design-Builder's contracting Plan	A
	Schedule	Design Submittal portion of the Project Baseline Schedule in accordance with <u>Section 1</u> (<i>General Scope of Work</i>) of the Technical Provisions	A
		Balance of Project Baseline Schedule in accordance with <u>Section 1</u> (<i>General Scope of Work</i>) of the Technical Provisions	B
	Quality Control	Procedures to establish and encourage continuous improvement	A
	Audit	Procedures to facilitate review and audit by the Department	A
		Auditing and management review of Design-Builder's own activities under the PMP	A
		Auditing and management review of Design-Builder's activities and management procedures	A
	PMP Update	Procedures for preparation of amendments and submission of amendments to any part of the PMP	A
	Document Management	The manner in which records will be maintained in compliance with the Technical Provisions, including any specific systems Design-Builder will use	A
		Document management procedures in compliance with <u>Section 1</u> (<i>General Scope of Work</i>) of the Technical Provisions, including EDMS.	A

Technical Provisions – Attachment 01-3
 Project Management Plan

Part	Section	Contents	Required by	
2. Quality Management System and Quality Manual				
	Organization	Design-BUILDER's main contractual arrangements	A	
		Organizational structure covering the activities to be performed in accordance with the Contract Documents	A	
	Personnel	Resource plan for Design-BUILDER and its Subcontractors	A	
		Arrangements for coordinating and managing staff interaction with the Department and its consultants including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	A	
		Names and contact details, titles, job roles and specific experience required for the Key Personnel and for other principal personnel during design	A	
		Names and contact details, titles, job roles of principal personnel for Subcontractors and any third party with which Design-BUILDER will coordinate activities	A	
	2A. Design Quality Management Plan			
		Organization	Design-BUILDER's main contractual arrangements	A
Organizational structure covering the activities to be performed in accordance with the Contract Documents			A	
Personnel		Resource plan for Design-BUILDER and its Subcontractors	A	
		Arrangements for coordinating and managing staff interaction with the Department and its consultants, including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	A	
		Names and contact details, titles, job roles, and specific experience required for the Key Personnel and for other principal personnel during Design Work	A	
		Names and contact details, titles, and job roles of principal personnel for Subcontractors and any third party with which Design-BUILDER will coordinate activities	A	
Offices and Equipment		Description of the necessary offices and office equipment to be provided by Design-BUILDER during Design Work	A	

Technical Provisions – Attachment 01-3
Project Management Plan

Part	Section	Contents	Required by
	Design-Builder's	Overall control procedures for Design-Builder's, including consultants and subconsultants	A
		Responsibility of Design-Builder's and affiliates	A
		Steps taken to ensure Design-Builder's and Suppliers meet the obligations imposed by their respective Contracts	A
	Interfaces	Interfacing between Design-Builder, Subcontractors, and independent certifiers during Design Work, including interfaces between the structural design auditor, the safety auditor, and any quality reviewer	A
		Coordination with Utility Owners	A
	Environmental	Control of the interactions between environmental requirements (including landscaping) and the Design Work of the Project	A
	Procedures	Procedures describing how the principal activities will be performed during the design stage: to include geotechnical site investigation, surveys and mapping, environmental management, safety audit, structural audit, and checking	A
	Quality Control/Quality Assurance	Quality control and quality assurance procedures, including a resource table for monitoring and auditing all design services, design review and certification, and verification of plans	A
		Procedures for environmental compliance	A
		Procedures to establish Design-Builder's hold points in the design process where checking and review will take place	A
		Procedures to ensure accuracy, completion, and quality in submittals to the Department and Governmental Entities	A
		Procedures to establish and encourage continuous improvement	A
	Audit	Name of Design-Builder's representative(s) with defined authority for establishing, maintaining, auditing and reporting on the Design Quality Management Plan (DQMP)	A
		Names, titles, roles, and responsibilities of supporting quality management staff reporting to the person with defined authority	A
	Document Management	The manner in which records will be maintained in compliance with the Technical Provisions, including any specific systems that Design-Builder will use	A
		Document management procedures in compliance with <u>Section 3 (Design Quality Management)</u> of the Technical Provisions	A
		Identify environmental documentation and reporting requirements for the Environmental Compliance	A

Technical Provisions – Attachment 01-3
 Project Management Plan

Part	Section	Contents	Required by
		Plan	
2B. Construction Quality Management Plan			
	Organization	Design-Builder's main contractual arrangements	A
		Organizational structure covering the activities to be performed in accordance with the Contract Documents	A
	Personnel	Resource plan for the Design-Builder and its Subcontractors	B
		Arrangements for coordinating and managing staff interaction with the Department and its consultants including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	B
		Names and contact details, titles, job roles, and specific experience required for the Key Personnel as related to Construction Work	A
		Names and contact details, titles, and job roles of principal personnel for Subcontractors and any third party with which Design-Builder will coordinate its activities	B
		Procedures for implementation of environmental compliance and mitigation training program for all employees in accordance with <u>Section 7 (Environmental)</u> of the Technical Provisions	B
		Offices and Equipment	Description of the necessary offices and office equipment to be provided by Design-Builder during Construction Work
	Design-Builder's	Overall control procedures for Design-Builder's, including consultants and subconsultants	B
		Responsibility of Design-Builder's and affiliates	B
		Steps taken to ensure Contractors and Suppliers meet the obligations imposed by their respective Contracts	B
		Procedures for implementation of environmental compliance and mitigation training program for employees of Contractors in accordance with <u>Section 7 (Environmental)</u> of the Technical Provisions	B
	Interfaces	Interaction among Design-Builder and Subcontractors, during Construction Work	A
	Procedures	List of Project-specific construction procedures	B
		Detailed procedure for each major Construction Work activity whether directly undertaken or subcontracted to include pavement, structures, drainage, and communications	B
		Construction transportation management plan	B

Part	Section	Contents	Required by
	Quality Control/Quality Assurance	Construction monitoring plan	B
		Construction monitoring program (environmental)	B
		Procedures for environmental compliance	B
		Control, identification, and traceability of materials, including any material or samples temporarily or otherwise removed from Site for testing or other reasons.	B
		Examinations and audits of Construction Work; review of examination and audit; issue of certificates	B
		Observation and reporting of all tests in compliance with <u>Section 4</u> (<i>Construction Quality Assurance, Quality Control, and Oversight</i>) of the Technical Provisions	B
		Procedures for tests and inspections for the purpose of the Design-Builder's certifying that prior to burying, each part of the Work is complete and conforms to the Contract Documents.	B
		Quality control and quality acceptance procedures, including a resource table for monitoring and auditing during any construction work and testing undertaken by Design-Builder's and Suppliers both onsite and offsite	B
		Procedures to establish Design-Builder's hold points in Construction Work	B
		Procedures to ensure accuracy, completion, and quality in submittals to the Department and Governmental Entities	B
		Procedures to establish and encourage continuous improvement	A
	Audit	Inspection and test plans that identify the pro forma and/or databases to be used for recording the inspection and test results, and methodology for transmitting acceptance testing and inspection reports to the Department	B
		Name of Design-Builder's representative with defined authority for establishing, maintaining, auditing, and reporting on the Construction Quality Management Plan (CQMP)	A
		Names, titles, roles, and responsibilities of supporting quality management staff reporting to the person with defined authority	B
	Document Management	The manner in which records will be maintained in compliance with the Technical Provisions, including any specific systems that Design-Builder will use	B
		Document management procedures in compliance with <u>Section 4</u> (<i>Construction Quality Assurance, Quality Control, and Oversight</i>) of the Technical Provisions	A

Technical Provisions – Attachment 01-3
 Project Management Plan

Part	Section	Contents	Required by
3. Environmental Management			
	Organization	Design-Builder's main contractual arrangements	A
		Organizational structure covering the activities to be performed in accordance with the Contract Documents	A
		Environmental contact tree	A
	Personnel	Resource plan for Design-Builder and its Subcontractors	B
		Arrangements for coordinating and managing staff interaction with the Department and its consultants, including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	A
		Names and contact details, titles, job roles, and specific experience required for Key Personnel and for other environmental personnel	A
		Implement environmental compliance and mitigation training program for all employees in accordance with <u>Section 7 (Environmental)</u> of the Technical Provisions	A
	Design-Builder's	Overall control procedures for Design-Builder's, including consultants and subconsultants	A
		Responsibility of Design-Builder's and affiliates	A
	Environmental	Environmental Compliance and Mitigation Plan (ECMP)	B
		Environmental Management System (EMS)	B
		Environmental compliance and mitigation training program	A
		Spill Prevention Plan	B
		Hazardous Materials Management Plan (HMMP)	B
	Quality Control and Quality Acceptance	Procedures to ensure accuracy, completion, and quality in submittals to the Department and Governmental Entities	A
		Procedures to establish and encourage continuous improvement	A
		Procedures for environmental compliance	A
	Audit	Names, titles, roles, and responsibilities of supporting quality management staff reporting to the person with defined authority	B
	Document Management	The manner in which records will be maintained in compliance with <u>Section 1 (General Scope of Work)</u> of the Technical Provisions, including any specific systems that Design-Builder will use	A
		Identify environmental documentation and reporting requirements	A

Part	Section	Contents	Required by
4. Public Involvement Plan			
	Organization	Design-Builder's main contractual arrangements	A
		Organizational structure covering the activities to be performed in accordance with the Contract Documents	A
	Personnel	Resource plan for the Design-Builder and its Subcontractors	A
		Arrangements for coordinating and managing staff interaction with the Department and its consultants, including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	A
		Names and contact details, titles, job roles, and specific experience required for Key Personnel and for other principal personnel	A
		Names and contact details, titles, and job roles of principal personnel for Subcontractors and any third party with which Design-Builder will coordinate its activities	A
	Offices and Equipment	Description of the necessary offices and office equipment to be provided by Design-Builder during Design Work	A
	Design-Builder's	Overall control procedures for Design-Builder's, including consultants and subconsultants	A
		Responsibility of Contractors and affiliates	A
		Steps taken to ensure Design-Builder's and Suppliers meet the obligations imposed by their respective Contracts	A
		Procedures for implementation of environmental compliance and mitigation training program for employees of Design-Builder	A
	Interfaces	Community Outreach Plan in accordance with <u>Section 6 (Public Involvement)</u> of the Technical Provisions	A
		Procedures for liaison with the public, the media, and other customer groups in accordance with <u>Section 6 (Public Involvement)</u> of the Technical Provisions and the press media policy of the Department. Proposed website configuration, layout, and content. Activation of Project website and hotline.	A
		Procedures to coordinate with Projects stakeholders such as municipalities, counties, Metropolitan Planning Organizations (MPOs), RMAs, and other customer groups	A

Technical Provisions – Attachment 01-3
 Project Management Plan

Part	Section	Contents	Required by
	Procedures	Procedures describing how the principal activities will be performed	A
	Quality Control	Quality control procedures including a resource table for monitoring and auditing all public information and communication services	A
		Procedures to ensure accuracy, completion, and quality in submittals to the Department, Governmental Entities, and customer groups	A
		Procedures to establish and encourage continuous improvement	A
	Audit	Name of Design-Builder's representative with defined authority for establishing, maintaining, auditing, and reporting on the PMP	A
		Names, titles, roles, and responsibilities of supporting quality management staff reporting to the person with defined authority	A
	Document Management	The manner in which records will be maintained in compliance with the Technical Provisions, including any specific systems that Design-Builder will use	A
		Document management procedures in compliance with <u>Section 1</u> (<i>General Scope of Work</i>) of the Technical Provisions	A
	5. Safety Plan		
	Organization	Policies, plans, training programs, Site controls, and Incident response plans to ensure the health and safety of personnel involved in the Project and the general public affected by the Project	B
		Procedures for immediately notifying the Department of all Incidents arising out of or in connection with the performance of the Work	B
	Personnel	Resource plan for the Design-Builder and its Subcontractors	B
		Arrangements for coordinating and managing staff interaction with the Department and its consultants, including collocation of Key Personnel and description of approach to coordinating work of offsite personnel	B
		Names and contact details, titles, job roles, and specific experience required for Key Personnel and for other principal personnel	B
		Names and contact details, titles, and job roles of principal personnel for Subcontractors and any third party with which Design-Builder will coordinate its activities	B
	Procedures	Safety Plan with the minimum requirements described in <u>Attachment 01-2</u> (<i>Health and Safety – Safety Plan</i>)	B

Part	Section	Contents	Required by
	Incident Management Plan	Incident Management Plan intended to address unplanned events or incidents for significant projects to ensure Incident response operations within the Project are managed effectively. The plan identifies priorities and procedures for detection and response to Incidents with the goal of safeguarding the public and restoring traffic flow as quickly as possible. The plan should define a process of regular review and analysis to identify actions that will reduce Incident frequency and severity.	B
6. Communications Plan			
		The manner in which Design-Builder’s organization will respond to unexpected requests for information, communicate changes or revisions to necessary Design-Builder personnel, and notify affected stakeholders before and after changes are made	A
		Processes and procedures for communication of Project information between Design-Builder’s organization and the Department	A
7. Transportation Management Plan			
		The Transportation Management Plan at a minimum, the content described in <u>Section 12.3</u> (<i>Transportation Management Plan</i>)	C
8. Preliminary L&A Plan			
		The revised Preliminary L&A Plan at a minimum the content described in <u>Section 5.3.1</u> (<i>Preliminary Landscape and Aesthetic Plan</i>).	C

This page intentionally left blank.

**ATTACHMENT 01-4
PROJECT SCHEDULE**

This page intentionally left blank.

PROJECT SCHEDULE

General

Design-Builder shall prepare and submit Project Schedules as specified herein showing the order in which the Work is proposed to be carried out.

Project Baseline Schedule – This time-scaled, resource-loaded, and cost-loaded Critical Path Method (CPM) network shall depict the milestones, durations, sequences, and interrelationships that represent Design-Builder’s Work plans; Design-Builder’s work breakdown structure (WBS) for designing, constructing, and completing the Project; from the date of Notice to Proceed (NTP) 1 to Final Acceptance. Design-Builder shall organize the Project Baseline Schedule to conform to WBS Level IV for Design and Construction Activities.

Design-Builder shall not construe the approval of any schedule submitted to assign responsibility of performance or contingencies to the Department or relieve Design-Builder’s responsibility to adjust forces, equipment, and work schedules as may be necessary to ensure completion of the Work within the Project Schedule Deadlines.

In addition to hard copies of plots and reports, Design-Builder shall submit the electronic copy of any Project Schedule in .xer or an approved compatible format, which can be accessed by the Department’s current version of the Primavera scheduling program. The submittal of satisfactory supplemental Project Schedules, including Project Baseline Schedule, Project Status Schedule, and recovery schedule, shall be considered as a necessary portion of the Work.

The Project Status Schedule and recovery schedule shall not alter the logic previously established in the Project Baseline Schedule unless approved by the Department in writing.

Definitions

The following definitions shall apply to the Project Schedule:

Activity – A task that is a definable part of the overall project. The task must be performed in order to complete the work defined in the Contract. An Activity has interrelationships, and is measurable by resource and time.

Level IV – A WBS that depicts Activities by package/area/facility/craft/crew, establishes a sequence for and interrelationship between Activities, and allows tracking of Activity progress with its associated resources.

Revised Project Baseline Schedule – Incorporates revisions to the Project Baseline Schedule subject to the approval of the Department.

Total Float – The amount of time that an Activity may be delayed without delaying the Substantial Completion Date.

Updated Schedule – The most current schedule in effect, which incorporates actual progress and sequence of activities to date, projected completion dates and proposed logic changes for future work, and approved Change Orders and/or time extensions.

For definitions not specified in this Attachment 01-4, refer to Appendix 1 of the Contract.

Schedule Requirements

General

- a) The work shall be scheduled to show the completion of the Contract within the Completion Deadlines.
- b) Schedule start date shall be NTP1.
- c) Design-Builder shall establish project specific calendars for the work. Design-Builder shall provide a list of non-work days, which include holidays and weather days. Holidays shall be established pursuant to the Contract. Additional holidays not recognized by the State of Nevada, such as union holidays, may be included as approved by the Department.
- d) Design-Builder shall submit tabular reports detailing the Predecessors and Successors and a report sorted by Total Float with every schedule submittal except the weekly look-ahead schedule. Basic schedule and tabular reporting templates shall be submitted by Design-Builder.
- e) All out of sequence logic conditions shall be corrected by adding new activities and relationships as opposed to deleting activities. Alternative approaches to correcting out of sequence activities shall be submitted and accepted by the Department prior to incorporating such corrections into the schedule.
- f) Activities shall not be deleted from the schedule. If the scope of work associated with an Activity has been removed through a Change Order, Design-Builder shall set the Activity's duration to zero, change the status to complete, and add "DELETE" to the description.
- g) Design-Builder shall establish the resource dictionary. The resource dictionary shall include labor and equipment. Labor may be represented by work crews, labor classifications, and/or individual names. If utilizing work crews, the composition of each crew shall be detailed and included as an appendix to the Project Baseline Schedule narrative report.
- h) Design-Builder shall use the precedence diagramming methods. The WBS of the Project Baseline Schedule shall be formatted in a manner consistent with the requirements of the Contract Documents.
- i) Failure to include any element of work required for performance of this Contract in the Preliminary Baseline Schedule, the Project Baseline Schedule, the Updated Schedule, or Revised Project Baseline Schedule will not excuse Design-Builder from completing work required to achieve Completion Deadlines, notwithstanding acceptance of schedule submittals.
- j) Schedule submittals shall not be used to notify the Department of owner caused delays or to request additional contract time. Formal notice and requests are required per applicable Contract provisions. The Department's acceptance of a schedule that shows work being performed later than the Completion Deadline(s) shall not be construed as approval to extend the contract time.

Activity Requirements

- a) A critical path Activity shall be defined as a current Activity located on the longest path. Not more than 50% of activities in the schedule can be critical or near critical. Near critical is defined as having a float value of five (5) days or less. The Design-Builder shall submit any proposed constraints in the schedule to the Department for approval.
- b) Schedule activities shall be cost and resource loaded. Resource loading shall include all major equipment and hours for each resource. The resource dictionary shall be used to assign the required resources to each Activity. There shall be no more than one driving resource per Activity. All schedules shall be “scheduled” and “resource leveled” using the driving resources. The Activity ID numbering, scope of work, and descriptions of activities shall remain the same as the accepted Project Baseline Schedule.
- c) The sum of all cost loaded activities shall equal the current Contract Price.
- d) Activity descriptions shall briefly convey scope and location of work indicated. The description shall consist of a verb or work function (e.g.; form, pour, excavate), an object (e.g.; slab, footing), and area/location (e.g.; bent 200, northeast corner).
- e) The schedules shall reflect any Department activities such as review times and third party activities.
- f) The work activities shall be subdivided to identify the staging of construction through the use of coding structure within Primavera. The coding structure can use either the WBS or Activity code structures and shall subdivide area, sub-area, discipline, stage, phase, and reference to sheet and specification sections.
- g) Work Activity durations shall not exceed 30 days in length for design activities and 14 days in length for construction activities. Exceptions would include procurement activities and Work activities that may be considered routine once they are initiated, as approved by the Department. No work Activity shall have an associated cost over \$500,000, unless otherwise approved by the Department.
- h) Should a work Activity require more than fifteen (15) calendar days, it shall be subdivided to appropriate work activities. The Department reserves the right to require more detailed sequences of work activities as deemed necessary to review the schedule or monitor the Work.
- i) With the exception of the first (start) and the last (finish) milestone activities, all other activities shall be logically tied to appropriate predecessors and successors.
- j) The Contract milestones dates and any Department furnished equipment availability date, as described in the Contract Documents, shall be unique zero duration activities containing corresponding dates and logic ties. These activities shall be designed as either "start" or "finish" milestones. Each milestone Activity shall constrain its dependent Work. Calculation of constraint dates for milestones shall assume NTP1 is given at day zero.
- k) Leads or lags shall not be used when the creation of an Activity will perform the same function (e.g. concrete cure time). Lag durations shall not have a negative value. The use

Technical Provisions – Attachment 01-4
Project Schedule

of interrelation constraints such as leads and lags on activities shall be explained in the narrative and submitted to the Department.

- l) Use of mandatory start or finish constraints, start on, expected finish and zero Total Float constraints shall not be used in the Project Baseline Schedule, Revised Project Baseline Schedule, Recovery Schedule, or Updated Schedules without the approval of the Department.
- m) Design-Builder shall provide an analysis of the network diagram that includes the following information as a minimum for each Activity:
 - 1. Preceding and succeeding event numbers
 - 2. Activity description and number
 - 3. Estimated duration of activities
 - 4. Early start date (by calendar date)
 - 5. Early finish date (by calendar date)
 - 6. Late start date (by calendar date)
 - 7. Late finish date (by calendar date)
 - 8. Total Float
 - 9. Activity constraints
- n) Activities shall be coded to allow for the following summaries:
 - 1. Responsible party for the accomplishment of each Activity, i.e., Design-Builder, Subcontractor, Department, or Utility Owner. Only one party can be responsible for an Activity.
 - 2. Phase/stage during which Activity is planned to be accomplished, including design.
 - 3. Area/location, i.e., bridges, ramps, or mainline station.
- o) Material quantities for each Activity shall be indicated in the resource fields when they become available. Material descriptions such as concrete, asphalt, guide railing, and signs shall be used.

Schedule Submittals

Preliminary Project Baseline Schedule (90-Day Schedule)

For the first 90 Days following NTP1, the Design-Builder will proceed with Work as described in the Preliminary Project Baseline Schedule submitted by Design-Builder with its Proposal and as accepted by the Department.

Project Baseline Schedule

The Project Baseline Schedule shall contain Design-Builder's detailed activities and sequencing for all Work. It is essential that the Project Baseline Schedule present a clear understanding of the staging of construction. This shall be reflected in the coding structure in the schedule. Design-Builder shall, unless directed otherwise by the Department, use the Project Baseline Schedule as target for required comparisons to the current updates in tabular reports, bar charts, physical progress curves or any other comparisons requested by the Department.

The Project Baseline Schedule activities shall indicate Design-Builder's best estimate for original durations, early dates, late dates, logic ties, constraint dates, and Total Float. Activities shall be scheduled in the sequence Design-Builder intends to perform the work.

The Project Baseline Schedule must be consistent with the Preliminary Project Baseline Schedule submitted in Design-Builder's Proposal.

The Project Baseline Schedule shall contain the Activity sequence for major material and equipment procurement, including submittal preparation, reviews by the Department and others, fabrication, and delivery. Procurement items that may contain multiple submittals occurring at different times shall be divided into separate Activity sequences that can be tracked on an individual basis.

Design-Builder shall incorporate into the Project Baseline Schedule all Project activities, activities for procurement and delivery of materials and equipment, activities assigned to Subcontractors, Design Reviews, and all Utility Work or Work by other Subcontractors within or near the Site.

Design-Builder shall incorporate into the Project Baseline Schedule and Project Status Schedule the Department's Project ROW for the activities described in Section 21.3 (*Project ROW Acquisition Status*).

Activities shall include the Contract deliverables, such as Submittal of design documents, permit applications, material samples, shop drawings, working drawings, Inspection and Testing Plans, safety and security plans. Activities that may affect progress shall be reflected, as well as those of affected utility companies and other similarly involved third parties. Any such activities set forth in the Contract Documents shall be reflected on the Project Baseline Schedule.

Once the Project Baseline Schedule is accepted by the Department in accordance with the PMP, it shall become the basis for the Updated Schedule.

Design-Builder shall submit six copies of the Project Baseline Schedule in accordance with the requirements of Section 1.6.1.1.1 of the Technical Provisions and Section 3.2.2.1 of the Contract. Design-Builder shall designate at the time of submittal, in writing, an authorized representative who will be responsible for the preparation, revision, and updating of the Project Schedules. Design-Builder shall participate in review and evaluation sessions of the Project Baseline Schedule with the Department, as requested, and shall provide requested revisions to the Project Schedule within 10 Days.

Design-Builder shall provide a plot of the Project Baseline Schedule in an acceptable size, scale, and format showing the order and interdependence of activities and the sequence of work. Critical activities shall be distinguished on all reports by the use of color or other acceptable means. Successors may not be required for certain activities that are not on the Project Schedule Critical Path, if it can be reasonably assumed that the Activity in question is not critical and must be completed sometime before Substantial Completion Deadline for Final Acceptance Date.

Monthly Project Status Schedule

Design-Builder shall provide six copies of monthly Project Status Schedule and reports together with an electronic copy in .xer or approved format showing the activities, or portions of activities, completed during the reporting period. Design-Builder shall state the percentage of the Work actually completed and scheduled, the remaining duration, and the progress along the Critical

Technical Provisions – Attachment 01-4
Project Schedule

Path in terms of Days ahead or behind the allowable dates as of the report date. Design-Builder shall indicate any changes made to the Project Baseline Schedule. Changes to the baseline schedule will only be allowed as approved by the Department. Design-Builder shall participate in a review and evaluation of the monthly update with the Department, as requested, and provide requested revisions to the monthly update within 10 Days.

Failure to Provide an Acceptable Schedule

Any failure or delay in the submittal or approval of a Project Baseline Schedule, monthly Project Status Schedule, or recovery schedule shall not result in any time extension under the Contract.

**ATTACHMENT 02-1
QUALITY MANUAL**

This page intentionally left blank.

**ATTACHMENT 02-1
QUALITY MANUAL**

1. As a component of the Project Management Plan (PMP), Design-Builder's Quality Manager shall establish and maintain a comprehensive Quality Manual that describes the Quality Management System (QMS) for all aspects of the Project Work. The Quality Manual shall establish the quality policy and quality objectives for all aspects of the Work. It shall also describe the processes that are to be established, implemented, controlled, and continually improved to achieve the aforementioned quality objectives.
2. The quality objectives shall be specific and measurable, consistent with the quality policy and linked to meeting the needs and performance expectations of the Department with regard to the Project. The QMS described in the Quality Manual shall include all of the activities required to achieve these quality objectives, including project controls such as scope, cost, schedule, and general document control management activities. All of these activities shall be subject to internal and external quality audits.
3. The Quality Manual shall describe the organization and reporting relationships of Design-Builder-Related Entities involved in performing the Work and how key quality management activities such as the management of project controls, design, construction, traffic, and environmental activities shall interface with each other.

The Quality Manual shall also provide an organizational chart showing the Department's Quality Oversight relationship with Design-Builder, and the responsibilities of all Design-Builder's Key Personnel involved with the Project. The Quality Manual shall also show how the various levels of QMS documentation are linked to each other.

4. The Quality Manual shall clearly define the reporting function and authority of Design-Builder's Quality Manager, who shall liaise with the Department and act as Design-Builder's single-point representative to the Department for all matters relating to quality management.

This page intentionally left blank.

**ATTACHMENT 02-2
DESIGN QUALITY MANAGEMENT PLAN**

This page intentionally left blank.

**ATTACHMENT 02-2
DESIGN QUALITY MANAGEMENT PLAN**

1. As a component of the Project Management Plan (PMP) and the Quality Management System (QMS), Design-Builder shall establish and maintain a comprehensive Design Quality Management Plan (DQMP) that describes how it will manage the design processes for the Project in accordance with the International Organization for Standardization (ISO) 9001:2008 standard, its Quality Manual, and the requirements of the Contract Documents, including Section 3 (*Design Quality Management*) of the Technical Provisions.
2. The DQMP shall contain an organizational chart for all design activities that expands on the organizational chart in the PMP and the Quality Manual, identifying personnel responsible for design management and their relationship with the Quality Manager, who is responsible for Design-Builder's overall QMS as documented in Design-Builder's Quality Manual. It shall also contain a description of the responsibilities, qualifications, and authority of the above personnel and the organizational interfaces between those responsible for design management and other engineering and construction management disciplines.
3. The DQMP shall, at a minimum, include or reference detailed procedures and detailed process flow charts for the following processes:
 - a. The procedures to be used or designing and checking of the designs and the form of design review to be undertaken.
 - b. The identification of the checking team.
 - c. The contents and format of Design Document Submittals.
 - d. A design and audit review schedule, including dates Design-Builder plans to:
 - i. Conduct internal audits of the design verification process.
 - ii. Submit design packages.
 - iii. Undertake Design Review meetings with the Department.
 - e. The process and schedule for road safety audits, including, but not limited to, performing an audit prior to opening a section of roadway to traffic.
 - f. A drawing tree indicating the organization and hierarchy of Design-Builder's drawings.
 - g. Suitable metrics to measure the progress of design for each discipline.
4. In addition, the DQMP shall, at minimum, include or reference detailed Quality System Procedures (QSPs) and detailed quality process flowcharts for the following processes and procedures that shall document who does the Work, and auditable evidence of compliance with the Contract Documents:
 - a. Design input and output review.
 - b. Design verification to ensure that design input requirements have been met.
 - c. Design validation to ensure that the completed design is compliant with the Contract Documents and suitable for its intended use.

Technical Provisions – Attachment 02-2
Design Quality Management Plan

- d. Design changes.
- e. Quality assessment and procurement of Design-Builder-Related Entities responsible for design.
- f. External quality audits of Design-Builder-Related Entities responsible for design.
- g. Internal quality audits of quality assurance (QA) and quality control (QC) processes.
- h. Corrective actions, preventive actions, and opportunities for improvement.
- i. Control of quality records.
- j. Document management.

**ATTACHMENT 02-3
CONSTRUCTION QUALITY MANAGEMENT PLAN**

This page intentionally left blank.

**ATTACHMENT 02-3
CONSTRUCTION QUALITY MANAGEMENT PLAN**

1. As a component of the Project Management Plan (PMP) and the Quality Management System (QMS), Design-Builder's Quality Manager shall establish and maintain a comprehensive Construction Quality Management Plan (CQMP) that describes how it will manage the construction activities in accordance with the International Organization for Standardization (ISO) 9001:2008 standard, its Quality Manual, and the requirements of the Contract Documents, including Section 4 (*Construction Quality Assurance, Quality Control, and Oversight*) of the Technical Provisions.
2. The CQMP shall contain an organizational chart, which expands upon the organizational chart of the Quality Manual, identifying personnel responsible for construction management and their relationship with the Quality Manager for the Design-Builder's overall QMS as documented in Design-Builder's Quality Manual. It shall also contain a description of the responsibilities, qualifications, and authority of the above personnel and the organizational interfaces between those responsible for the Work, including construction management and other disciplines such as design management, environmental, and traffic management.
3. The CQMP shall, at a minimum, include or reference detailed Quality System Procedures (QSPs) and detail process flowcharts for the following processes:
 - a. Construction safety audits.
 - b. The process and schedule for work zone safety audits.
 - c. Inspection, testing, and monitoring.
 - d. Materials identification and traceability.
 - e. Quality assessment and procurement of Design-Builder-Related Entities responsible for construction.
 - f. External quality audits of DB-Related Entities responsible for Construction Work.
 - g. Internal quality audits.
 - h. Control of Nonconforming Work.
 - i. Corrective actions, preventive actions, and opportunities for improvement.
 - j. Document management.
 - k. Control of quality records.
 - l. The above procedures and flowcharts shall document who does the Work, what they do, and what provide evidence they have done the Work correctly.
4. The CQMP shall also include and/or reference an Inspection and Testing Plan. The Inspection and Testing Plan shall, at a minimum, include:
 - a. Description of the operations or stage of Work.
 - b. Description of the inspection, calibration, sample, test or trial activity (at what stage the inspection or test take place), and monitoring activity.

Technical Provisions – Attachment 02-3
Construction Quality Management Plan

- c. Frequency, number, and time schedule of inspections, calibration, sample, test and monitoring for both QC and QA.
- d. Reference to Project Standards, codes, specifications, and acceptance criteria.
- e. Specified testing and inspection procedures and applicable checklists and reports.
- f. Personnel or agency responsible for inspection, calibration, sample, test, trial activity, and monitoring activity.
- g. QA review, all hold points and witness points.
- h. When applicable, description and frequency of geotechnical instrumentation.
- i. Monitoring and adherence to acceptance criteria and other records.
- j. Witness and hold points, including who is the responsible party (includes Designer and the Department).
- k. The steel fabricator's QC program outlining the QC tasks to be performed and identifying the individuals responsible for performing the QC tasks.
- l. Concrete QC plan, revisions and weekly reports that address the production, QC testing, transport, contingency plans for equipment breakdown or inclement weather, placement, finish, and cure of Portland cement concrete for foundations, abutments, superstructures, decks, drainage structures, pavement and other pours over 100 yd³ (75m³).
- m. Design support during construction review points.

**ATTACHMENT 02-4
TRAFFIC QUALITY MANAGEMENT PLAN**

This page intentionally left blank.

**ATTACHMENT 02-4
TRAFFIC QUALITY MANAGEMENT PLAN**

1. As a component of the Project Management Plan (PMP) and the Quality Management System (QMS), Design-Builder shall provide a comprehensive Traffic Quality Management Plan (TQMP) that describes how it will administer the Project's traffic management processes in accordance with the International Organization for Standardization (ISO) 9001:2008 standard, its Quality Manual, and the requirements of the Contract Documents, including Section 12 (Maintenance of Traffic During Construction Period) of the Technical Provisions. The TQMP is to apply throughout Design and Construction, and all traffic personnel of Design-Builder and those of Design-Builder-Related Entities shall comply with the Quality Manual, this TQMP, and the processes and procedures that are part of this TQMP.
2. The TQMP shall contain an organizational chart, which expands upon the organization chart of the Quality Manual, identifying personnel responsible for traffic management and their relationship with the Maintenance of Traffic (MOT) Manager, the Quality Manager, and for Design-Builder's overall Quality Management System (QMS) as documented in Design-Builder's Quality Manual. It shall also contain a description of the responsibilities, qualifications, and authority of the above personnel and the organizational interfaces between those responsible for traffic management and other disciplines such as design management, construction management, and environmental management. The TQMP shall address the manner in which traffic management relates to Project Design and Construction.
3. The TQMP shall, at a minimum, include or reference detailed Quality System Procedures (QSPs) and process flowcharts for the following processes:
 - a. Significant processes outlined in Design-Builder's Transportation Management Plan (TMP) and associated sub-plans.
 - b. External quality audits of Design-Builder-Related Entities responsible for traffic management.
 - c. Internal quality audits.
 - d. Management of Nonconforming Work.
 - e. Corrective actions and preventive actions.
 - f. Document management.
 - g. Control of quality records.
4. The above procedures and flowcharts shall document who does the Work, what they do, and what evidence is generated that they have done the Work correctly. When the above processes are already covered as part of another QMP, the process heading still needs to be identified as part of the TQMP; however, the details can be minimized to a reference to the other QMP and section or paragraph where the details are provided. The referenced QMP and section or paragraph must indicate specific requirements with regard to the above processes as it relates to traffic quality management. Notwithstanding the above, processes that fall within the specific requirements of the TMP must include detailed QSPs and process flowcharts under the TQMP.

Technical Provisions – Attachment 02-4
Traffic Quality Management Plan

This page intentionally left blank.

**ATTACHMENT 02-5
ENVIRONMENTAL QUALITY MANAGEMENT PLAN**

This page intentionally left blank.

**ATTACHMENT 02-5
ENVIRONMENTAL QUALITY MANAGEMENT PLAN**

1. As a component of the Project Management Plan (PMP) and the Quality Management System (QMS), Design-Builder shall provide a comprehensive Environmental Quality Management Plan (EQMP) that describes how it intends to manage the environmental components of the Project in accordance with the International Organization for Standardization (ISO) 9001:2008 standard, its Quality Manual, the requirements of the Contract Documents, and Environmental Management System (EMS), and the Environmental Compliance Management Plan (ECMP). The EQMP is to apply through Final Acceptance.
2. The EQMP shall contain an organizational chart that expands upon the organizational chart of the Quality Manual, identifying personnel responsible for environmental management and their relationship with the Environmental Compliance Manager (ECM), the Quality Manager, and Project Manager for Design-Builder's overall QMS as documented in Design-Builder's Quality Manual. It shall also contain a description of the responsibilities, qualifications, and authority of the above personnel and the organizational interfaces between those responsible for environmental management and other discipline such as management of Project Design and Construction.
3. Design-Builder shall appoint an ECM meeting the qualifications as described in Section 1.6.3 (Key Personnel) who shall be responsible for the EQMP and who shall report to the Quality Manager.
4. The EQMP shall include or reference detailed Quality System Procedures (QSPs) and process flowcharts for the following processes:
 - a. Satisfying and ensuring compliance with Design-Builder's environmental obligations, including compliance with the EMS and in particular, the preparation and implementation of an ECMP and specific plans as may be detailed elsewhere in the Contract Documents.
 - b. Obtaining and maintaining applicable permits, licenses, and approvals.
 - c. Environmental monitoring and reporting.
 - d. Environmental incident reporting and tracking.
 - e. External quality audits of Design-Builder-Related Entities responsible for environmental aspects of the Project.
 - f. Internal quality audits.
 - g. Control of Nonconforming Work.
 - h. Corrective actions, preventive actions, and opportunities for improvement.
 - i. Document management.
 - j. Control and retention of quality records.

The above procedures and flowcharts shall document who does the Work, what they do, and what evidence is generated that they have done the Work correctly.

1. The Department, in the course of its review, shall pay special attention to Design-Builder's EQMP to verify that Design-Builder has taken full responsibility for all of the environmental requirements as specified for the Project.

Technical Provisions – Attachment 02-5
Environmental Quality Management Plan

This page intentionally left blank.

**ATTACHMENT 05-1
LANDSCAPE AND AESTHETICS REQUIREMENTS**

This page intentionally left blank.



PROJECT NEON DB 1-4 LANDSCAPE AND AESTHETICS REQUIREMENTS

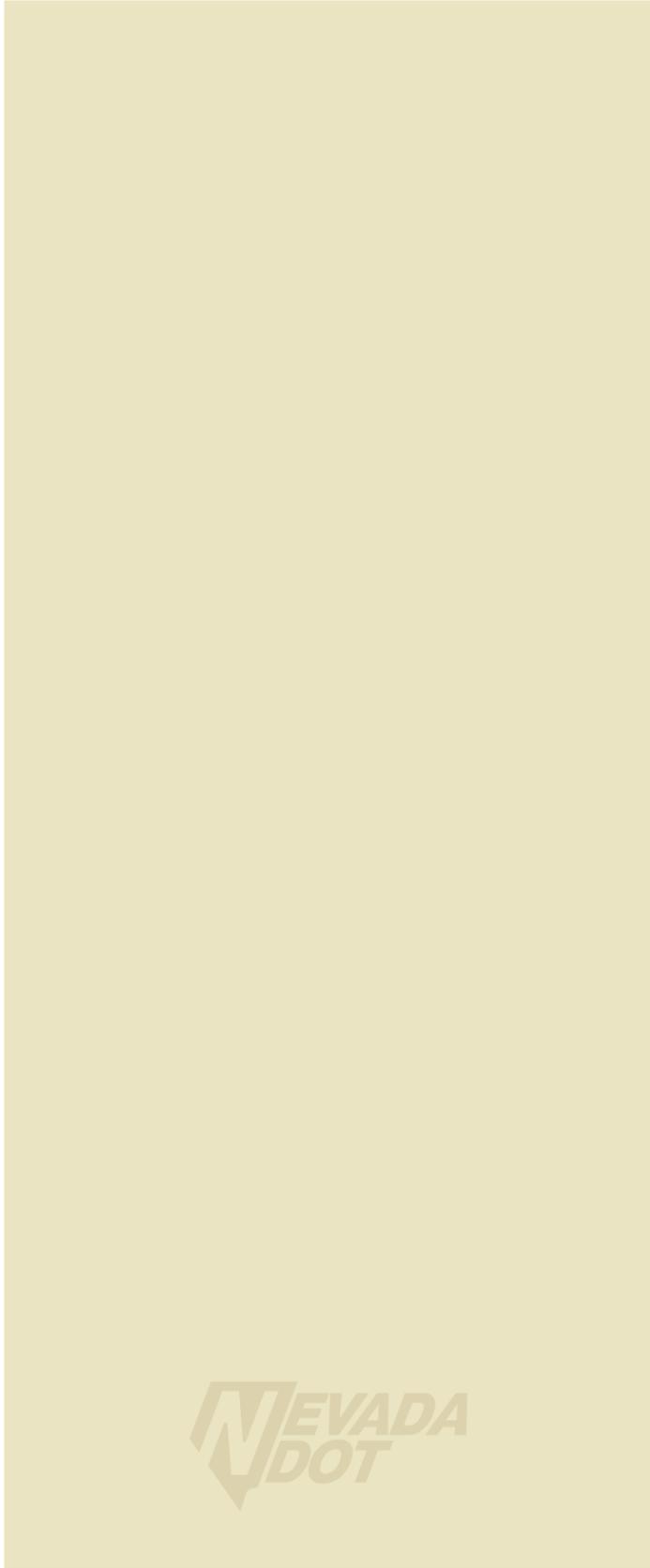


TABLE OF CONTENTS



Table of Contents	i
Use of Landscape and Aesthetics Requirements	iii
Introduction to Meadows Redux.....	v
1.0 Bridge Aesthetics	1-1
2.0 Wall Aesthetics	2-1
3.0 Groundplane Treatments	3-1
4.0 Vegetation.....	4-1
5.0 Sculptural/Artistic Features	5-1
6.0 Color Palette.....	6-1
7.0 Local Agency Project Infrastructure	7-1







USE OF LANDSCAPE & AESTHETICS REQUIREMENTS



GENERAL

These landscape and aesthetic (L&A) requirements shall supplement the project technical specifications and shall be used by project Design-Builder to guide the aesthetic design of the

Project NEON DB 1-4. These requirements set the aesthetic expectations for the project and allow for innovation in achieving project requirements. These requirements set the design parameters and prescribe design templates in the project corridor for mainlines, gateways, interchanges, and remnant parcels to specific architecture and landscape architecture components. The components represented in these requirements were selected to relate to one another through massing, colors, materials, and graphic elements to create an overall aesthetic that supports the Meadows Redux design theme.

These requirements illustrate the application of L&A elements for the thematic character chosen for the project. The L&A theme is Meadows Redux as described in the Project NEON Landscape and Aesthetics Requirements Report by NDOT listed in the Technical Provisions Section 26 (Standards and References).

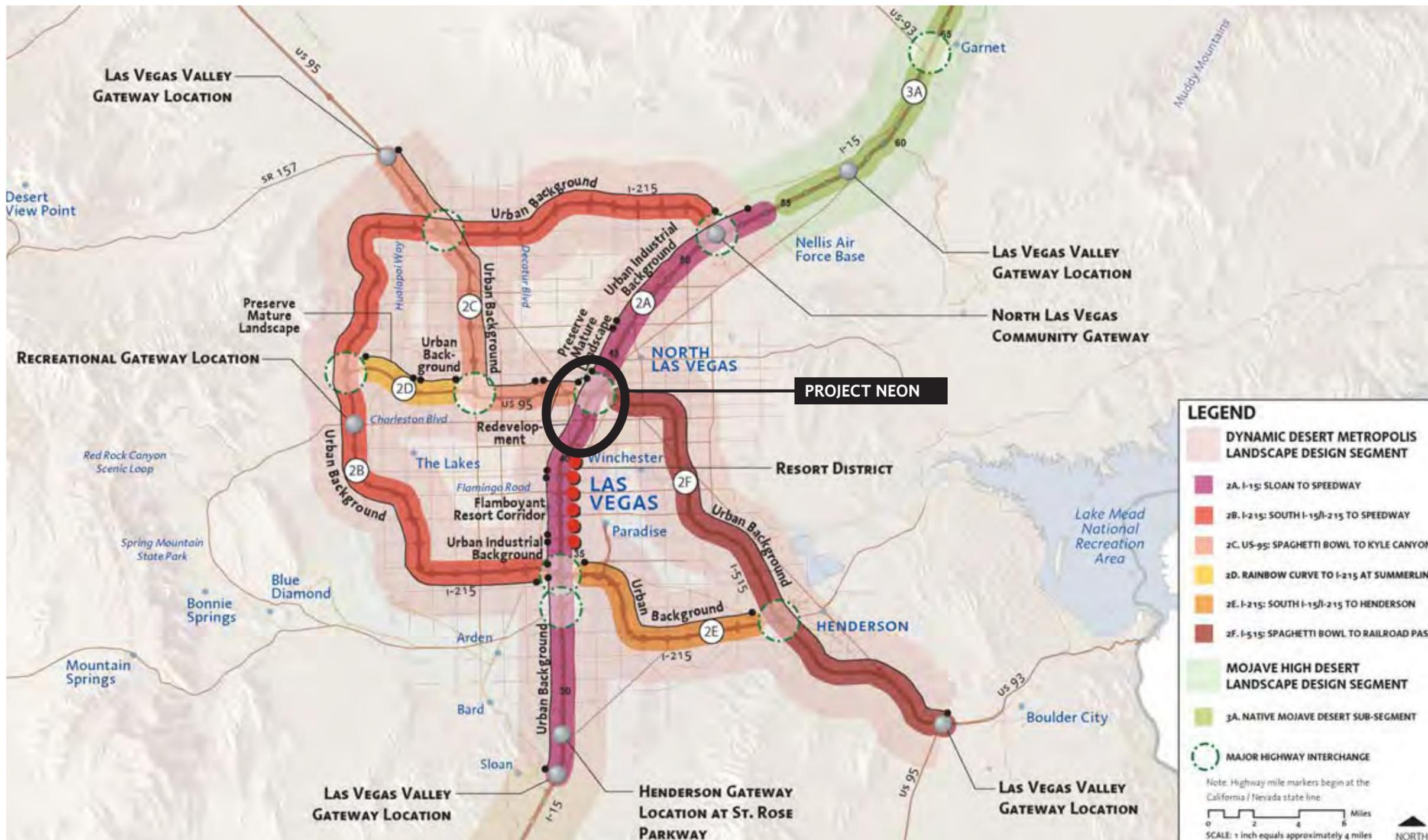
These requirements lay out the application of the theme elements. The Design-Builder shall design a compatible set of artistic impressions of the theme.

The following sections address Bridge Aesthetics, Wall Treatments, Groundplane Treatments, Vegetation, Sculptural/Artistic Features, and Color Palette.

Placement of L&A elements shall be defined by a hierarchy of treatment levels:

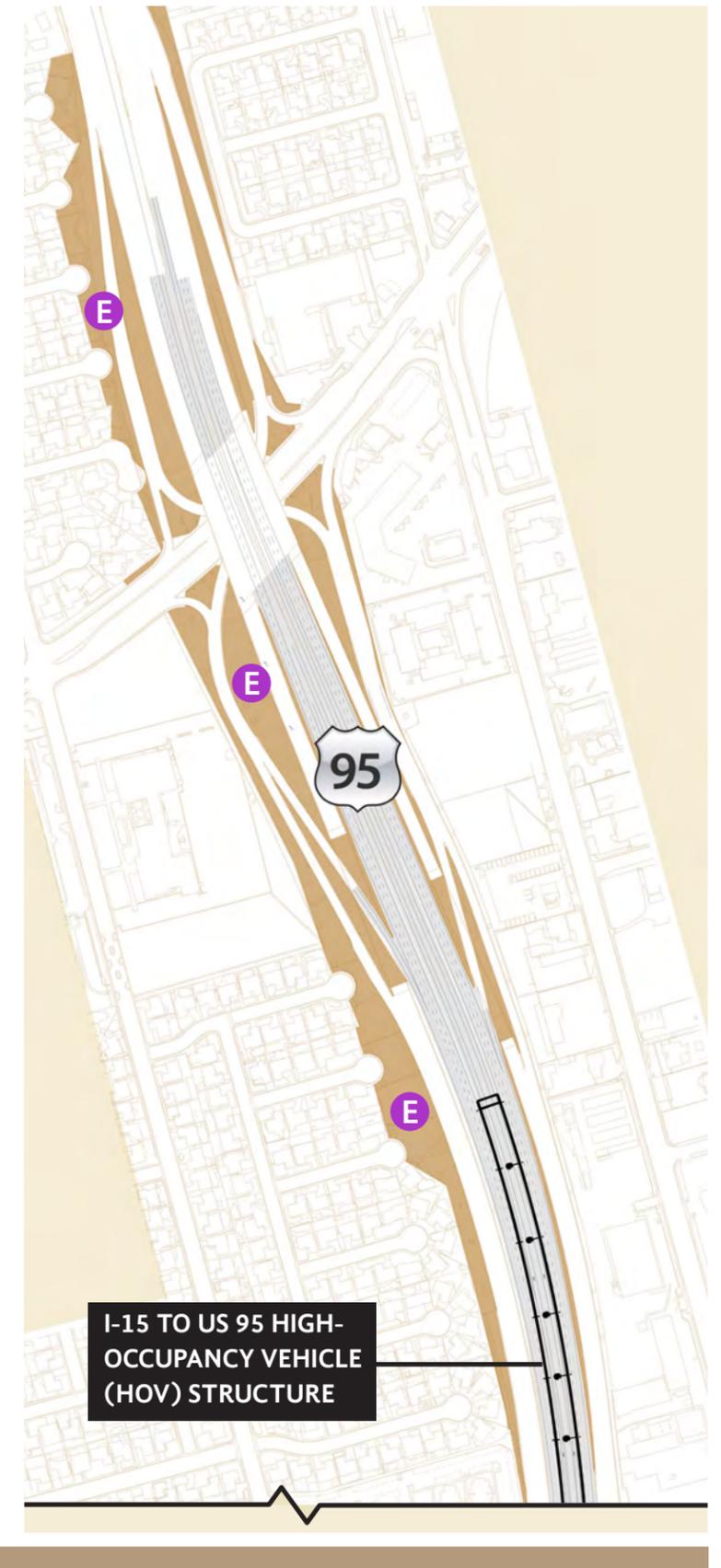
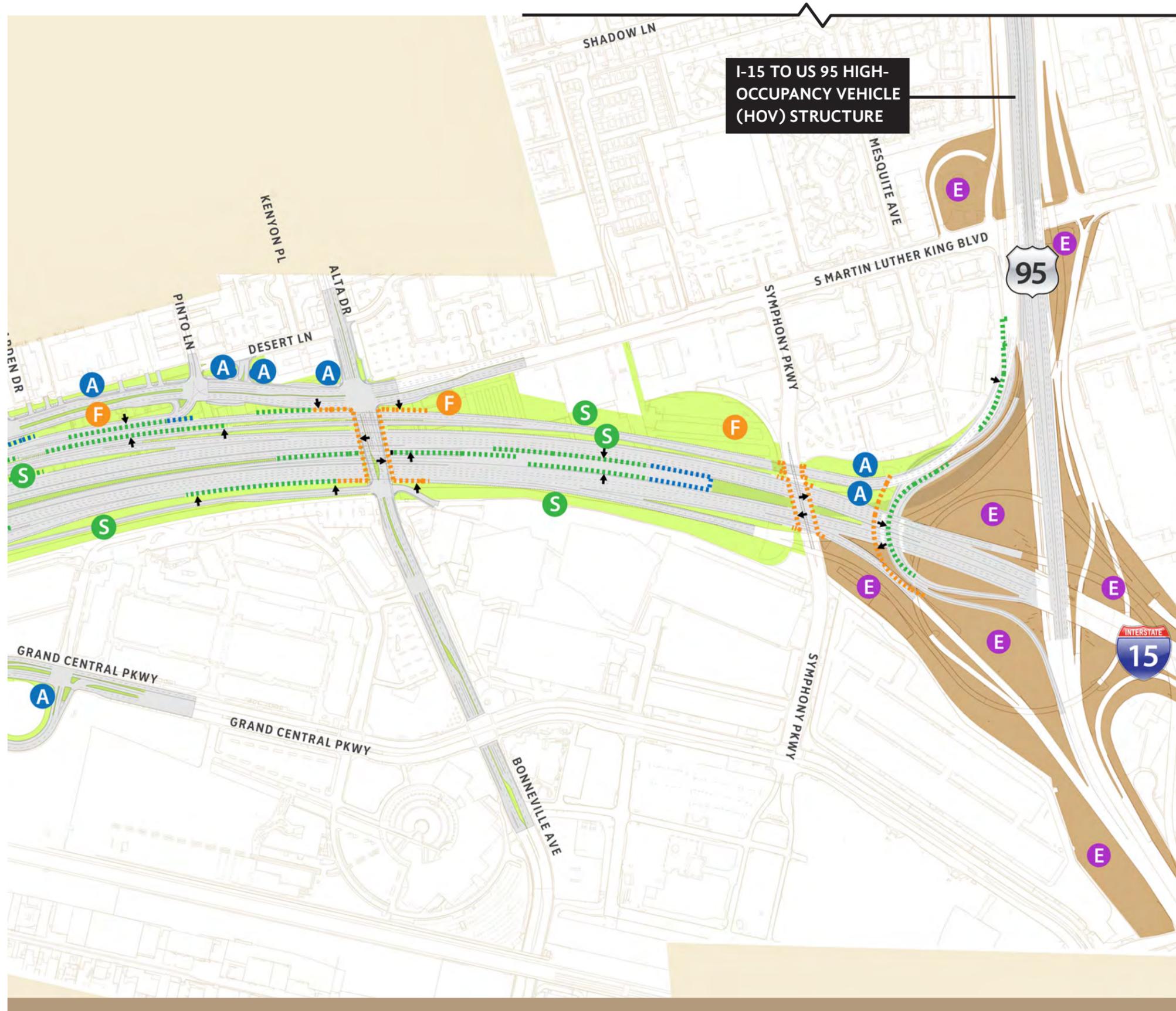
- **Standard**— the base elements throughout the corridor (base color and texture)
- **Accentuated**— areas where the traveling public will view an area as pleasing rather than mundane
- **Focal**— areas to draw attention or that will have focused attention
- **Landmark**— big theme L&A treatments





I-15 CORRIDOR PLAN
LAS VEGAS METROPOLITAN AREA
 Dynamic Desert Metropolis Landscape Design Segment







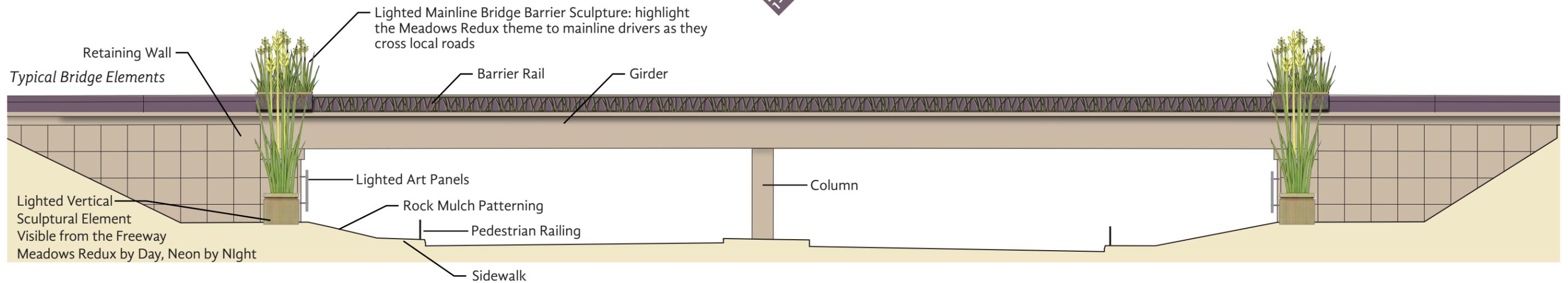


1.0 BRIDGE AESTHETICS

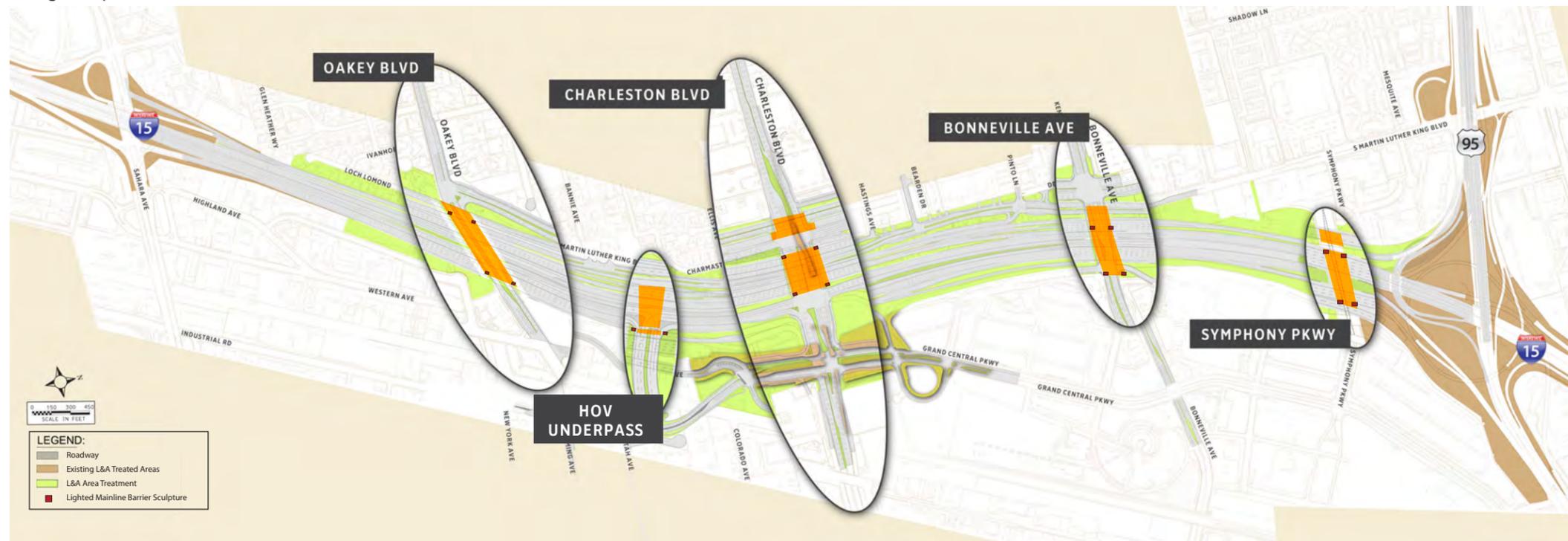




1.0 BRIDGE AESTHETICS



Bridge Map



VISION

Good bridge engineering and aesthetics should be synonymous. Beauty is not simply a matter of taste alone. When qualities such as proportion, order, and symmetry are applied well, people typically often agree the object has aesthetic value; when applied poorly, they generally agree it does not. Aesthetics should be an integral part of design and must be considered both in the general form and in the details that support it. The parts must be considered as contributing to the whole.

DESIGN INTEGRITY

A well-designed bridge is the product of design decisions that are in alignment with one another, with one result being that the design has integrity. Myriad options are available to design, express, and highlight structural form.

Scale: Scale refers to the size relationships among features of the bridge structure and between the bridge structure and its surroundings. Because most design relates to things that will be used by people, a connection exists between the human body and designed objects. Structures that respond to the size of the human form are often referred to as having human scale. Highways have a larger scale because they are built for vehicles moving at high speeds. Highway elements such as piers or girders can be very large but appear “in scale” with the highway environment. Conflicts in scale become apparent when pedestrian accommodations are integrated into the highway environment. Ways must then be found to humanize the scale of the pedestrian portion of the bridge structure so that the structure operates at both scales.

Proportion: Proportion creates a sense of order by assigning appropriate relative sizes to different elements. The goal of good design is to achieve appropriate proportions among the parts of a structure: between its height, width, and depth; between solids and voids; between surfaces and openings; and between areas of sunlight and shadow. Proportion can suggest the order of significance of the elements or the roles played by the elements in the structure. Surface textures and colors also contribute to the sense of proportion.

- Meadows Redux formliner motif along bridge barrier with two accent colors shall extend along the entire length of bridge structures and the approach slab.
- Meadows Redux formliner motif along bridge barrier rail with two accent colors shall be used for 30 feet on either side of bridge columns on the I-15/US 95 HOV Connector.

Harmony, Contrast, and Rhythm: Harmony results when design elements have visual similarity and a complementary relationship. If planes or lines in a design have more dissimilar characteristics than similar characteristics, they are generally not perceived as being harmonious. Contrast relieves the monotony of simple harmony by juxtaposing the characteristics of some design elements with their opposites. Contrast often takes the form of dramatic differences in color or light and shadow. A dominant theme is essential in organizing the design into a pleasing aesthetic experience. Rhythm creates a sense of order by repeating similar elements in, on, or around a structure. These elements create a pleasing natural flow. On bridges, rhythms may be created by the spacing of light poles, spacing posts within a railing, and applying surface texture and color.

Color: Color can be applied to define, clarify, modify, accentuate, or subdue the visual effects of structural elements. Warm colors tend to emphasize the presence and size of forms, whereas cool colors diminish the visual importance of the elements to which they are applied. Colors are perceived differently throughout the day and during various seasons because of the position of the sun and atmospheric conditions. Colors are also influenced by the background against which they are seen, and their appropriateness is often judged in terms of their fit with their background. Background is particularly important for highway color selections because the highway element is generally a very small part of a much larger scene.

Texture: Texture helps define form through subtle surface variations and shadings. Texture can be used to soften or reduce imposing scale, add visual interest, and introduce human scale to large objects such as piers, abutments, monuments, and retaining walls. Distance and motion alter the perception of texture. When viewed from a distance or at high speeds, fine textures blend into a single tone and appear flat. The greater the distance, the higher the observer’s speed, or the larger the object to which it is applied, the coarser or larger the texture must be to stand out.

DEFINED HIERARCHY OF TREATMENT LEVELS Standard

Base color and texture, accent colors

Accentuated

Repeating pattern of Meadows Redux motif, accent colors or appliqué

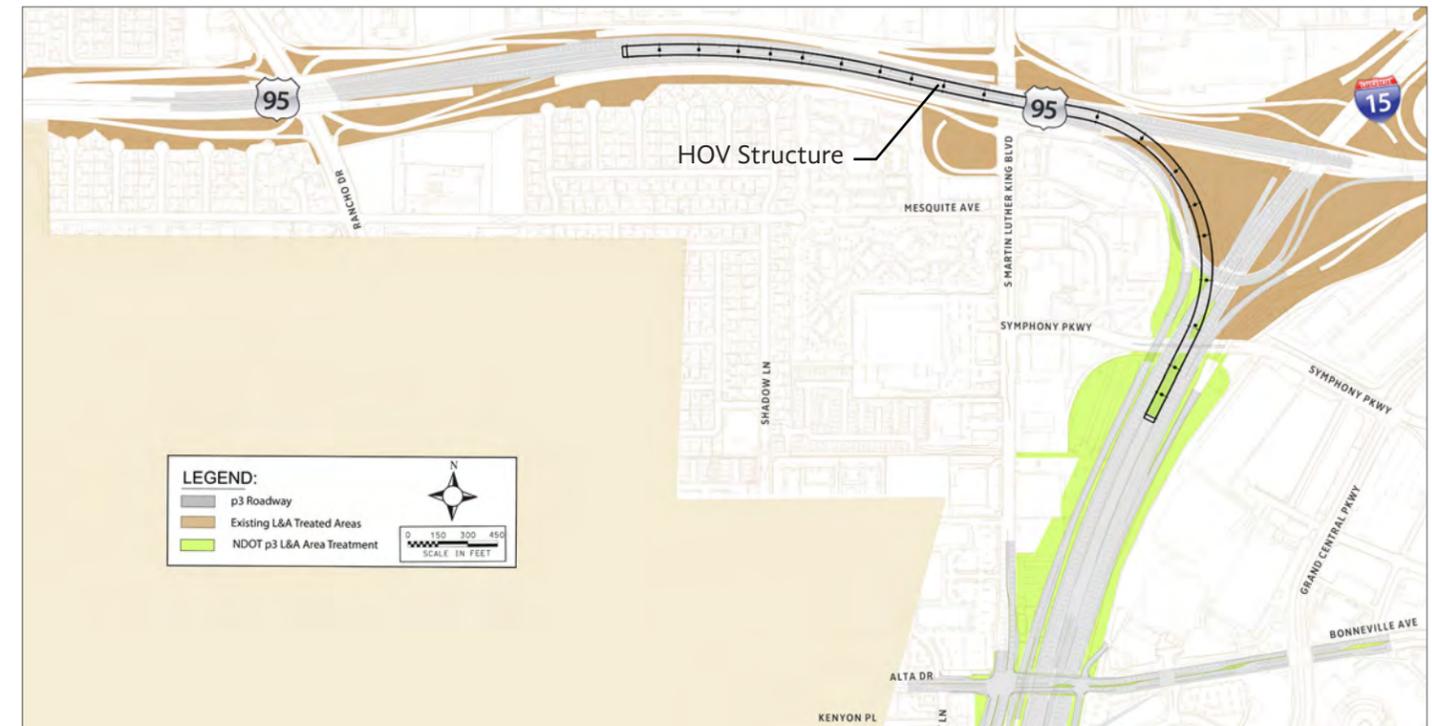
Focal

Meadows Redux motif on barrier rail on bridges and on sections of barrier rail over columns on HOV structure

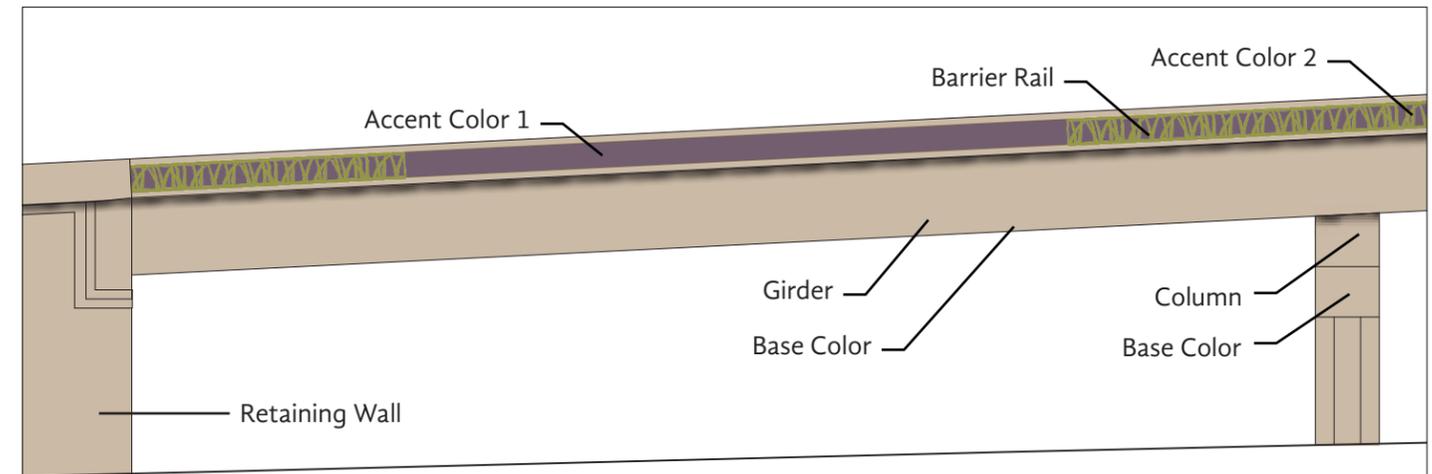
Landmark

Bridge barrier rails or columns: enhanced to carry out a strong theme statement, draw the traveler’s attention, or make a visual connection to the unique place and/or history

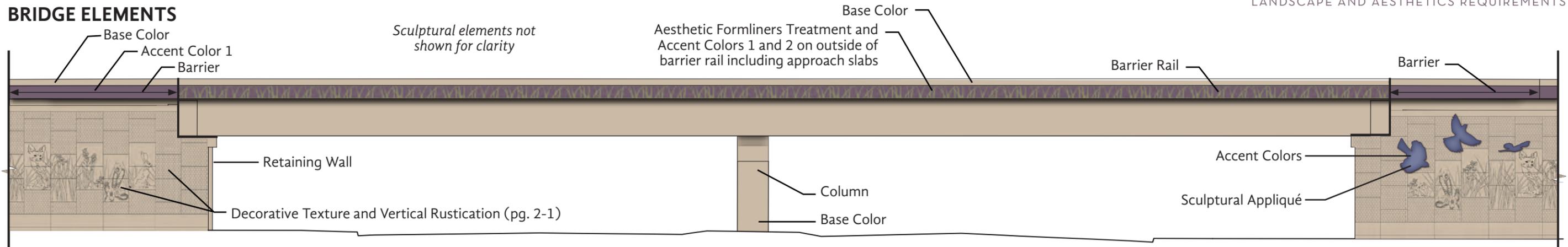
I-15 to US 95 HOV Structure



HOV Structure Elements



BRIDGE ELEMENTS



DESIGN CHARACTER

Meadows Redux Grasses and Flowers:

Mojave Fauna
Mojave Flora

Hierarchy Landmark Treatment:

HOV/NEON Gateway
Charleston Boulevard

Focal Treatment:

Bonneville Avenue/Alta Drive

COLOR PALETTE (see Section 6.0)

Base Color:

DE 6130 Wooded Acre

Accent Colors:

DE 5978 Plum Wine

DE 5537 Woodland Walk

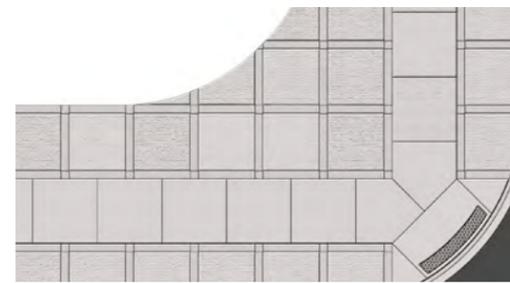
DE 5914 Bossa Nova Blue

PEDESTRIAN RAILINGS



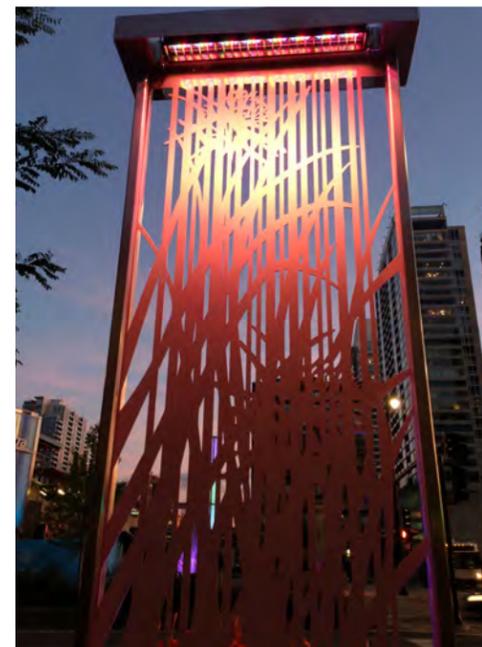
Pedestrian railings shall be used for pedestrian safety and directional control.

SIDEWALKS



Sidewalks shall be standard finish and accessible, 6 feet to 8 feet wide or greater. The remaining sidewalk area shall be scored or textured under the bridges and at intersections.

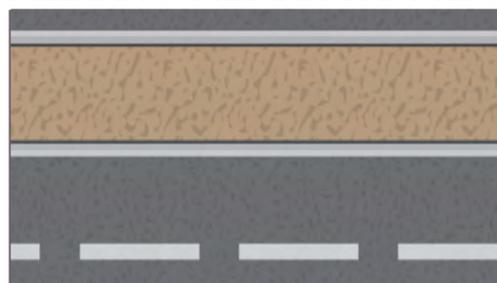
UNDERPASS ART PANELS



A series of lighted art panels under bridge overpasses shall enhance pedestrian safety and experience.



MEDIAN & MEDIAN BARRIERS



Medians under bridge structures shall be stamped concrete or pavers that are base color and textured.

EXISTING SLOPE PAVE

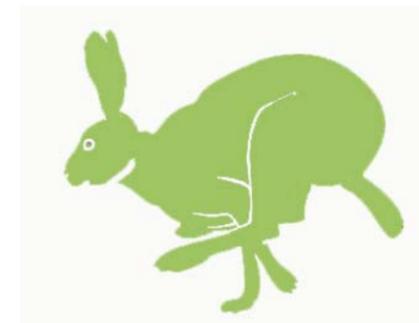


Slope pave shall be base color with accent color patterning and sculptural appliques.

SCULPTURAL APPLIQUÉS



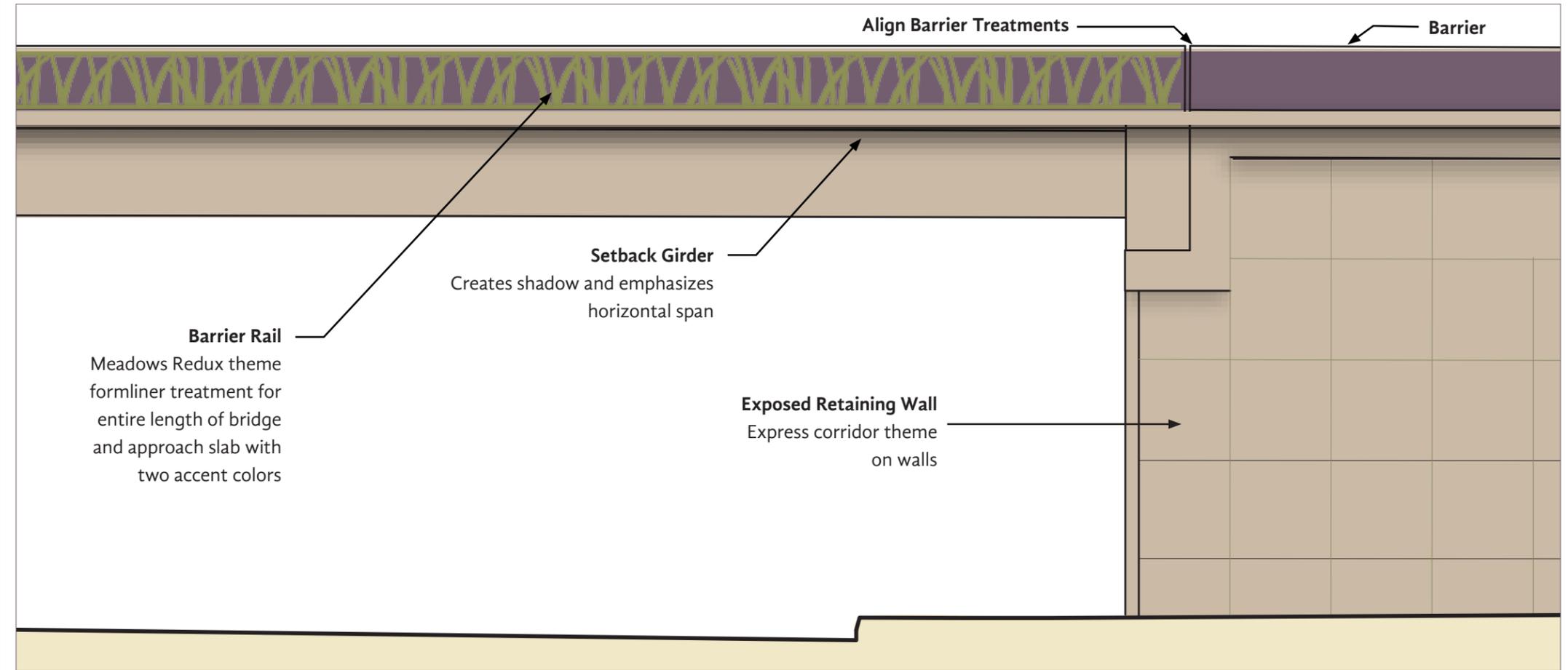
Sculptural appliques promoting the Meadows Redux theme and accent colors shall be applied to walls to provide scale, proportion, contrast, and interest.



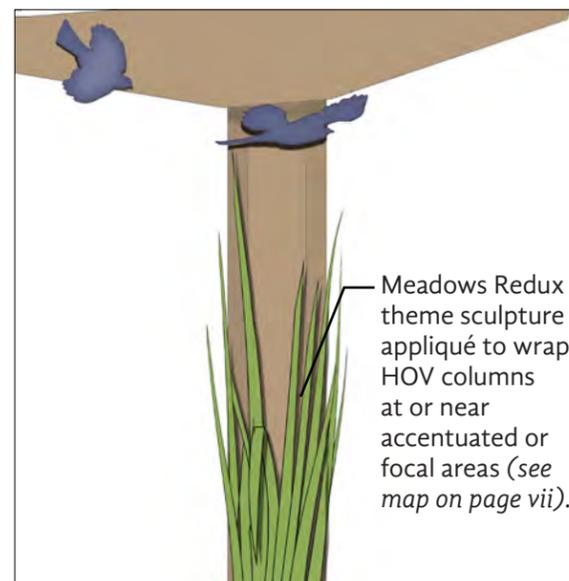
- All highway structure elements shall be painted with the base color.
- Accent colors shall be used in a composition to visually reinforce structural elements on bridges.
- Accent colors shall be used to highlight structural aspects in high-visibility areas.
- Abutment walls with properly scaled aesthetic images, formliners and vertical rustication shall provide a strong visual anchor for the bridge.
- A consistent horizontal span across the bridge length shall be provided on either side of bridge column set back from the edge to provide a strong shadow line to the bridge girder.
- Center columns shall be well-proportioned to the overall bridge.
- Lighted mainline bridge barrier sculptures shall be placed on the outside mainline bridge rail, where the mainline crossing consists of multiple bridges.
- Pedestrian rails, as shown on the civil drawings, control pedestrian crossings along amenity zones and sidewalks, under bridges, and along medians.

BARRIER RAILS AND GIRDERS

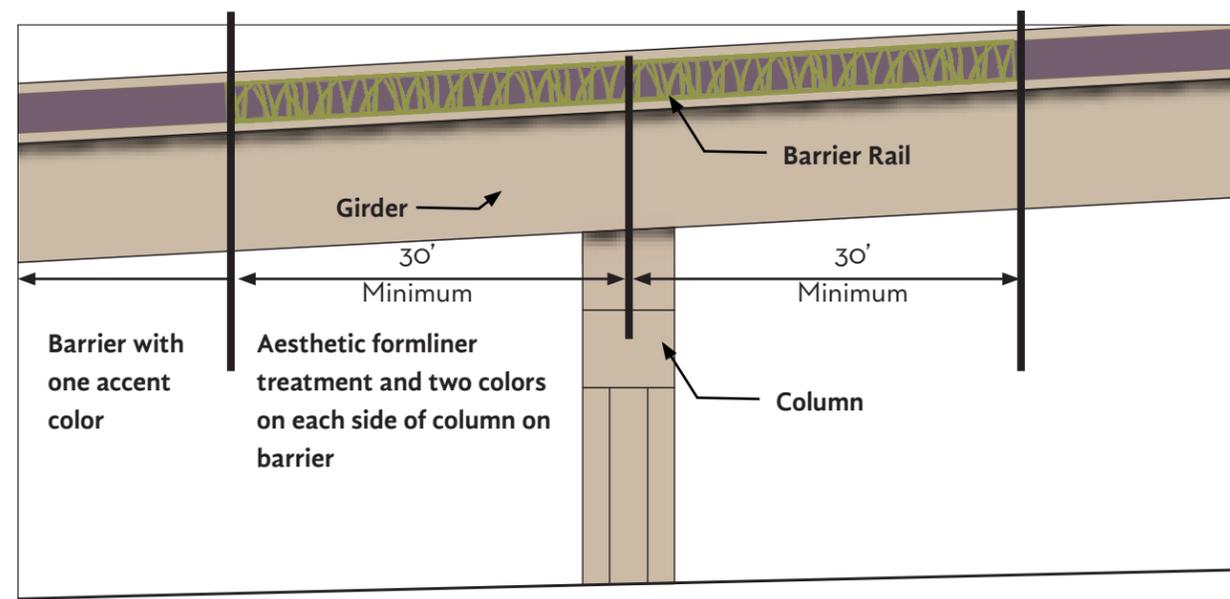
- Bridge abutment wing walls shall be exposed the full height of retaining wall for a 25' length before sloping up to meet grade to allow for expression of the corridor theme on walls.
- Aesthetic treatment of the bridge barrier rail shall appear integrated into the approach barrier.
- Bridge barrier rail treatment shall include a minimum of two accent colors.
- Apply appliqué elements and wraps on three columns in accented/focal areas (see map on page vii).



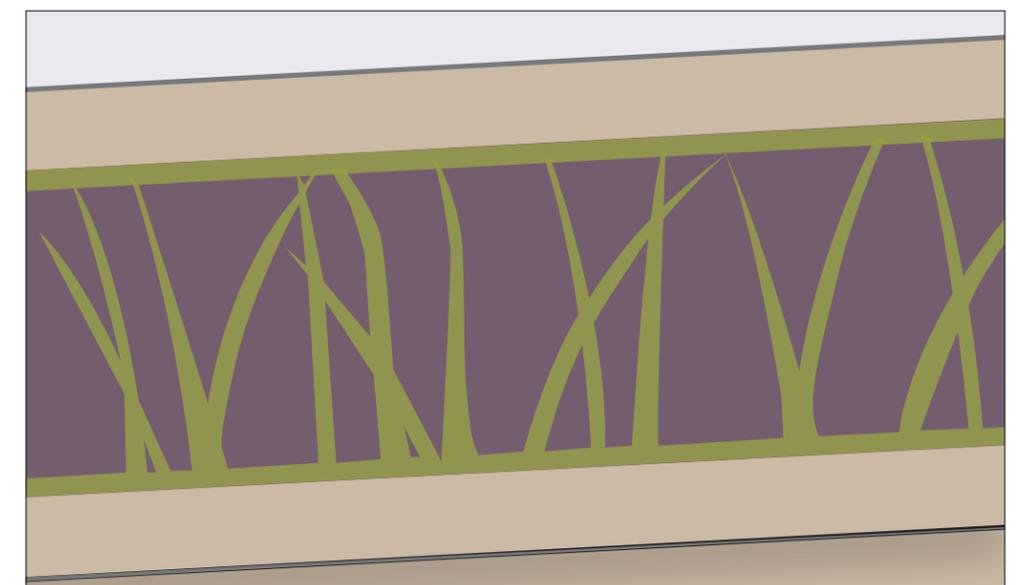
Barrier Rail and Girder at Abutment



Appliqué Treatments



Barrier Rail on HOV Structure



Aesthetic Treatment for Barrier Rail



2.0 WALL AESTHETICS





2.0 WALL AESTHETICS



INTRODUCTION

This section addresses the treatment of retaining walls, soundwalls, and bridge/structure abutment walls.

All walls shall be integral with their caps and associated traffic barriers and/or retaining walls in the application of a unified base color (Section 6.0) and texture (rustication).

DEFINED HIERARCHY OF TREATMENT LEVELS

Standard

Base color and texture

Accentuated

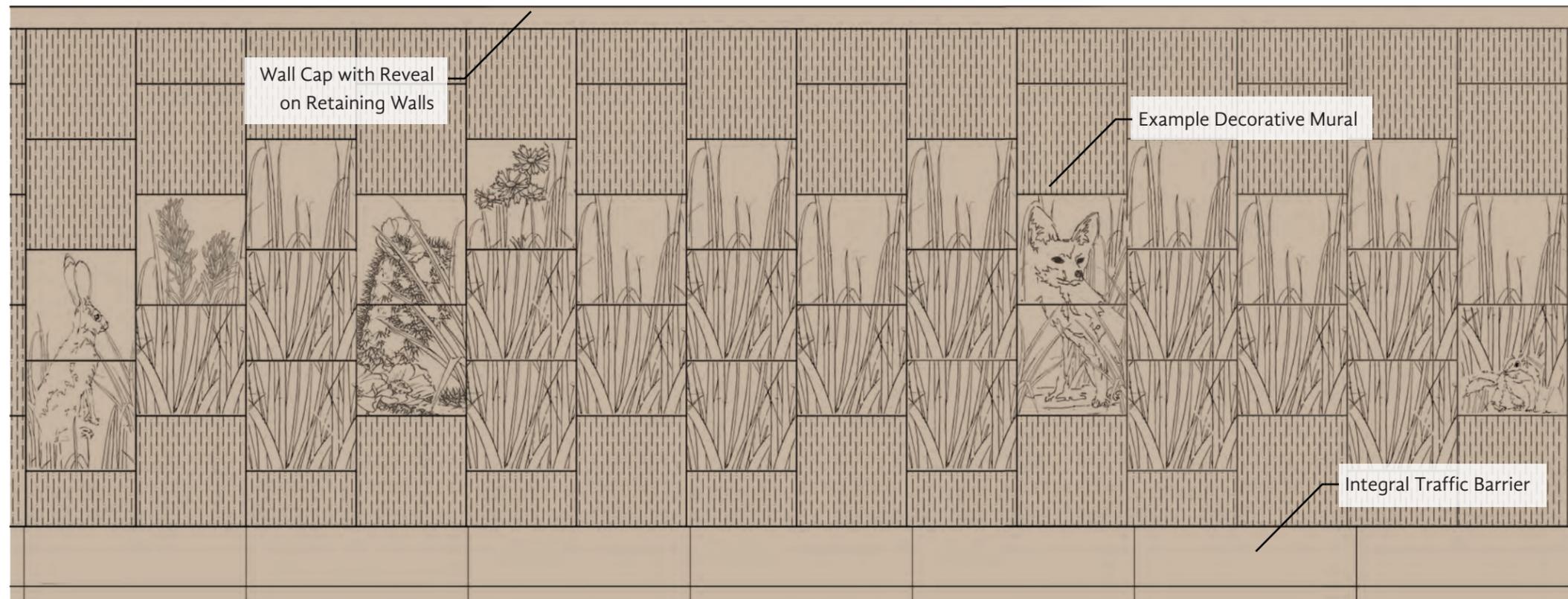
Repeating pattern of mural inserts, accent colors, or appliqués

Focal

All areas viewed for a sustained time, on a curve, on/off ramps, or a stop light condition where the decorative wall motif shall be more detailed

Landmark

Wall areas enhanced to carry out a strong theme statement, draw the traveler's attention, or make a visual connection to the unique place and/or history



- Surrounding land shall be graded with slopes, terraces, and low walls to minimize wall height and turn ends into slopes.
- Planting shall be provided in front of walls where space permits to soften appearance of wall.
- Walls which require steps in the top level shall have steps with no height greater than 2 feet.
- No post and panel walls or segmental block walls shall be allowed. All terraces shall be planted.
- All retaining walls shall be treated with vertical rustication as a base treatment.
- All retaining walls shall be treated with interspersed aesthetic panels (formliners) depicting the NEON Meadows Redux theme.
- Use one detailed set to three less detailed panels of equal size.
- See the Sculptured Artistic Features section of this attachment for use of structural/artistic features.

RETAINING WALLS

Retaining wall treatments shall include a multi-panel Meadows Redux theme mural that can be used in multiple combinations depending on the wall type, height, and width.

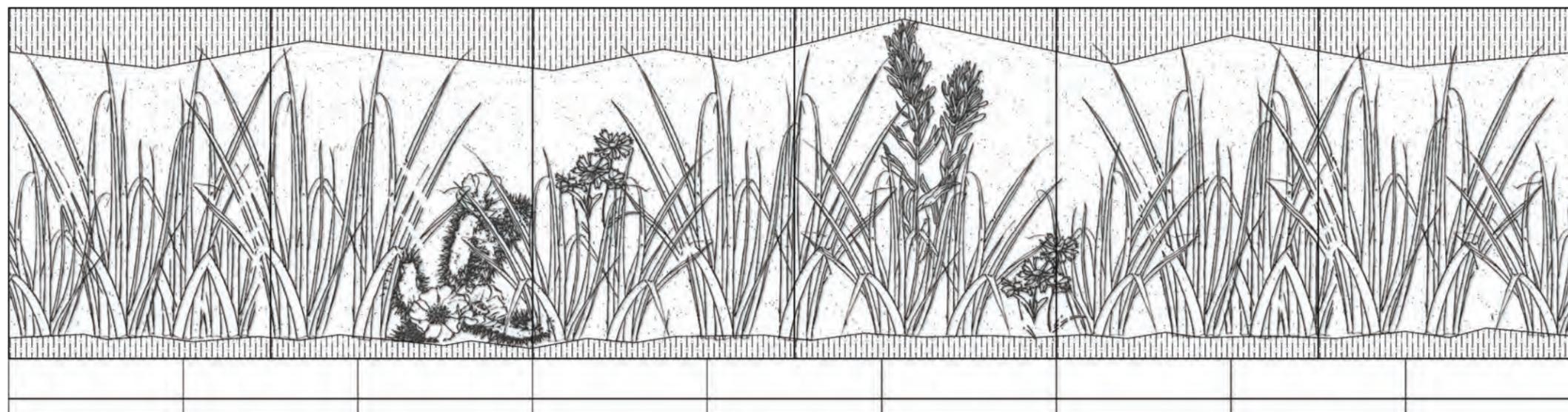
A Meadows Redux motif of grasses, wildflowers, desert cacti, and native wildlife of appropriate size and scale to the location shall be developed into retaining panels or retaining wall formliners and used in areas of lower speeds or to highlight bridges or intersections.

SOUNDWALLS

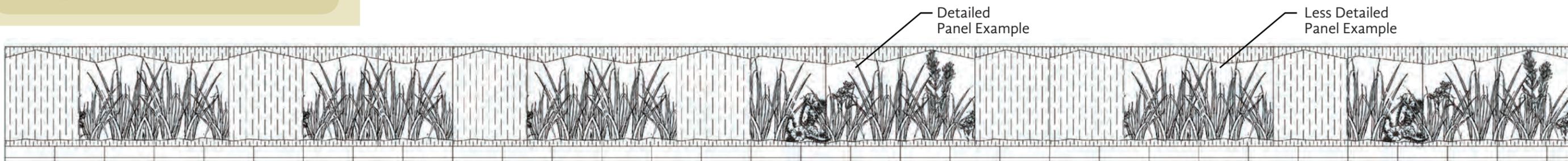
Pattern shall be used on both sides of soundwalls. A series of Meadows Redux landscape murals shall be developed at an appropriate size and scale for highway speeds. A minimum of three textures, including vertical rustication, shall be used.

The incorporation of appliques on the soundwalls is encouraged to break up patterns.

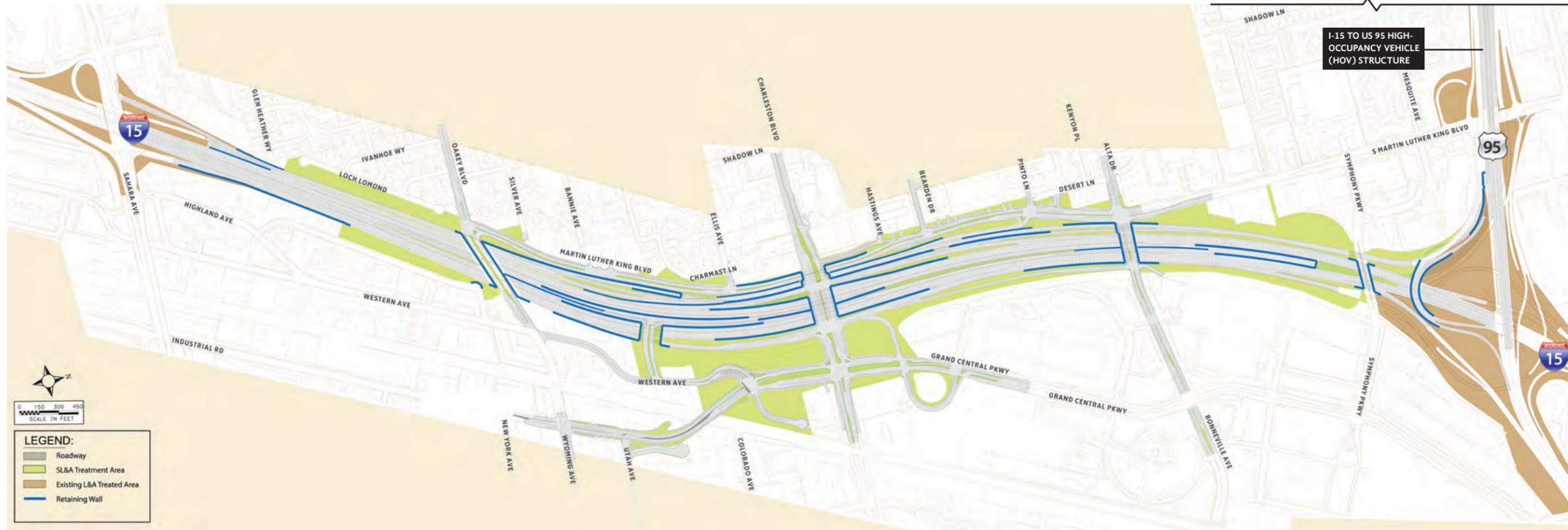
- All soundwalls shall be treated with vertical rustication as a base treatment on both sides.
- All soundwalls shall be treated with interspersed aesthetic panels (formliners) depicting the Project NEON Meadows Redux theme.
- A varied pattern of number of panels is preferred.
- One detailed mural panel to three less detailed panels of equal size shall be used.
- A ratio of one third vertical rustication to two thirds mural patterns shall be used.
- Placement of aesthetic patterns and appliques on walls shall be appropriate in scale to the hierarchy of treatment levels.
- All soundwalls shall receive equal aesthetic treatment on both sides.
- Soundwalls shall have interior columns and single outside seams. Post and panel walls shall not be allowed.
- Each soundwall mural panel shall work independently and in combination with others and special attention paid to avoid horizontal line reveal or texture distortions.



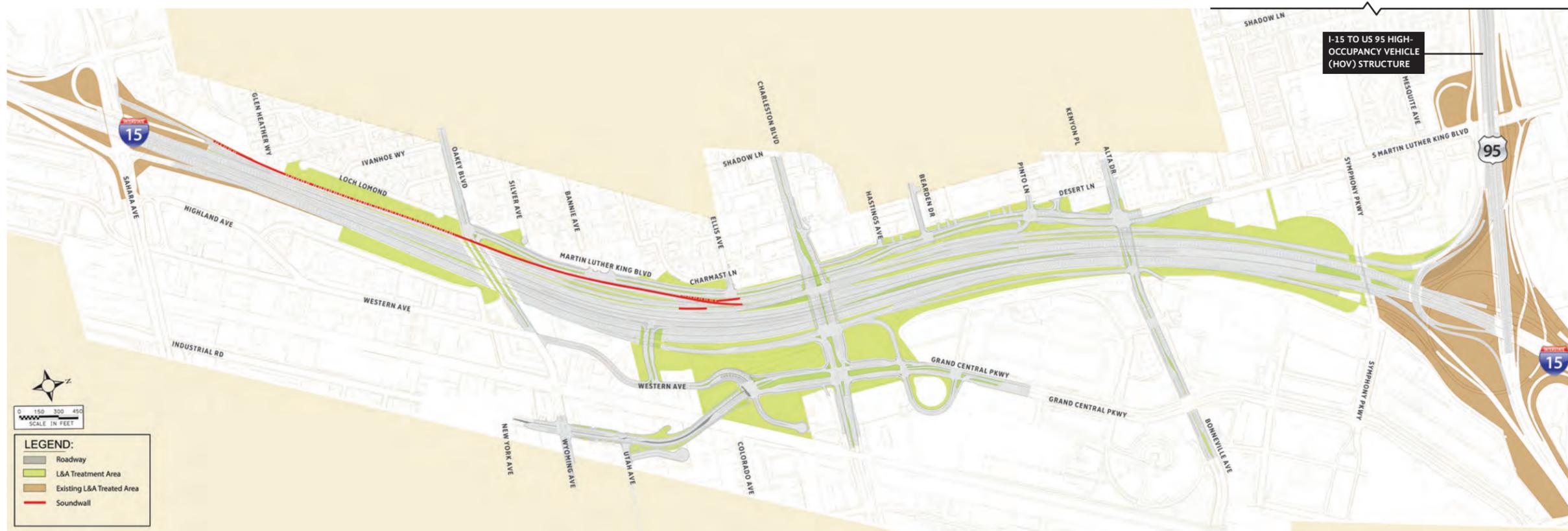
Mural Concept A six-panel Meadows Redux mural concept with vertical rustication top and bottom. Depth and scale of reveals shall be appropriate for highway speeds.



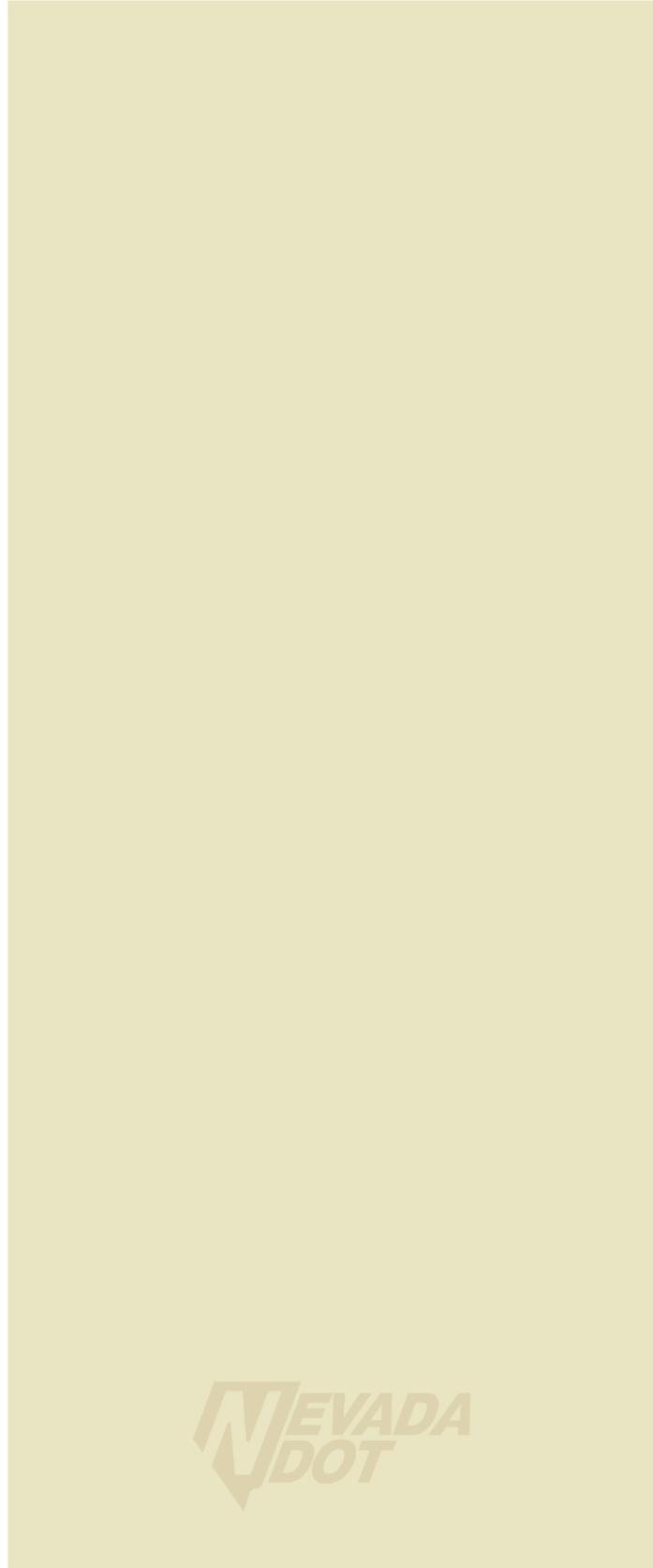
A 250-Foot Sample Wall Segment Series This 250' sample soundwall series uses two-thirds mural panels to one-third vertical rustication panels. Ground plane and skyline align at each panel minimizing horizontal and texture distortions as the panels change.



Retaining Wall Map



Soundwall Map





3.0 GROUNDPLANE TREATMENTS





3.0 GROUNDPLANE TREATMENTS



GROUNDPLANE CONCEPTS

Groundplane treatments along the roadway provide erosion protection, dust and weed control, and an aesthetically diverse visual environment. This treatment includes uniform depth applications

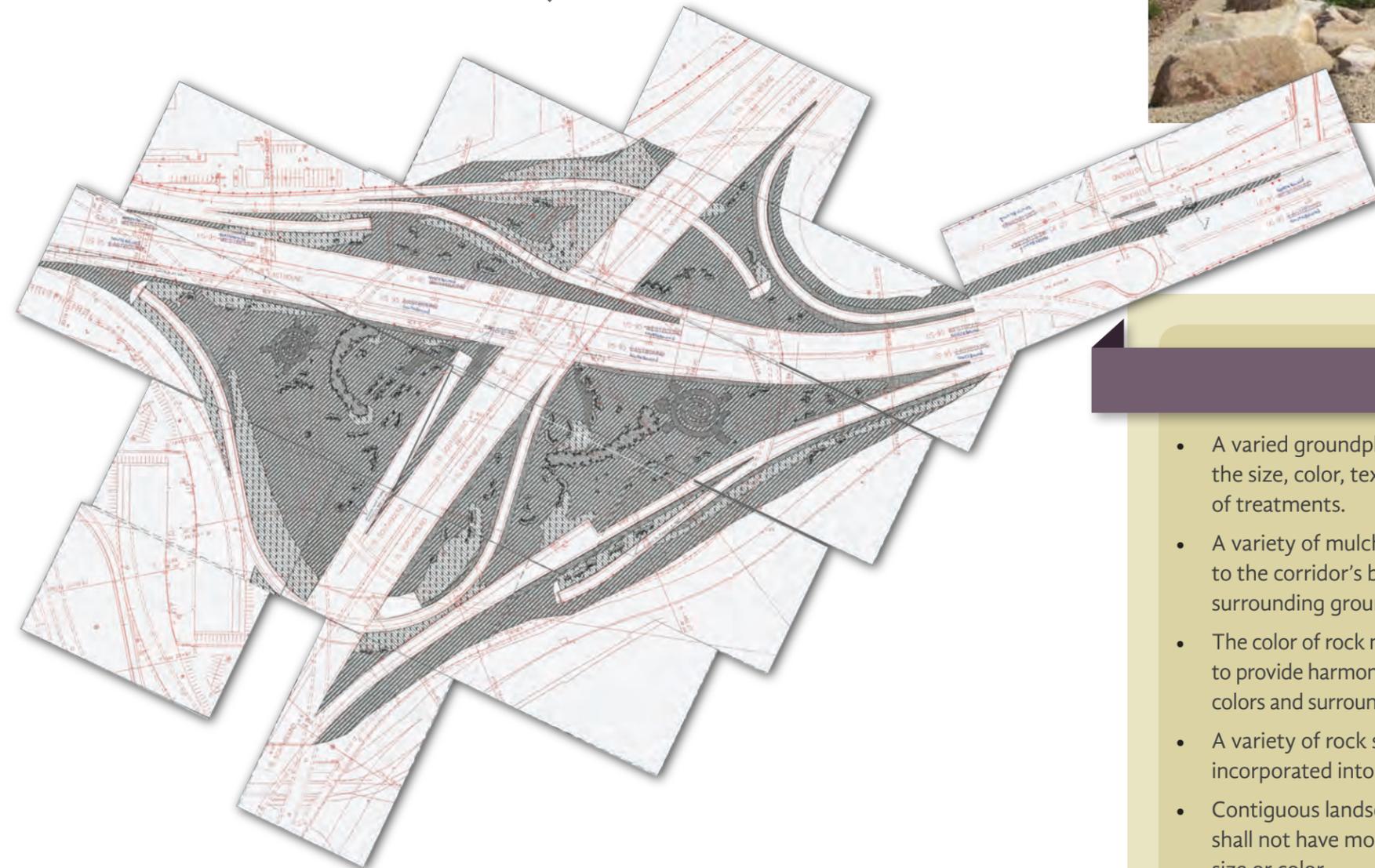
of rock mulch, variable sizes and colors of stone, boulders, or glass mulch combined to create textures and patterns that mimic the existing environment and/or the thematic character of the corridor.

The use of varying rock sizes and textures shall break up the monotony of a continuous plane of mulch for a more natural and aesthetically pleasing visual environment. Varying rock sizes and patterns creates shadow lines and reduces the potential for eye fatigue and related safety issues.

Use of rock mulch colors adds special visual interest, depth of visual scene, and an opportunity to reinforce the corridor theme.

Use of groundplane type, size, color, and patterning design shall be defined by the following hierarchy of treatment levels as viewed from I-15 or the local roadways:

- **Standard**— Minimally viewed areas treated with a varied use of decorative rock, earthforms, and earth art
- **Accentuated**— Areas viewed briefly or with limited exposure to travelers and pedestrians shall include boulders/ walls and landscape elements in addition to the Standard treatment.
- **Focal**— All areas viewed for a sustained time, on a curve, on/off ramps, along local street frontages where



the design motif shall be more detailed and engaging for travelers beyond Standard and Accentuated

- **Landmark**— Areas enhanced to create a strong theme statement, draw the travelers and pedestrians

attention or make a visual connection to a unique place. Shall include all above treatments plus sculptural/artistic elements.

- A varied groundplane shall be created by the size, color, texture, and configuration of treatments.
- A variety of mulch colors that correspond to the corridor's base color and the natural surrounding groundplane shall be used.
- The color of rock mulch shall be coordinated to provide harmony with the corridor theme colors and surrounding environment.
- A variety of rock sizes shall be incorporated into the design.
- Contiguous landscape and aesthetics areas shall not have more than 30% of one rock size or color.
- All exposed ground shall be treated to include as a minimum with earthforms, decorative rock, and earth art.

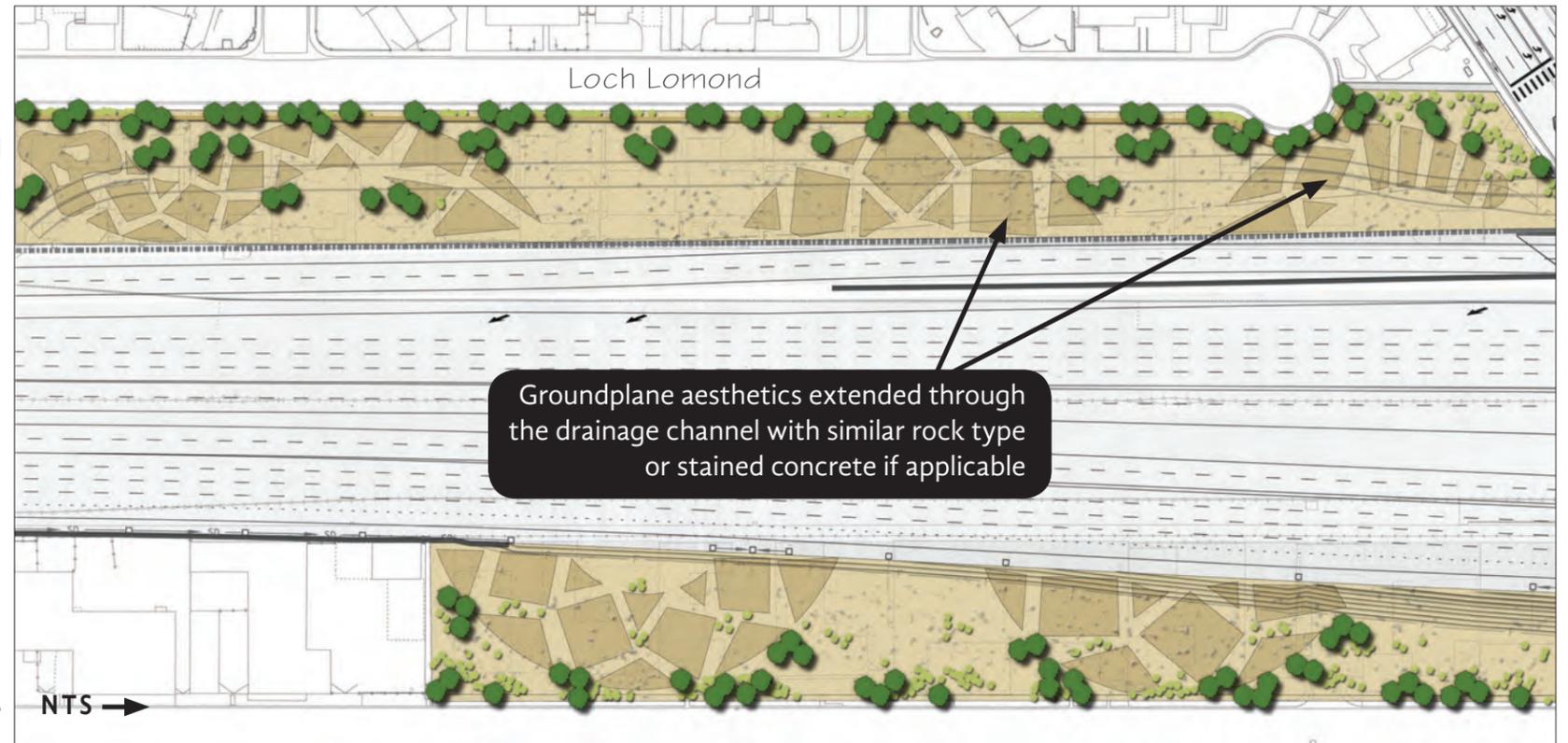
GROUNDPLANE CONCEPTS

The design for groundplane aesthetics shall use familiar desert meadow shapes and concepts. Although not always apparent, the concepts help organize materials and guard against random placement. The chosen concept shall focus on achieving the desired outcome whether disguising linear drainages, or screening or creating patterning on uniform fill slopes. Design rock mulch patterns with a curvilinear alignment that flows over and through linear drainage channels, and up slope and shall be used to provide a natural appearance.

Rounding of tops and toes of slopes in channels and painting of concrete-lined channels shall be used to add to the integration of drainage into the landscape.

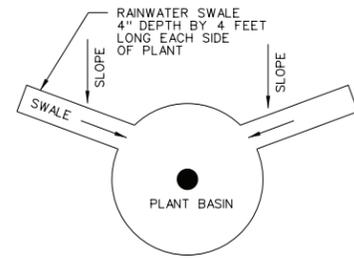
- Patterns, sizes, and textures of rock mulch shall be used in combination with plant material (see the Vegetation section of this attachment).
- Slope paving shall be used only when other demonstrable, viable alternative treatments are not available.
- Smooth transitions shall be designed with rounding tops and toes of slopes.
- Large spaces of one or more acres shall have aesthetic landforms that vary the topography.
- Use of larger rock size shall meet clear zone safety requirements while providing aesthetic relief.
- Channel alignments shall create naturalized patterns while keeping engineering and hydraulic considerations in focus.
- Pockets of varied size boulders along the edges of the drainage channels shall be used to soften the appearance and visually connect the channel to the landscape context.

Large remnant parcels that flank I-15 near Loch Lomond Way and South Highland Avenue are shown below. As illustrated, the area has large Mojave rattlesnake patterning of a second rock mulch type. Landscape boulders, water-wise trees, and desert shrubs are placed infrequently along the edges.

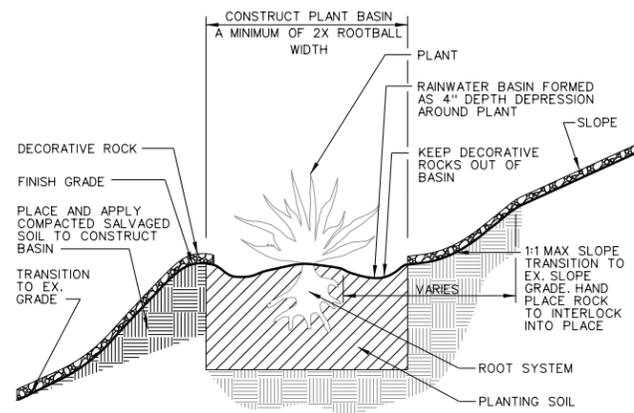


The HOV Gateway from I-15 to Western Avenue is envisioned as a landmark treatment area that includes a formal groundplane treatment. Appropriate height and scale earthen berms, spaced for the travel speed, would be covered with a grid pattern of grasses and contrasting rock mulch. Six Meadows Redux sculptures (see Sculptural/Artistic Features of this document) in increasing height announce the gateway access. Smaller sculptures grace the median together with trees, grasses, and a formal pattern of rock mulch. Glass mulch shall be designed to catch the light from sculptures and street lights. See cover sheet for rendering.

Remnant parcel treatment at I-15 and Symphony Park Avenue. Curvilinear shapes and earthen berms shall be used and second mulch soften long linear fill slopes and drainage channels. Landscape boulders, water-wise trees, and desert shrubs screen the remnant edges and dot the berms and drainage channels. Rock mulch groundplane patterning shall transition seamlessly up slopes.



PLAN VIEW



1 TYPICAL RAINWATER HARVESTING DETAIL
NTS

Planting Pit Prior to plant installation, a planting pit shall be dug 6 inches deeper than the root extension. The planting pit shall be filled with water and allowed to drain. If the planting pit does not drain within 8 hours, then the pit shall have a 6-inch by 24-inch-deep chimney hole dug and filled with pea gravel to improve drainage. For all plants on slopes, dig two shallow depressions (4 inches deep, 12 feet wide by 4 feet or greater long) on uphill side of pits to direct rainwater to plant pit for capturing rainfall from slope. Fill depression with decorative rock (no fines) matching color and size to adjacent decorative rock.



Rainwater Harvesting Rainwater harvesting on slopes increases stormwater collection for infiltration and reduces runoff volume.

RAINWATER HARVESTING

Rainwater harvesting slows water flow during peak rainfall, and may lessen the burden placed on stormwater drainage systems. The goal of rainwater harvesting is to use natural drainage corridors and thoughtful grading to disperse drainage paths over a broad area, decreasing runoff volume and slowing water flow to create greater contact with soils and promote natural infiltration and plant health. This natural infiltration from paved surfaces also may reduce pollutant transport. Rainwater harvesting increases water collection within the landscape to use in place of or to supplement irrigation.

Small retention facilities shall be used to facilitate rainwater harvesting for landscape and aesthetics. For drainage design purposes, any retention provided shall not be considered for storm retention.

LANDFORMS

Earthen forms, along with various rocks, boulders, decorative mulches, sculpture, and art, complete the decorative groundplane at intersections and other points of interest.



- Water harvesting shall be employed as a passive system of drawing natural rainfall to all plantings.
- Landforms shall be designed for large remnant parcels, 1 acre or greater, to provide a background for perimeter planting and aesthetic interest to the traveling public.



Positive Drainage Using positive drainage from slopes, plants can capture stormwater for required moisture.



FREESTANDING METAL ART WALLS

Decorative freestanding art walls can provide vertical elements, add visual interest, and screen traffic from undesirable views.

Metal walls shall be treated with a natural-looking finish such as Desert Varnish, approved accent colors, or other approved finishes.

- Freestanding walls, landscape planting, and rock mulch designs shall be integrated with vehicle recovery zone setbacks in non-parallel, pleasing curvilinear or geometric designs.
- Freestanding walls shall not exceed 14 feet in height without a step in the wall plane; individual step heights shall not exceed 2 feet.
- All freestanding wall foundations shall be covered by groundplane treatment so they are not visually exposed.



FREESTANDING GABION ROCK ART WALLS

Curvilinear freestanding gabion art walls add interest to large remnant parcels and highlight changes in groundplane materials.



DRY STACK ROCK WALLS

Curvilinear freestanding rock walls shall be designed as dry stack to add interest to large remnant parcels and highlight changes in groundplane materials.



GRADE CHANGES

Rammed earth walls allow for subtle grade changes and the display of sculpture or desert landscape. Boulder groups transition slopes naturally.



- Uniform slopes with boulder outcroppings, dry stack, or rammed earth wall shall be used. These will be varied to create interesting areas for landscape or sculpture.
- The tops and toes slope rounding of fill slopes and undulate steepness shall be used and alternated with boulder groupings or earth walls to transition grades and increase visual interest while creating vegetation and rainwater harvesting pockets.
- Decorative freestanding art walls shall be used in a unifying pattern in all contiguous open areas of 1 acre and a minimum of 100 linear feet.
- Dry stack, rammed earth, and boulders shall be used to create grade changes in open landscape areas under one acre.



- Depth of all decorative rock mulches shall be no less than 3 inches.
- Landscape boulders shall be placed in clusters visible to motorists and pedestrians to enhance remnant parcels, fill slopes, and interchanges in focal areas.
- Landscape boulders shall be used in the following sizes and numbers at a minimum:

Small	1'x2'	600
Medium	2'x3'	400
Large	3'x4'	300
- In areas of non-concentrated drainage flows decorative rock shall be 1/2" minimum to 6" maximum.

DECORATIVE ROCK

Rock mulch shall be varied and employ multiple colors, sizes, and textures. Patterns and shapes created with rock mulch can lead to a view of special features such as sculptures and accent vegetation. A homogenous palette of rock mulch can produce negative views such as glare and a monotonous driving experience. Overuse of lightly colored mulch can create sunscald on plant material so shall not be used under or around vegetation.



Apache Gold Rock



Gold Granite



Mojave Gold Rock



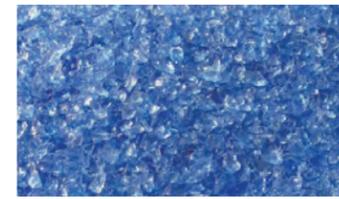
Kino Blue Riprap

GLASS MULCH

Glass mulch can avoid monotonous environments when used primarily as accents among rock mulch or as a groundplane feature or art piece. Large expanses of glass mulch is discouraged.



Recycled glass colors



Recycled glass with epoxy coating can emulate water flow or water bodies

BOULDERS

Boulders can break up rock mulch areas by adding visual interest. They can also simulate a stream or linear path by drawing the eye to special site features such as a sculpture or other site accent, thus creating visual movement.

Boulders shall be placed in varying patterns and sizes and shall not have similar visual characteristics within the same grouping. Boulders to be buried 1/3 depth and oriented such that no scaring will show.



Desert Gold Boulders

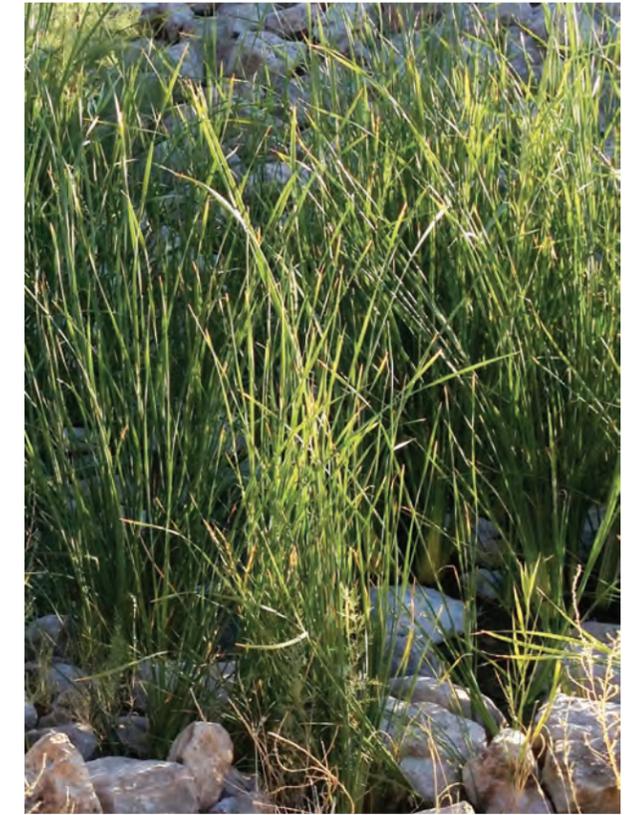


Corona Brown Boulders



Kino Blue Boulders





4.0 VEGETATION





4.0 VEGETATION



Vegetation treatment types for the existing I-15 corridor vary from simple groundcover treatments to masses of varied vegetation. Vegetation for the Meadows Redux concept includes plant material from native Mojave specimens to diverse, regionally adapted plant material selected for color and seasonal interest.

Landscape plant material shall emulate the Meadows Redux theme with the use of grasses or grass-like plants in focal areas. Vegetation areas shall be concentrated in areas most visible to the traveling public on I-15, US 95, and local streets.

Vegetation shall be designed in coordination with groundplane treatments of rock mulches, boulders, berms, and land forms; wherever feasible, rainwater harvesting shall be sculpted into the land.

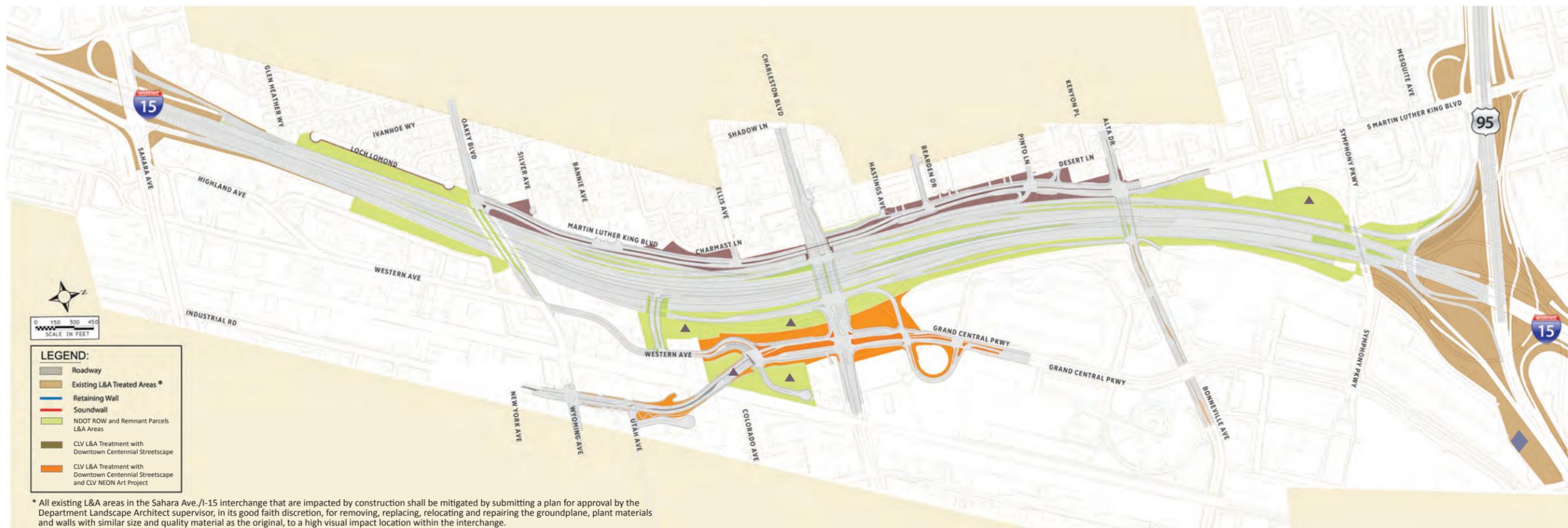


Enhanced Native



Native Revegetation

- See City of Las Vegas L&A section of this document.
- Native revegetation seed shall be installed in interior areas of large remnant parcels shown with ▲.
- The existing berm will be removed, the area shall be treated to be compatible with the existing US 95 L&A treatments. Treatments shall include, land sculpting to add interest and varied topography without blocking views to adjacent properties; irrigation with a tap and meter within Department ROW shall be accessible to maintenance crews and compatible with District 1 Central Control system; drought tolerant species to match species and density of the existing Spaghetti Bowl theme and vegetation. Shown with ◆.



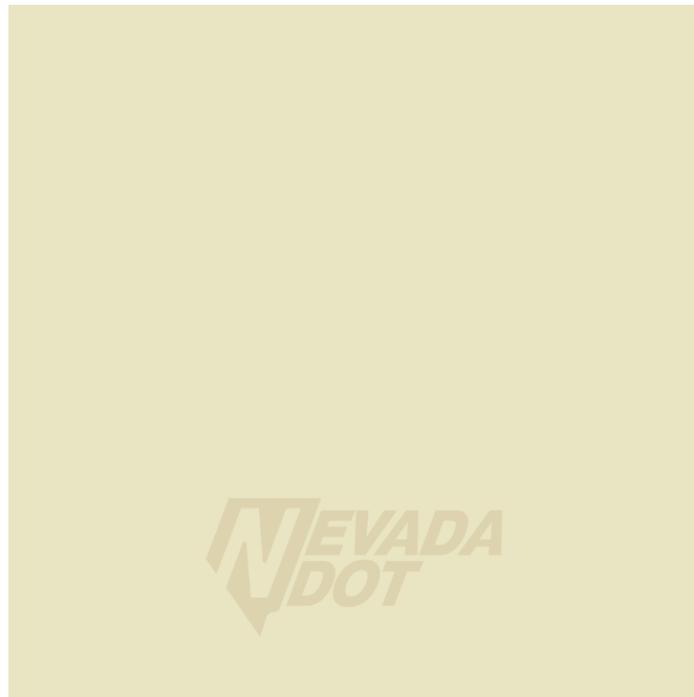
* All existing L&A areas in the Sahara Ave./I-15 interchange that are impacted by construction shall be mitigated by submitting a plan for approval by the Department Landscape Architect supervisor, in its good faith discretion, for removing, replacing, relocating and repairing the groundplane, plant materials and walls with similar size and quality material as the original, to a high visual impact location within the interchange.



PLANT PALETTE - TREES

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
NATIVE VEGETATION				
<i>Acacia greggii</i> - Catclaw Acacia	15-25' x 15'	Full	Low	Spring/Fall
<i>Chilopsis linearis</i> - Desert Willow	20' x 15'	Full	Low to Medium	Spring/Fall
<i>Prosopis glandulosa</i> - Honey Mesquite	25' x 35'	Full	Medium	Summer
<i>Yucca brevifolia</i> - Joshua Tree	30' x 15'	Full	Low	Spring
ENHANCED NATIVE				
<i>Acacia shaffneri</i> - Twisted Acacia	18' x 20'	Full	Low	Spring
<i>Acacia smallii</i> - Sweet Acacia	10-35' X 15-25'	Full	Low	Spring
<i>Cercidium microphyllum</i> - Foothills Palo Verde	20' x 20'	Full	Low	Spring
<i>Cordia parviflora</i> - Little Leaf Cordia	4' x 8'	Full	Low	Summer
<i>Parkinsonia aculeata</i> - Mexican Palo Verde	30' x 30'	Full	Low	Spring
<i>Rhus lancea</i> - African Sumac	20' x 30'	Full to Partial	Low to Medium	Spring
REGIONALLY ADAPTED				
<i>Cercidium Hybrid</i> - Desert Museum Palo Verde	25' x 25'	Full	Low	Spring
<i>Cordia boissieri</i> - Texas Olive	10' x 10'	Full to Partial	Low	Summer
<i>Parkinsonia floridum</i> - Blue Palo Verde	20' x 25'	Full	Low	Spring

Note: Several of the plants listed above will require establishment from seed because they are not available in containers.



PLANT PALETTE - SHRUBS

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
NATIVE VEGETATION				
<i>Ambrosia dumosa</i> - White Bursage	2' x 3'	Full	Low	Fall/Spring
<i>Atriplex canescens</i> - Four Wing Saltbush	5' x 8'	Full	Low	Year round
<i>Baccharis spp.</i> - Baccharis ***note: plant male species only	9' x 9'	Full to Partial	Low	Spring
<i>Coleogyne ramosissima</i> - Blackbrush ***note seed with <i>Erioneuron pulchellum</i>	5'x6'	Full	Low	Spring
<i>Ephedra nevadensis</i> - Mormon Tea	3' x 3'	Full	Low	Year round
<i>Larrea tridentata</i> - Creosote Bush	10' x 10'	Full	Low	Spring
ENHANCED NATIVE				
<i>Acacia cultriformis</i> - Knifeleaf Acacia	10-15' x 10-15'	Full	Low	Spring
<i>Cassia artemisioides</i> - Feathery Cassia	6' x 6'	Full	Low	Spring
<i>Cassia nemophila</i> - Desert Cassia	6' x 6'	Full	Low	Spring
<i>Chrysothamnus nauseosus</i> - Rabbit Brush	4' x 4'	Full to Partial	Low	Fall
<i>Ephedra viridis</i> - Mormon Tea	3' x 3'	Full	Low	Year Round
<i>Eremophila spp.</i> - Valentine (TM)	4' x 4'	Full	Low to Medium	Winter
<i>Ericamerica larcifolia</i> - Turpentine Bush	2' x 3'	Full	Low	Fall
<i>Leucophyllum frutescens</i> - Texas Ranger	5' x 5'	Full	Low	Summer
<i>Santolina virens</i> - Green Santolina	2' x 3'	Full	Low	Summer
<i>Simmondsia chinensis</i> - Jojoba	6' x 6'	Full	Low	Spring
REGIONALLY ADAPTED				
<i>Anisacanthus quadrifidus</i> - Mountain Flame	3' x 3'	Full to Partial	Low	Fall/Summer
<i>Buddleia davidii</i> - Navajo Purple Butterfly Bush	8' x 6'	Full to Partial	Low	Spring
<i>Cassia phyllodenia</i> - Silver Leaf Senna	6' X 6'	Full	Low	Spring
<i>Chrysactinia mexicana</i> - Damianita	2' x 2'	Full	Low	Summer
<i>Convolvulus cneurom</i> - Bush Morning Glory	2' x 3'	Full	Low	Spring/Fall
<i>Dalea spp.</i> - Dalea	4' x 5'	Full	Low	Fall
<i>Dodonea viscosa</i> - Hopbush	10' x 6'	Full	Low	Year Round
<i>Leucophyllum spp.</i> - Texas Ranger	4' x 4'	Full	Low	Summer
<i>Rhus ovata</i> - Sugar Bush	10' x 10'	Full to Partial	Low	Spring
<i>Salvia clevelandii</i> - Chaparral Sage	4' x 6'	Full	Low	Spring



- Trees shall be provided at a minimum of 10 per 1 acre of area.
- Grasses, shrubs, cactus, and perennial groundcovers shall be provided at a minimum of 40 per 1 acre of L&A treated areas and remnant parcels.
- Plantings shall be located in groupings for maximum impact.
- The landscape shall be planted to make the best use of the natural form of plants. Groups that require shearing to maintain the design aesthetic shall not be used.
- Plantings shall be designed in accordance with the Meadows Redux theme with native and Mojave desert-adapted low-water-use plants.
- Planting design, placement, and type shall respond to the defined hierarchy of treatment levels.
- At a minimum, plants shall be installed as 24-inch box trees (1.25" to 1.5" caliper, depending on species), 5-6 foot Joshua trees, 5-gallon containers for shrubs and cacti, and 1-gallon containers for groundcovers and perennials.



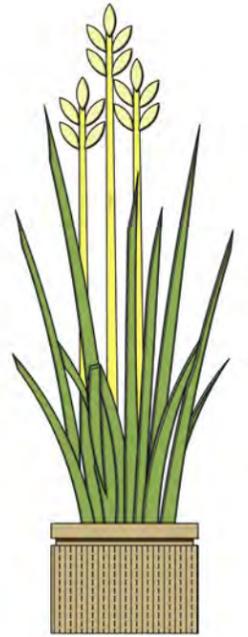
- Existing plants removed shall be mitigated per the Project NEON Technical Specifications.
- An efficient and effective temporary low-water-use irrigation system shall be used for the 2-year warranty and plant maintenance period.
- This system shall have an integral fertigation system that delivers controlled, organic-based fertilizer, soil amendments and conditioners, wetting agents, organic bio-stimulants, organic critter repellent, and insect control.
- The temporary irrigation system shall meet water purveyor requirements.
- No exposed above-ground systems will be allowed.
- The Design-Builder shall be responsible for all water and electrical service coordination, fees, and charges.
- For CLV irrigation requirements refer to TP Section 5.3.14 and Attachment 05-1 section 7.0 Local Agency Project Infrastructure.



PLANT PALETTE - CACTI, PERENNIALS, AND ACCENTS

	Height x Width	Exposure to Sun	Water Requirement	Seasonal Interest
NATIVE VEGETATION				
<i>Baileya multiradiata</i> - Desert Marigold	1' x 1'	Full to Partial	Low	Spring/Summer/Fall
<i>Echinocereus engelmannii</i> - Hedge Hog Cactus	4' x 1.25'	Full	Low	Year round
<i>Encelia farinosa</i> - Brittlebush	3' x 4'	Full	Low	Spring
<i>Erioneuron pulchellum</i> - Fluffgrass	2" x 6"	Full	Low	Spring/Summer
<i>Ferocactus acanthodes</i> - Barrel Cactus	3-5' x 1.5'	Full	Low	Spring/Summer
<i>Fouquieria splendens</i> - Ocotillo	15' x 5-25'			
<i>Opuntia bigelovia</i> - Teddy Bear Cholla	4' x 2'	Full	Low	Spring
<i>Sphaeralcea ambigua</i> - Desert Globemallow	3' x 3'	Full	Low	Spring
<i>Yucca schidigera</i> - Mojave Yucca	12' x 6'	Full	Low	Spring
ENHANCED NATIVE				
<i>Erigeron divergens</i> - Native Fleabane	1.5' x 1'	Full	Low	Summer
<i>Ferocactus wislizenii</i> - Fish Hook Barrel	5' x 2'	Full	Low	Summer
<i>Opuntia microdasys</i> - Polka Dot Cactus	3' x 3'	Full	Low	Summer
<i>Psilotrophe cooperi</i> - Paper Flower	1' x 1.5'	Full to Partial	Low to Medium	Spring/Summer/Fall
<i>Santolina chamaecyparissus</i> - Lavender Cotton	1.5' x 3'	Full	Low	Spring
<i>Yucca spp.</i> - Yucca	10' x 6'	Full	Low	Summer
REGIONALLY ADAPTED				
<i>Agave weberi</i> - Weber's Century Plant	3' x 2'	Full to Partial	Low	Summer
<i>Artemisia frigida</i> - Wormwood	1' x 1'	Full	Low	Spring
<i>Convolvulus mauritanicus</i> - Ground Morning Glory	1' x 3'	Full to Partial	Low	Spring/Summer
<i>Hemerocallis spp.</i> - Daylily	2' x 2'	Full to Partial	Low	Spring
<i>Muhlenbergia rigens</i> - Deer Grass	3' x 4'	Full	Low	Summer
<i>Nolina erumpens</i> - Beargrass	4' x 6'	Full	Low	Spring
<i>Penstemon spp.</i> - Penstemon	3' x 2'	Full	Low	Spring
<i>Tulbaghia violacea</i> - Society Garlic	3' x 3'	Full	Low	Spring/Summer





5.0 SCULPTURAL/ ARTISTIC FEATURES





5.0 SCULPTURAL/ARTISTIC FEATURES



INTRODUCTION

This section addresses sculptural/artistic features that shall be used throughout the Project NEON to enhance the Meadows Redux theme. These features shall be in the form of standalone features in the landscape or additions to bridges and walls.

Sculptural/artistic features are designed in scale and type and placed according to the defined hierarchy of treatment levels used as a guide throughout this document.



SCULPTURE

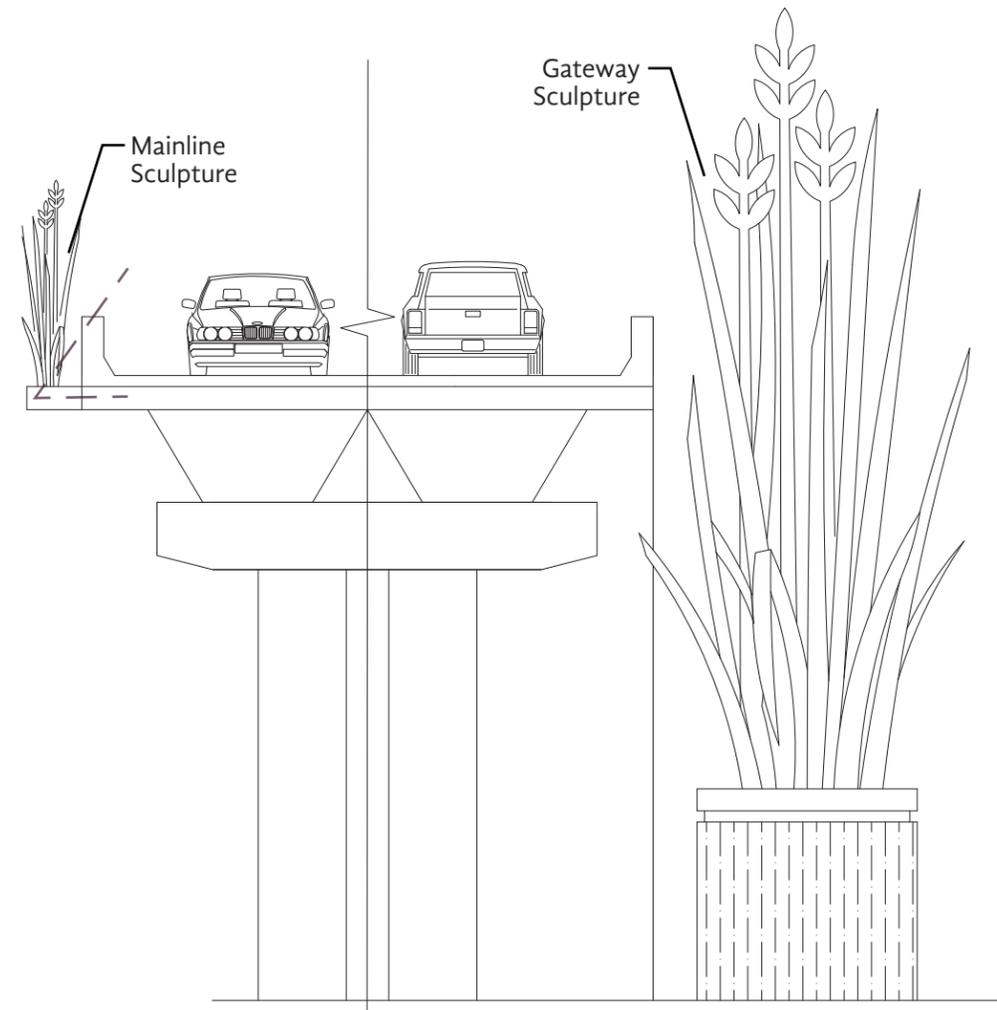
Sculptural features shall be used to accent walls, bridges, and remnant parcels in focal and landmark areas. They shall be characterized by excellence in craftsmanship, quality, and originality and shall have a minimum design life of 30 years.

Special attention shall be paid to the lighting of all installations so that they transform from the Meadows Redux theme during the day to a lighted gateway theme at night. A series of lighted verticle sculptural elements shall be installed to be seen from I-15 at bridge crossings of local streets and at the HOV gateway. Sculptures placed as focal points in the landscape shall be aesthetically lighted.

- A series of lighted gateway sculptural elements and lighted mainline sculptural shall be placed at outside bridge overpass/underpass at the following locations;
 - Oakey Boulevard** – Two large gateway sculptures shall be included, one at each outside bridge abutment, and four mainline sculptures.
 - HOV Gateway** - Two large gateway sculptures, four medium sculptures and six small sculptures shall be included leading to the entrance to the bridge overpass. In addition a minimum of two medium or four small sculptures shall be placed in the median between the underpass and Grand Central Blvd. Two mainline sculptures placed at outside bridge rails.
 - Charleston Boulevard** - Two large gateway sculptures shall be included, one at each outside bridge abutment and four mainline sculptures.
 - Alta Drive / Bonneville Avenue** – Two large gateway sculptures shall be included, one at each outside bridge abutment and four mainline sculptures.
 - Symphony Parkway** - Four mainline sculptures shall be included.
- The sculptures shall be of appropriate size and illumination to be visible from both the local streets below and the highway above.
- Sculptures shall be designed to portray the Meadow Redux theme without lighting during the day but shall transition to lighted art installation at night.



A family of sculptural elements shall vary in size and include Project NEON accent colors and wind- or motion-activated elements. The wind- or motion-activated system of sculptural elements shall have a minimum design life of 10 years, shall be accessible and easily maintained with standard practices.

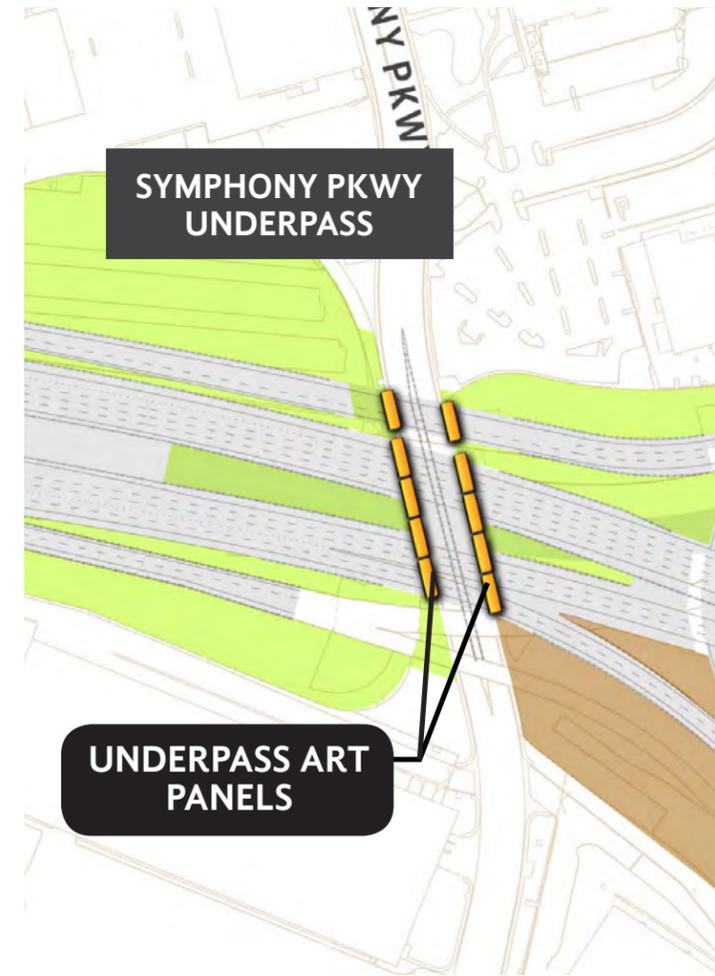
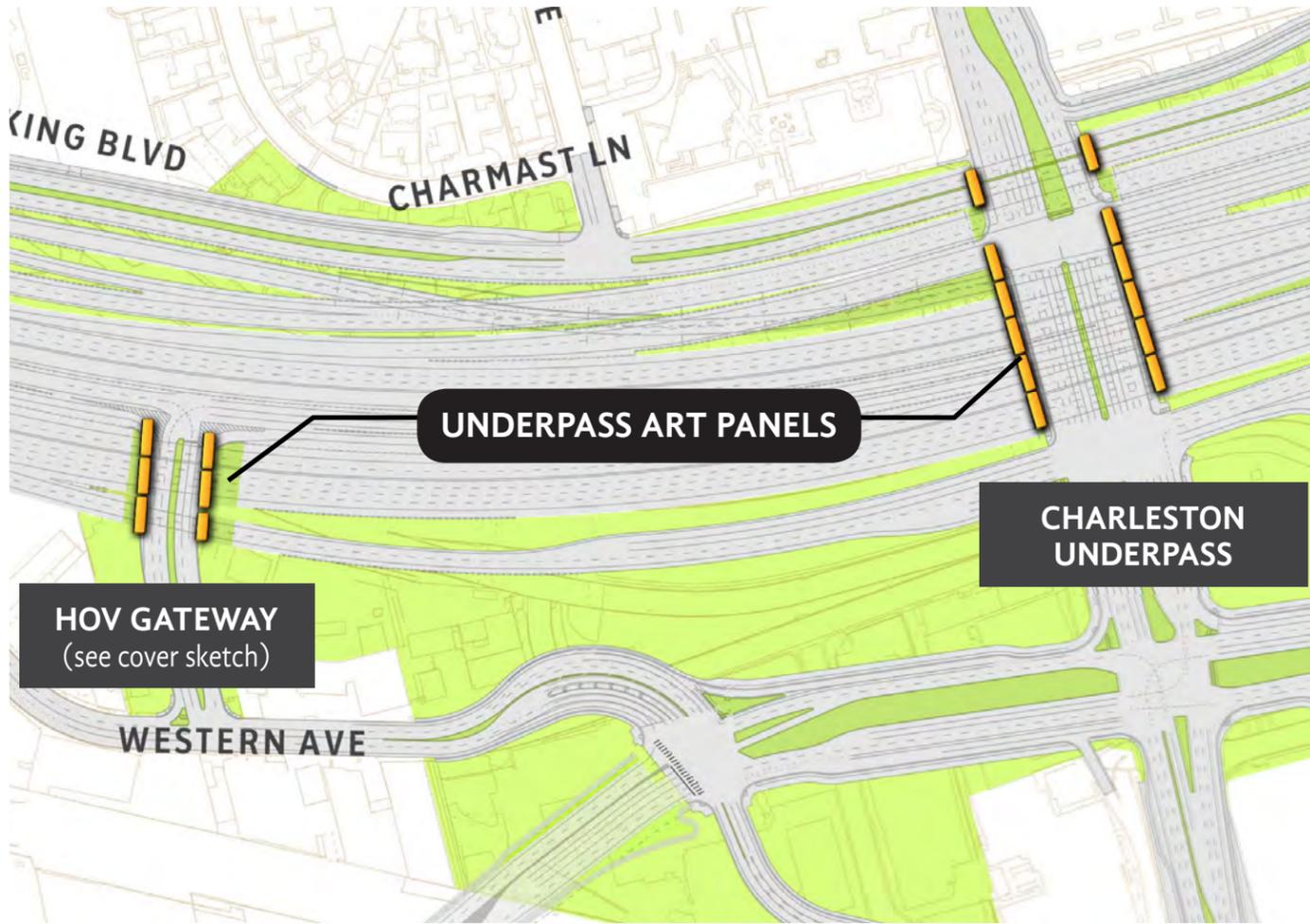


The largest sculptural element shall be visible from the elevated highway and shall provide both daytime color and nighttime lighting effects.



UNDERPASS ART PANELS

The I-15 bridges spanning the HOV entrance/exit, Charleston Boulevard and Symphony Parkway underpass provide opportunities to showcase a day-to-night transition as travelers enter and exit the Downtown Arts District and Las Vegas Government Center area. Attention shall focus on underpass abutment walls where as many as eight bridge structures pass overhead. Meadows Redux underpass art panels shall provide a colorful texture by day then transform into an iconic lighted art installation after dark. Panel installations shall be durable and vandal-resistant and shall enhance the safe movement of both pedestrians and drivers.



- Underpass art panels shall provide at a minimum the light level required for pedestrians and shall have automatic/remote controls for color and timing.
- Underpass art panels shall cover a minimum of 75 percent of the exposed wall height for each installation.
- Underpass art panels shall cover a minimum of 33 percent of the total horizontal distance of each designated overpass structure. Panels shall be no less than 5 panels per 150 linear feet.
- Supplementary lighting may be allowed if it is incorporated and integrated into the Meadows Redux Underpass Art Panel theme.

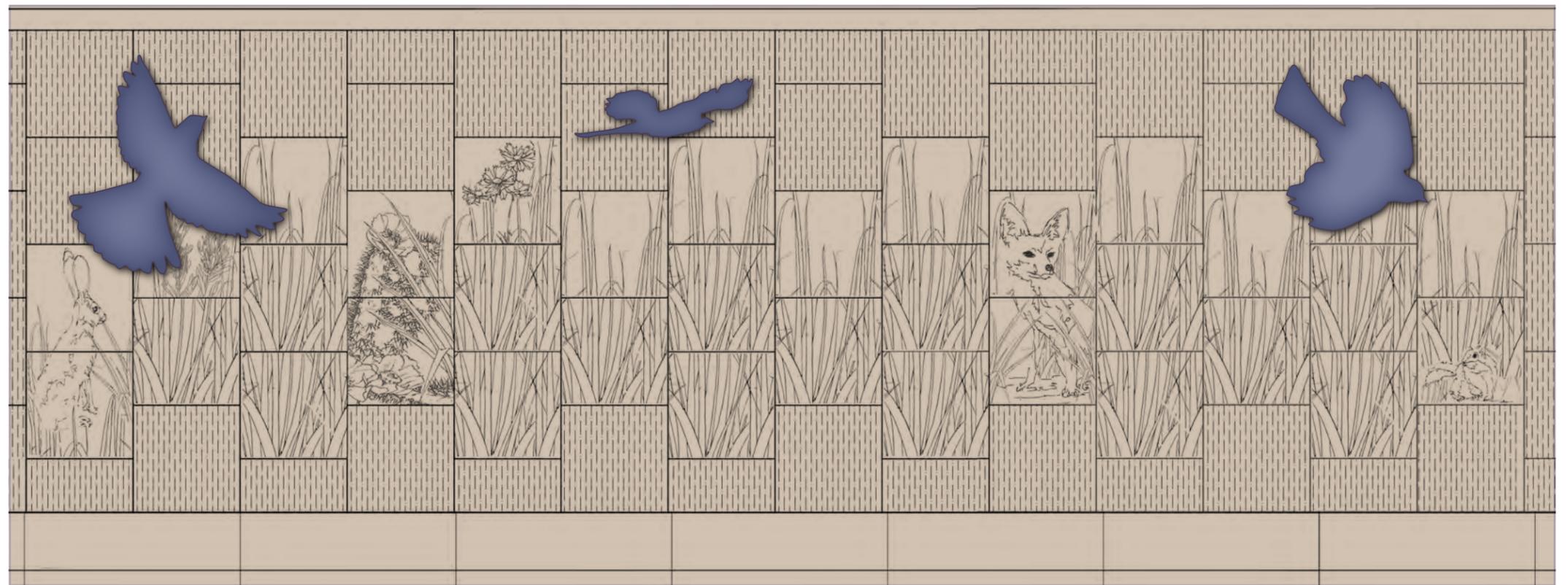
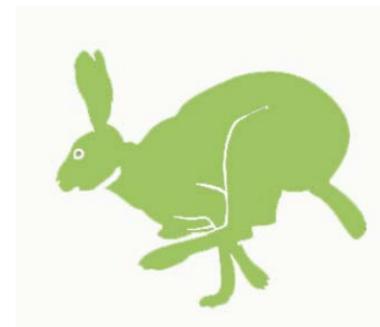
Lighted art panels depicting a Meadows Redux scene shall line bridge abutment walls at the HOV Gateway Charleston Boulevard overpasses and Symphony Parkway Underpass. Lighting may include color changes or motion activation.



APPLIQUÉS

Appliqué art panels showing desert wildlife shall be placed on walls or bridges to add visual interest. A greater concentration of panels shall be placed where drivers travel at slower speeds. Animal appliqués shall be scaled relative to their size and in scale to each other.

- Large-size art appliqué installations (minimum 10 feet by 12 feet) shall be placed along mainline areas as transitions between graphic murals on soundwalls and retaining walls.
- Medium-sized art appliqué installations (minimum 8 feet by 10 feet) shall be grouped with small appliqués to add visual interest to areas of significance or where driver speed is reduced. These areas include large slope-paved areas, on-ramps and off-ramps, or at bridge underpasses.
- Small-sized art appliqué installations (minimum 5 feet by 7 feet), when not used along with larger applications, shall be placed in groups of no fewer than five.
- The following minimums are required on the project:
 - 20 large-size art appliqués
 - 50 medium-size art appliqués
 - 45 small-size art appliqués
- Slope paving is undesirable. In the event slope pave is approved by the Department, additional medium and small-size appliqués are required.





6. COLOR PALETTE





6. COLOR PALETTE



COLOR PALETTE APPLICATION

A uniform, consistent color palette shall be used for all highway structures. The standard NDOT practice is to use a uniform and consistent color palette for all new and existing highway structures to complement the surrounding landscape. Base and accent stain or paint colors for all NDOT highways have been selected. To ensure accurate color references, the colors are matched to the Dunn-Edwards system (shown right).

Each highway structure shall use the selected base color and up to two accent colors. Roadway structures within a single landscape design segment shall use the same base color and accent color(s). As existing structures require refinishing, they shall be stained or repainted to be consistent with the selected color palette. Existing art is exempt from this color palette requirement.

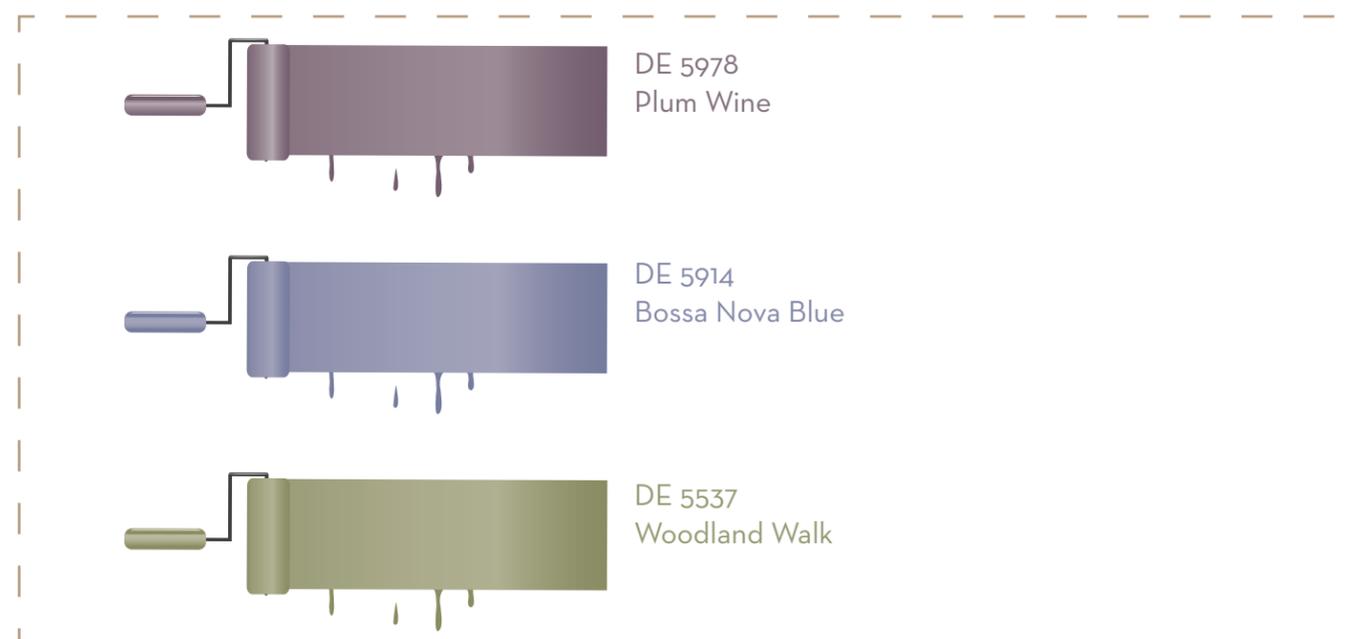
Accent colors shall be used to highlight structural aspects and/or details of highway structures, such as the girder of a bridge or a barrier rail. Accent color application shall logically respond to and reinforce structural features or change in materials.

Surface stain Desert Varnish specifically formulated for galvanized metal (hereafter referred to as Desert Varnish) creates a permanent natural earth tone when applied to galvanized steel. Desert Varnish shall be applied to galvanized steel surfaces including fencing, fabric posts and gates, pedestrian light poles, signal-sign bridges and poles, and guardrails.

BASE COLOR

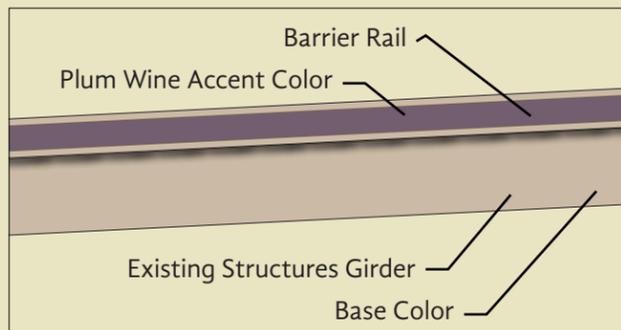


NEON SELECTED ACCENT COLORS

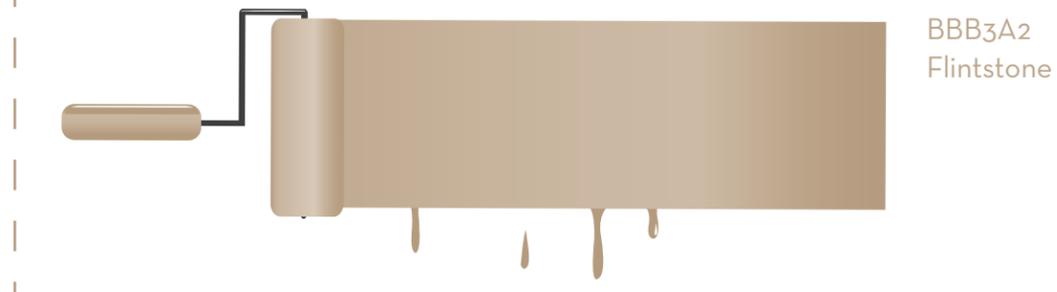


- The color palette has been selected for the Project NEON DB 1-4. These colors shall be used on all landscape and aesthetic features, barriers, structural features, and groundplane treatments.
- The base color shall be used on roadway or bridge barriers, columns, retaining walls and soundwalls to present a consistent color from top to bottom with addition of accent colors.
- Fencing, fabric, posts, gates, sign poles, traffic light poles, signal-sign bridges and poles, and pedestrian light poles shall be treated with Desert Varnish.
- Guardrails shall be galvanized and treated with Desert Varnish.
- Color for sculptural/artistic features shall be chosen from the selected accent colors or treated with a complementary thematic finish.
- Desert Varnish formulated for concrete shall be applied to all existing or new concrete open channels, concrete drainage swales or exposed surfaces of open storm drain confluence structures such as headwalls.
- Control of access fencing shall be treated with Desert Varnish.

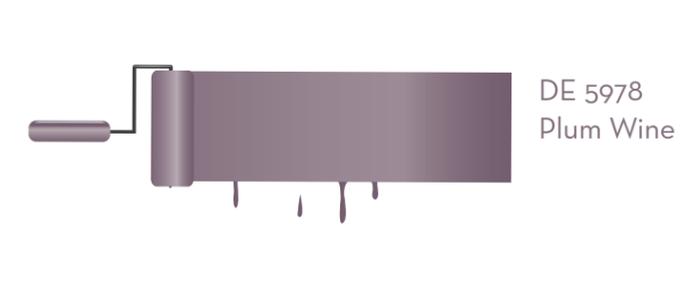
- Existing Spaghetti Bowl structures shown on plan shall be painted I-15/ US-95 color themes.
- Existing surfaces to be painted with base color include but not limited to, barrier rails (both inside and outside), monuments, bridges, bridge rail, bridge columns, girders, soundwalls, retaining walls, and slope paving.
- All existing barrier rail outside surfaces shall be painted with one accent color (Plum Wine).
- All existing aesthetic painted thematic design elements shall be inspected, cleaned, repaired, restored, repainted per Section 20 (Maintenance Requirements) of the Technical Provisions.
- All existing plant material, art and groundplane treatments shall be protected from paint overspray.

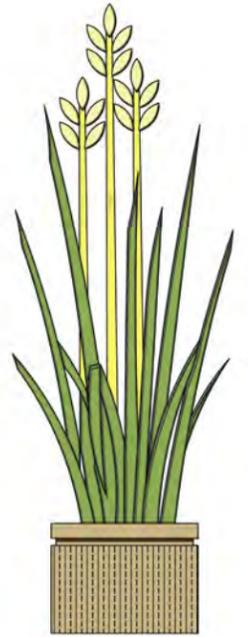


US 95 BASE COLOR



US 95 SELECTED ACCENT COLORS





7.0 LOCAL AGENCY PROJECT INFRASTRUCTURE



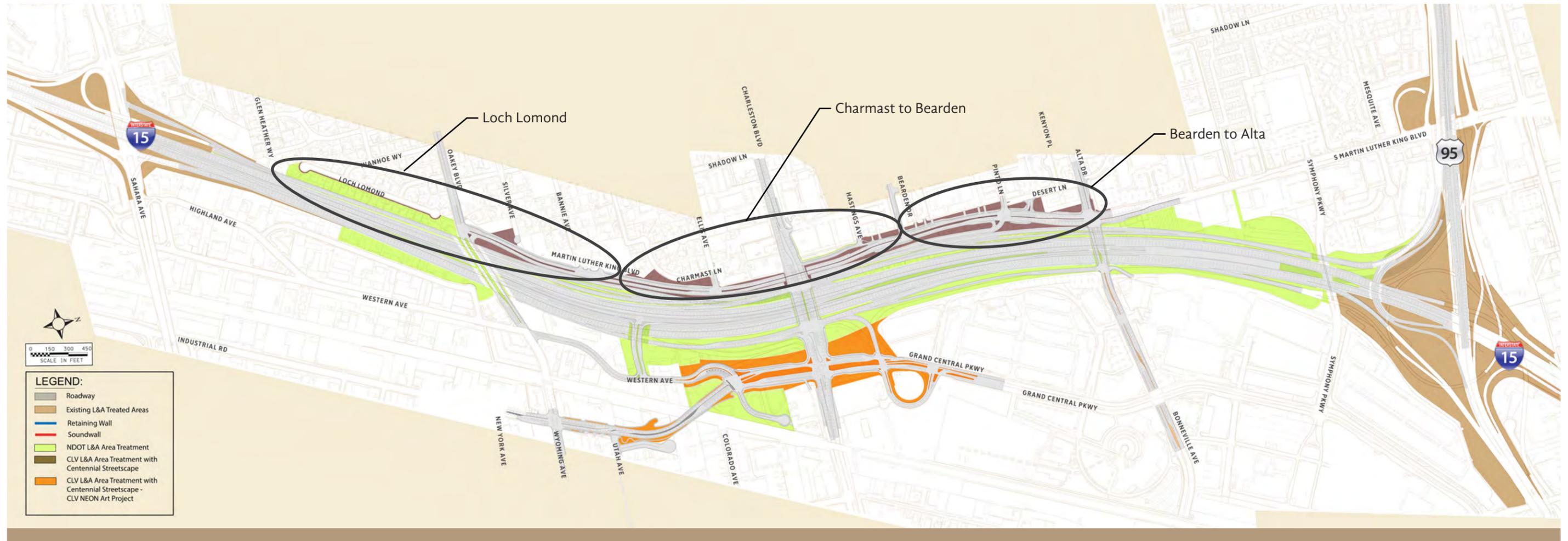


7.0 LOCAL AGENCY PROJECT INFRASTRUCTURE

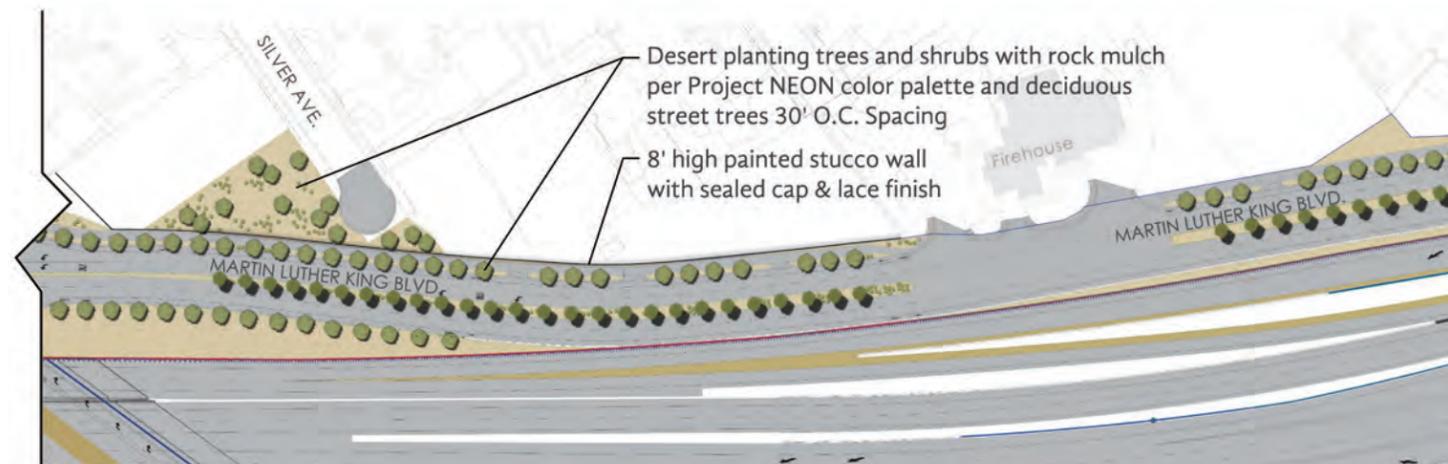
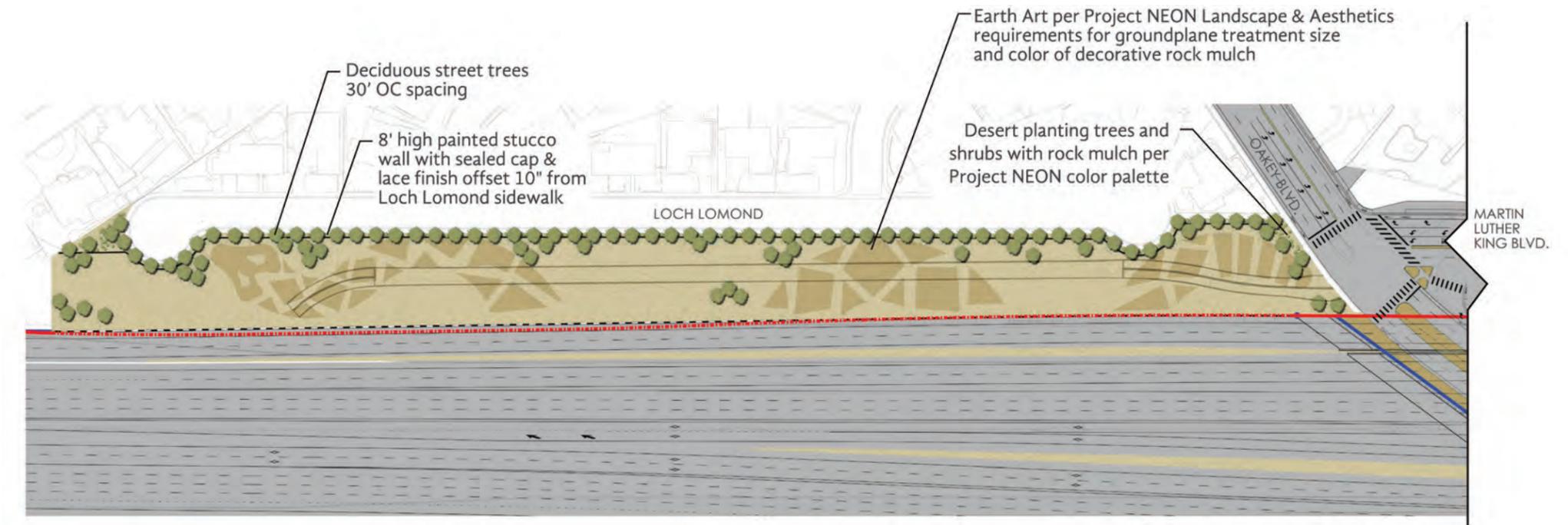


L&A Work that will be locally maintained and operated infrastructure and will be designed and constructed to City of Las Vegas Downtown Centennial Standards. Design-Builder shall maintain those treatments through a two year maintenance and establishment period,

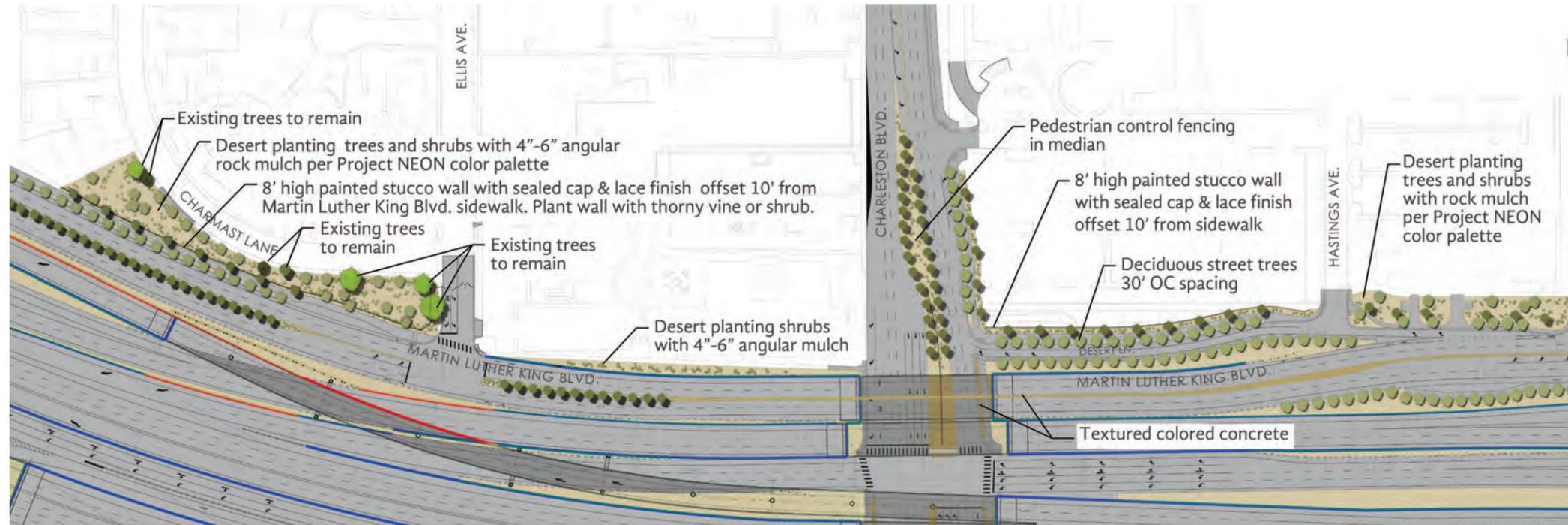
and until the City of Las Vegas's acceptance of the said improvements, in a manner consistent with City of Las Vegas standards and practices.



- Sidewalks shall be 10' wide.
- Amenity Zone between sidewalk and roadways shall be 5' wide and contain deciduous street trees with 30' on center spacing.
- Planted medians shall contain street trees with 30' on center spacing.
- Trees planted in medians and streetscape amenity zones shall be a minimum of 36-inch box (2.25"-2.5" caliper depending on species). Shrubs and cacti shall be a minimum size of 5-gallon containers, and 1-gallon containers for groundcovers and perennials.
- Complimentary species of desert trees shall be planted outside the sidewalk where space allows with 60' on center spacing.
- 5' amenity zones under Project NEON Bridges shall be colored and textured concrete.
- Planting of desert grasses, shrubs, and perennial groundcovers shall be provided in remnant parcels at 40 per 1 acre of area.
- Plants installed in remnant parcels shall be, at a minimum, 24" box trees (1.25" caliper depending on species), 5-6 foot Joshua trees, 5-gallon containers of shrubs and cacti, and 1-gallon containers for containers and perennials.
- Plantings shall be located in groupings for maximum impact.
- An efficient and effective low-water use irrigation system shall be used. This system shall have an integral fertigation system that delivers controlled, organic-based fertilizer, soil amendments and conditioners, wetting agents, organic bio-stimulants, organic critter repellent, and insect control.



Remnant Parcels - Loch Lomond

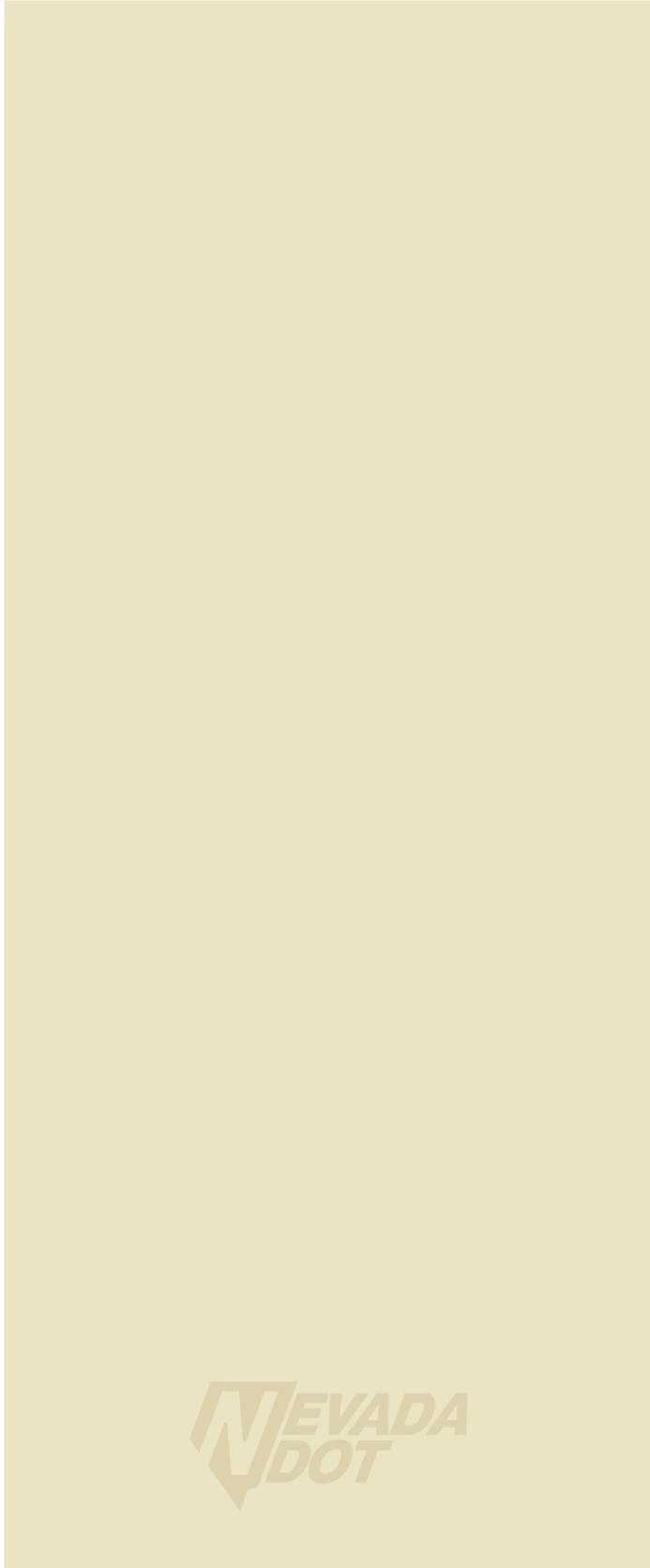


Remnant Parcels - Charmast to Bearden



Remnant Parcels - Bearden to Alta

- The landscape shall be planted to make the best use of the natural form of plants. Groups that require shearing to maintain the design aesthetic shall not be used.
- The irrigation system shall meet City of Las Vegas design Requirements.
- Patterns, sizes, and textures of rock mulch shall be used in combination with plant material.
- A varied groundplane shall be created by the size, color, texture, and configuration of treatments.
- A variety of mulch colors that correspond to the corridor's base color and the natural surrounding groundplane shall be used.
- The color of rock mulch shall be coordinated to provide harmony with the corridor theme colors and surrounding environment.
- A variety of rock sizes shall be incorporated into the design.
- Uniformly sized and colored rock mulch in large expanses shall not be accepted.
- All exposed ground shall be treated to include as a minimum earthforms, decorative rock, and earth art.
- In Downtown Centennial Area, poles and appurtenances shall be painted "Black Green" RAL 6012.
- CLV bridge and wall structures shall comply with Meadow Redux theme colors (base and accent) and textures. Refer to 1.0 Bridge Aesthetics and 2.0 Wall Aesthetics.
- In Downtown Centennial Area, pedestrian railings shall be painted a Meadow Redux accent color to complement the bridge and wall aesthetics.



**ATTACHMENT 07-1
PERMITS AND STATUS**

Department-Provided Approvals

Location	Approval Name	Administrating Agency	Approval Date
Project	Record of Decision	FHWA	2010
Project	Final EIS	FHWA	2010
Project	Final EIS Reevaluation	FHWA	2012
Project	Final EIS Reevaluation	FHWA	Pending

Major Environmental Approvals

Location	Approval Name	Administrating Agency	Major Environmental Approval Deadline
Project	Section 404 Permit: Discharge of dredged or fill material into Waters of the U.S. (jurisdiction begins at OHWM) (aboveground drainage feature west of I-15 and south of Sahara Drive between South Rancho Drive and I-15)	U.S. Army Corps of Engineers (USACE)	Within 120 days of the resource agencies receipt of Design-Builder's complete design and information package.
Project	Section 401 Water Quality Certification Permit Discharge of dredged or fill material into Waters of the U.S. (drainage feature west of I-15 and south of Sahara Drive between South Rancho Drive and I-15)	Nevada Division of Environmental Protection	Within 150 days of the resource agencies receipt of Design-Builder's complete design and information package.

Note:

On January 23, 2013 the Department sent a preliminary Jurisdictional Determination Report to the U.S. Army Corps of Engineers (USACE) seeking the agency's input on whether there are Waters of the U.S. within the Site. On March 3, 2014 the USACE sent a letter to the Department indicating that the only potential Water of the U.S. in the Project area is a drainage feature on the west side of I-15 between South Rancho Drive and I-15, which extends approximately 2,169 feet between Meade Avenue on the south and a point between Kings Way and West Sahara Avenue on the north. Section 7.5.1.3 (Waters of the United States) of the Technical Provisions provides further information.

This page intentionally left blank.

**ATTACHMENT 08-1
DRAINAGE DESIGN CRITERIA SUMMARY**

This page intentionally left blank.

Technical Provisions – Attachment 08-1
Drainage Design Criteria Summary

Design Criteria		Design Summary	Reference	
Hydrologic Parameters	HEC-1 (SCS Unit Hydrograph or Kinematic Wave)	Use for offsite flows to storm sewers, inlets, roadside ditches, and culverts typically up to 100 square miles		
	Rational Method	Use for onsite flows to storm sewers, inlets, roadside ditches, and culverts, and typically up to 150 acres		
	Natural Resources Conservation Service (NRCS) TR-55 Method	Use for offsite flows to storm sewers, inlets, roadside ditches, and culverts typically up to 150 acres		
	Refer to <i>HCDDM</i> , Section 304.3, for Stormwater Runoff Determination Computation Procedures and Section 3.2 of the <i>NDOT Drainage Manual</i> for additional guidance.			NDOT <i>Drainage Manual</i> , Section 3
	Time of Concentration	NRCS (TR-55)		<i>Hydrologic Criteria Drainage Design Manual (HCDDM)</i>
		Maximum sheet flow = 300 feet		
		Minimum Tc = 5 minutes		
	Rainfall Data	Offsite Hydrology - from <i>HCDDM</i> , Section 500 -or- Onsite Hydrology - obtain from NOAA atlas 14 Use single gauge		National Oceanic and Atmospheric Administration (NOAA) atlases
	Rainfall Distribution (<i>HCDDM</i> , Table 503)	SDN3 Distribution – Tributary Area is less than 8 square miles SDN4 Distribution – Tributary Area is greater than or equal to 8 square miles and less than 12 square miles SDN5 Distribution – Tributary Area is greater than or equal to 12 square miles		
	Runoff Coefficients	<i>HCDDM</i> , Section 600		
NRCS Curve Numbers	<i>HCDDM</i> , Section 600			

Technical Provisions – Attachment 08-1
 Drainage Design Criteria Summary

Design Criteria		Design Summary	Reference
CCRFCDD Master Plan Update (MPU) Facilities	Design Storm	100-year Proposed Condition flow to verify Project NEON improvements do not negatively impact the area more than the Existing Conditions	HCDDM
		100-year Ultimate Condition flow to verify all applicable criteria are met.	
	Design Procedures	Acceptable methods per NDOT <i>Drainage Manual</i> and <i>HCDDM</i>	
	Maximum Allowable Velocity	Refer to <i>HCDDM</i> , Table 703	
	Freeboard	<i>HCDDM</i> , Section 706.1.3 or Section 706.2.4	
	Channel Lining	100-year design storm – Design for the worse case flow parameters between Proposed Condition and Ultimate Condition	
		All lining shall be in accordance with NDOT <i>Drainage Manual</i> and <i>HCDDM</i>	
	Flow Superelevation	2 feet maximum per <i>HCDDM</i> , Section 706	
Roadside Ditches (Open Channels)	Design Storm	Per NDOT <i>Drainage Manual/ HCDDM</i> appropriate requirements	NDOT <i>Drainage Manual</i> <i>HCDDM</i> Section 700
		Proposed Condition flow to verify Project NEON improvements do not negatively impact the area more than the Existing Conditions	
		Ultimate Condition flow to verify all applicable criteria are met.	
	Design Procedures	Manning's equation	
	Maximum Allowable Velocity	Refer to <i>HCDDM</i> , Table 703	
	Freeboard	<i>HCDDM</i> , Section 706.1.3 or Section 706.2.4	
	Channel Lining	Design for the worse case flow parameters between Proposed Condition and Ultimate Condition	
		All lining shall be in accordance with NDOT <i>Drainage Manual</i> and <i>HCDDM</i>	
	Side Slopes	2:1 maximum for riprap-lined channels	
		3:1 maximum outside of clear zone	
		6:1 within clear zone or protect.	
Shall meet clear-zone requirements			

Technical Provisions – Attachment 08-1
Drainage Design Criteria Summary

Design Criteria		Design Summary	Reference
Culverts	Design Storm	Per NDOT <i>Drainage Manual HCDDM</i> appropriate requirements	NDOT <i>Drainage Manual HCDDM</i> , Section 1000
		Proposed Condition flow to verify Project NEON improvements do not negatively impact the area more than the Existing Conditions	
		Ultimate Condition flow to verify all applicable criteria are met.	
	Culvert Roughness	Minimum value of n = 0.012 for smooth wall and minimum value of n = 0.024 for corrugated wall	
	Minimum Size (Diameter)	24-inch minimum on interstate system (or equivalent diameter) 18-inch minimum (or equivalent diameter)	
	Maximum Velocity (V) and Outlet Protection	V < 5 feet/second – Minimum Riprap Protection	
		5 feet/second ≤ V < 15 feet/second – Riprap Protection or Energy Dissipater	
		V ≥ 15 feet/second – Use Energy Dissipator	
	Energy Dissipators	Refer to <i>HCDDM</i> , Section 1102 and NDOT <i>Drainage Manual</i>	
Slope	0.3% minimum, except where limited due to the existing tie in location		
Spread Criteria	Freeways (mainline, ramps, bridges):	Design: 25-year (edge of travel lane)	NDOT <i>Drainage Manual HCDDM</i>
	Ramps, gores, auxiliary lanes, acceleration and deceleration lanes with striped lane widths > 12 feet	Design: 25-year – 12 foot dry lane within lane striping	
	Local Roads	Design: For the Ultimate Condition flow – 10-year and 100-year requirements per <i>HCDDM</i> , Section 303.4	
		Design: For the Proposed Condition flow – 10-year and 100-year flow conditions do not negatively impact adjacent properties	
Manholes, Drop Inlets, and Scuppers (where allowed)	Drainage Structure Types	Outside of NDOT right-of-way (ROW) – Clark County Standard Drawings and Specifications	NDOT <i>Drainage Manual HCDDM</i>
	Maximum Manhole Spacing	Pipes 24-inch or less – 300 feet Pipes over 24-inch – 400 feet	
	Minimum difference between invert and outlet pipe invert elevations	0.1 foot, unless flat slopes for connecting pipes, then use the through slope of the storm drain system	

Technical Provisions – Attachment 08-1
 Drainage Design Criteria Summary

Design Criteria		Design Summary	Reference
	Inlet Location	Onsite: Refer to NDOT <i>Drainage Manual</i> , Section 3.3.2.2 for onsite inlet location or <i>HCDDM</i> , as appropriate	
		Offsite: Refer to <i>HCDDM</i> and Clark County Standard Drawings and Specifications and NDOT <i>Drainage Manual</i> for offsite inlet locations	
	Inlet Spacing	Dependent on Roadway Spread Criteria and key collection points	
	Clogging	0% on grade elevated freeway drop inlets 25% on grade drop inlets 50% sag locations drop inlets 35% on grade elevated freeway scuppers 35% on grade scuppers 50% sag locations or flat sections of roadway (< 0.3% longitudinal slope) scuppers	
Storm Sewer Networks	Design Storm – Freeways and Ramps	Per NDOT <i>Drainage Manual/ HCDDM</i> appropriate requirements	NDOT <i>Drainage Manual</i> <i>HCDDM</i>
	Design Storm – Non-Freeways	Per NDOT <i>Drainage Manual/ HCDDM</i> appropriate requirements	
		10-year and 100-year Proposed Condition flow to verify Project NEON improvements do not negatively impact the area more than the Existing Conditions	
		10-year and 100-year Ultimate Condition flow to verify all applicable criteria are met.	
	Minimum Size	18-inch diameter 12-inch diameter for down drains	
	Minimum Slope	Slope to ensure 3 feet/second or no less than 0.3 percent, except where limited due to the existing tie in location	
	Maximum Level of Surcharging	Ultimate Condition flow with maximum hydraulic grade level (HGL) to 1 foot below the final grade above the storm sewer at all locations	
Proposed Condition flow HGL shall not exceed the Existing Condition HGL			
New Facilities (independent system, unaffected by existing surcharging drainage facilities) – Proposed Condition flow & Ultimate Condition flow with maximum hydraulic grade level (HGL) to 1 foot below the final grade above the storm sewer at all locations			

Technical Provisions – Attachment 08-1
Drainage Design Criteria Summary

Design Criteria		Design Summary	Reference
	Design Velocities	3 feet/second minimum (design flow)	
		25 feet/second maximum (design flow)	
	Outlet Velocities (V) and Protection	V < 5 feet/second – Minimum Riprap Protection	
		5 feet/second ≤ V < 15 feet/second – Riprap Protection or Energy Dissipater	
	V ≥ 15 feet/second – Use Energy Dissipator		
Bridges	Bridge Deck Drainage	Refer to NDOT <i>Drainage Manual</i> Section 3.3.2.2.6 or <i>HCDDM</i> as appropriate	NDOT <i>Drainage Manual</i> <i>HCDDM</i>
Flood Zone	CLOMR/LOMR	FEMA guidelines and procedures	FEMA

This page intentionally left blank.

ATTACHMENT 08-2
DRAINAGE DESIGN COMPONENTS: REQUIREMENTS / LIMITATIONS /
PROHIBITIONS

This page intentionally left blank.

Technical Provisions – Attachment 08-2
 Drainage Design Components: Requirements/Limitations/Prohibitions

Drainage Design Component	Required/ Limited/ Restricted
Steel or Iron Grates.	Required
Bridge Drains – Ultraviolet (UV) protected fiberglass-reinforced pipe (FRP) or steel pipe with 8-inch minimum diameter.	Required
Channel Linings – Articulated Concrete Block, Partially Grouted Riprap (per HEC-23), Loose Riprap, or Concrete.	Required
Reinforced-concrete pipe (RCP) and reinforced-concrete box (RCB) under I-15 mainline ramps, major arterials, or other locations where required by the Department or Local Agencies.	Required
Water tight joints behind walls and on all flexible pipe and where leakage /infiltration is a concern.	Required
Concrete headwalls, metal or precast concrete end sections, or similar outfall treatment.	Required
Drop Inlet with reinforced concrete or corrugated high-density polyethylene (HDPE) pipe riser in shoulder area.	Required
Minimum Fill Height Requirements on Box Culverts – see <u>Section 14.3.6 (Drainage Structures)</u> of these Technical Provisions.	Required
Underdrain System wrapped in the appropriate geotextile fabric and provide a functional 100-year design life, where subgrade drainage to accommodate groundwater is necessary.	Limited Use
Scuppers – circular or rectangular, 9-inch-high by 18-inch-wide opening in concrete barrier with constant slope face or 6-inch-high by 24-inch-wide opening in F-shape concrete barrier; approved in accordance with National Cooperative Highway Research Program (NCHRP) Report 350; must be configured such that debris will not be able to collect and restrict flow; may be considered for use in areas where drop inlets are not desirable, it is difficult to meet spread criteria, and must be approved on a case by case basis by the Department. Limited use upon approval of Deviation in accordance with <u>Section 1.2.10 (Deviations to the Technical Provisions)</u> .	Limited Use
Linear Drains (Trench or Slotted) must be configured such that debris will not be able to collect and restrict flow and per the requirements in <u>Section 8.3.6 (Inlets)</u> of these Technical Provisions. Limited use upon approval of Deviation in accordance with <u>Section 1.2.10 (Deviations to the Technical Provisions)</u> .	Limited Use
Structures not conforming to NDOT or local standards as appropriate. Limited use upon approval of Deviation in accordance with <u>Section 1.2.10 (Deviations to the Technical Provisions)</u> .	Limited Use
Detention Basins – except where other flood protection or mitigation is not available.	Prohibited
Retention Basins – except for rainwater harvesting purposes as specified in <u>Section 5 (Landscape and Aesthetics)</u> of these Technical Provisions.	Prohibited
Plastic Pipe and corrugated metal pipe (CMP) under freeway mainline, ramps, or major arterials. HDPE pipe may be used for pipe risers, vertical drop shafts, or similar when located in the roadway shoulder and not under the travel lanes.	Prohibited
Polyvinyl chloride (PVC) and single-wall HDPE Storm Drain/Culverts.	Prohibited
Plastic Drop Inlets – unless encased in structural concrete with steel or iron grates.	Prohibited
Bridge Drains – PVC or HDPE.	Prohibited
Closed Conveyances with an open or soft bottom.	Prohibited
Channel Lining – Gabions.	Prohibited
Channel Lining – Fully Grouted Riprap.	Prohibited
Channel Lining relying on geotextiles and vegetative uptake.	Prohibited

**ATTACHMENT 09-1
FREEWAY DESIGN CRITERIA**

This page intentionally left blank.

DESIGN STANDARDS	DESIGN CRITERIA - FREEWAY SYSTEM						
	INTERSTATE	MANAGED LANES – HOV	MANAGE LANES – HOV DIRECT CONNECTOR ¹	MANAGED DROP RAMP – HOV	RAMP	SYSTEM CONNECTOR	COLLECTOR DISTRIBUTOR
Functional Classification	Interstate	Interstate	Ramp	Ramp	Ramp	System Connector	Collector Distributor
Ownership	NDOT						
Access	Full						
Design Speed (DS) (mph) (Upper/Middle/Lower Ranges, where applicable) for Ramps	70	70	50	60/50/35	60/50/35 ²	60/50/40 ²	65
Posted Speed (mph)	65	65	45	VARIES	VARIES	VARIES	65
Design Vehicle	WB-67	A-BUS	A-BUS	A-BUS	WB-67	WB-67	WB-67
Minimum Stopping Sight Distance (feet)	730	730	425	570/425/250	570/425/250	570/425/305	645
Stopping Sight Distance Adjustments for Grades	AASHTO 2011 Table 3-2						
GEOMETRY							
Horizontal							
Minimum Horizontal Radius Curve (feet)	AASHTO 2011 Table 3-10b	AASHTO 2011 Table 3-10b ^{3,4}	AASHTO 2011 Table 3-10b ³	AASHTO 2011 Table 3-10b			
Minimum Length of Curve (feet)	AASHTO 2011 Section 3.3.13						
Maximum Superelevation (%)	8	8	8	8	8	8	8
Design Superelevation Rate	AASHTO 2011 Table 3-10b	AASHTO 2011 Table 3-10b ^{3,4}	AASHTO 2011 Table 3-10b ³	AASHTO 2011 Table 3-10b			
Minimum Length of Runoff	AASHTO 2011 Table 3-17b AASHTO 2011 Equation 3-23						
Minimum Length of Runout	AASHTO 2011 Equation 3-24						
% of Runoff on Tangent	AASHTO 2011 Table 3-18						
Vertical							
Terrain classification	Level						
Maximum Grade (%)	3	3	6	6	6	6	4
Minimum Grade (%)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Minimum Rate of Vertical Curvature (Ksag – Design)	AASHTO 2011 Table 3-36						
Minimum Rate of Vertical Curvature (Kcrest – Design)	AASHTO 2011 Table 3-34						
Minimum Length of Vertical Curve (feet)	3 x Design Speed						
Minimum Vertical Clearance - New Roadway Structures	16 feet-6 inches						
Notes:							
¹ Managed Lanes HOV Direct Connector between station "MC" 831+45 to "MC" 899+00 from the RID Reference Design Documents.							
² "EN", "MLK-515" and "MLK-NB15" ramp design speed shall be 60/50/30.							
³ "EN", "MLK-515" and "MLK-NB15" shall use AASHTO 2011 Table 3-9.							
⁴ "CH-GC" shall use AASHTO Table 3-13b.							
AASHTO = American Association of State Highway and Transportation Officials DS = design speed mph = miles per hour							

Technical Provisions – Attachment 09-1
Freeway Design Criteria

DESIGN STANDARDS	DESIGN CRITERIA - FREEWAY SYSTEM						
	INTERSTATE	MANAGED LANES – HOV	MANAGE LANES – HOV DIRECT CONNECTOR ¹	MANAGED DROP RAMP – HOV	RAMP	SYSTEM CONNECTOR	COLLECTOR DISTRIBUTOR
Intersections							
Signalization	-----	-----	-----	Yes	Yes ²	-----	-----
Design Vehicle (Inside Lane/Outside Lane)	-----	-----	-----	SU/A-BUS	SU/WB-65	-----	-----
Right Turn Radius	-----	-----	-----	25'	25'	-----	-----
Pedestrian Access	-----	-----	-----	No	No	-----	-----
Bike Facility	-----	-----	-----	No	No	-----	-----
Ramp Metering	-----	-----	-----	-----	Yes ³	-----	-----
CROSS SECTION							
Travel Lanes							
Minimum Number of Lanes	Varies	Varies	2	1	Varies	Varies	Varies
Minimum Lane Width (feet)	12	12	12	12	12	12	12
Turn Lanes							
Minimum No. of Lanes	-----	-----	-----	2LT/1RT	1RT	-----	-----
Minimum Lane Width (feet)	-----	-----	-----	12	12	-----	-----
Shoulders							
Minimum Shoulder Width – Left/Inside (feet)	10	4	4	4	4	4	4
Minimum Shoulder Width – Right/Outside (feet)	12	0-foot Buffer	8	8	8	8	8
Cross Slope							
Normal Crown (%)	2	2	2	2	2	2	2
Minimum Roadbed Widening (feet) for Fill Slopes 3:1 or Steeper	5	5	5	5	5	5	5
Graded Roadway Slopes							
Depth of Cut – Back Slope Ratio (feet/ratio)	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20
Height of Fill – Slope Ratio (feet/ratio)	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20	NDOT Road Design Guide Section 2.20, Table 2.20
Concrete Barrier Rail							
Lateral Offset (Beyond Normal Edge of Shoulder) (feet)	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1
Widening for Barrier Rail (ft)	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1	Standard Drawings R-8.6.1
Roadside Safety							
Minimum Clear Zone Distance (feet)	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1	AASHTO Roadside Design Guide Table 3.1

Notes:

¹ Managed Lanes HOV Direct Connector between station “MC” 847+00 to “MC” 865+00 from the RID Reference Design Documents.

² See Section 15 of the Technical Provisions for Signalized intersection locations.

³ See Section 9 of the Technical Provisions for Ramp Metering Locations.

⁴ See Section 9.3.3 (High-Occupancy Vehicle Lanes) for the minimum horizontal clearance width requirements between barriers. The minimum shoulder widths listed above for the Manage Lanes – HOV Direct Connector can be switched from left to right for sight distance requirements.

AASHTO = American Association of State Highway and Transportation Officials

ATTACHMENT 09-2
ARTERIALS, COLLECTORS, AND LOCAL STREETS DESIGN CRITERIA

This page intentionally left blank.

ATTACHMENT 09-2

Design Standards	Design Criteria – Arterials, Collectors, and Local Streets																			
	SR 159 Charleston Boulevard	Martin Luther King Blvd (Oakey to Pinto)	Martin Luther King (Pinto to North of Alta)	Grand Central Parkway (Iron Horse Loop to Western)	Grand Central Parkway/Industrial Connector (Western to Wyoming)	Alta Drive	Oakey Boulevard	Western Avenue	Iron Horse Drive	Martin Luther King to Charleston Slip Ramp	Ellis Avenue	Hastings Avenue	Pinto Lane	Charmast Lane	Wall Street	Beardon Drive	Desert Lane	Silver Avenue	Symphony Park Avenue	Neon Gateway
Functional Classification	Principal Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Urban Collector	Minor Urban Arterial	Urban Collector
Ownership	NDOT	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	City of Las Vegas	NDOT
Design Speed (mph)	45	45	45	35	35	40	40	25	30	35	30	30	30	30	30	30	30	30	40	35
Posted Speed (mph)	35	35	35	35	35	35	35	25	25	30	25	25	25	25	25	25	25	25	35	25
Design Vehicle	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62	ABUS
Stopping Sight Distance (feet)	360	360	360	250	250	305	305	360	300	250	300	300	300	300	300	300	300	300	305	250
Geometry																				
Horizontal																				
Minimum Horizontal Radius Curve (feet)	1039	1039	1039	510	510	762	762	148	Match Existing	510	333	333	333	333	333	333	333	333	762	510
Maximum Superelevation – Emax (%)	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	6	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
Vertical																				
Maximum Grade (%) – Maximum	7	6	6	6	6	7	7	6	9	9	9	9	9	9	9	9	9	9	7	6
Minimum Grade (%) – Minimum	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
Rate of Vertical Curvature (Ksag – Design)	79	79	79	49	49	64	64	79	37	49	37	37	37	37	37	37	37	37	64	4.9
Rate of Vertical Curvature (Kcrest – Design)	61	61	61	29	29	44	44	61	19	29	19	19	19	19	19	19	19	19	44	29
Minimum Length of Vertical Curve (feet) - Minimum	135	135	135	105	105	120	120	135	90	105	90	90	90	90	90	90	90	90	120	105
Vertical Clearance – New Roadway Structures	16'-6"	16'-6"	16'-6"	16'-6"	(Note 7)	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"

ATTACHMENT 09-2

Design Standards	Design Criteria – Arterials, Collectors, and Local Streets																			
	SR 159 Charleston Boulevard	Martin Luther King Blvd (Oakey to Pinto)	Martin Luther King (Pinto to North of Alta)	Grand Central Parkway (Iron Horse Loop to Western)	Grand Central Parkway/Industrial Connector (Western to Wyoming)	Alta Drive	Oakey Boulevard	Western Avenue	Iron Horse Drive	Martin Luther King to Charleston Slip Ramp	Ellis Avenue	Hastings Avenue	Pinto Lane	Charmast Lane	Wall Street	Beardon Drive	Desert Lane	Silver Avenue	Symphony Park Avenue	Neon Gateway
Design Vehicle (Inside Lane/Outside Lane)	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	SU/WB-50	—	—	—	—	—	—	—	—	—	SU/WB-50	ABUS
Pedestrian Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Bike Facility	No	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Cross-Section																				
Number of Through Lanes – Each Direction (See Note 8)	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Varies
Travel Lane Width (feet) – Minimum	11	11	11	11	11	10	11	10.5	12	11	12	12	12	12	12	12	12	12	10	12
Turn Lane Width (feet) – Minimum	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	12
Bike Lane (LT/RT)	No/No	Yes/Yes	Yes/Yes Ellis to Alta Only	Yes/Yes Charleston to Western only	Yes/Yes	Yes/Yes	Yes/Yes	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No
Bike Lane Width (feet) – Minimum	-----	5	5	-----	5	4	4	—	—	—	—	—	—	—	—	—	—	—	—	—
Shared Use Lane Width (feet) – Minimum	14	—	—	—	—	—	—	16	—	19	14	14	14	14	14	14	14	14	14	—
Cross Slope																				
Normal Crown (%)	2	2	2	2	2	2	2	2	Match Existing	2	2	2	2	2	2	2	2	2	2	2
Concrete Barrier Rail																				
Lateral Offset from Vehicular Lane to Face of Barrier(feet) – Minimum	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Median																				
Width (feet) Minimum	4	4	4	4	4	4	2	4	4	—	—	—	2	—	—	—	4	—	4	4
Sidewalk																				

ATTACHMENT 09-2

Design Standards	Design Criteria – Arterials, Collectors, and Local Streets																			
	SR 159 Charleston Boulevard	Martin Luther King Blvd (Oakey to Pinto)	Martin Luther King (Pinto to North of Alta)	Grand Central Parkway (Iron Horse Loop to Western)	Grand Central Parkway/Industrial Connector (Western to Wyoming)	Alta Drive	Oakey Boulevard	Western Avenue	Iron Horse Drive	Martin Luther King to Charleston Slip Ramp	Ellis Avenue	Hastings Avenue	Pinto Lane	Charmast Lane	Wall Street	Beardon Drive	Desert Lane	Silver Avenue	Symphony Park Avenue	Neon Gateway
Sidewalk (LT/RT)	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	No/Yes	Yes/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/No	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	No/No
Width (feet) – Minimum (Note 5)	5	10	5	5	5	5 (Note3)	5	5	5	10	5	5	5	5	5	5	5	5	5	—
Amenity strip -5-foot park strip with 10-foot Minimum Sidewalk (LT/RT)	Yes/Yes (Note 2)	Yes/No	Yes/No	Yes/Yes (Charleston to Iron Horse Loop Only)	Yes/Yes	No/No	No/No	No/No	No/No	Yes/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No	No/No
Cut and Fill Slopes																				
Depth of Cut – Back Slope Ratio (feet/ratio) (horizontal/vertical)	4:1	4:1	4:1	2:1	2:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Height of Fill – Slope Ratio (feet/ratio) (horizontal/vertical)	4:1	4:1	4:1	2:1	2:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1	4:1
Roadside Safety																				
Clear Zone Distance (feet) – Minimum	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	—
Lateral Clearance with Curb and Gutter (feet) – Minimum	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	—

Notes:

- SR 589 Sahara Avenue and SR 599 Rancho Avenue shall meet standards for Principle Urban Arterial and be similar to Design Criteria for Charleston Boulevard.
- City amenity required on the north side of Charleston Blvd. starting a minimum of 320 feet on the west side of the University of Nevada-Las Vegas (UNLV) Parking lot to the intersection with Grand Central Parkway and on the south side from the intersection with the SB I-15 on-ramp to the intersection with Grand Central Parkway.
- 10-foot minimum sidewalk required under I-15 Bridge on both sides of Alta Drive.
- Western Avenue is from the intersection with Oakey Blvd. to the intersection with Grand Central Parkway, Grand Central Parkway is from the intersection with Western Ave. to the north to Iron Horse Loop. Grand Central Parkway/Industrial Connector is from Grand Central Parkway and Western intersection to Industrial and Wyoming intersection.
- 2-foot minimum lateral offset required to walls, barrier rail, piers, guardrail and building.
- Transition lengths to match existing roadway widths shall be a minimum of a 25:1 taper rate.
- Minimum clearance as required in accordance with *BNSF Railway – Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects* and AREMA requirements.
- If not listed, the minimum number of lanes is as set forth in Section 9.3.4 (Local Infrastructure) of the Technical Provisions. The number of lanes for Neon Gateway is as set forth in Section 9.3.3 (High-Occupancy Vehicle Lanes)

LT = left turn; mph = miles per hour; NB = northbound; RT = right turn; SB = southbound

This page intentionally left blank.

Technical Provisions – Attachment 09-2
Arterials, Collectors, and Local Streets Design Criteria

ATTACHMENT 09-2						
DESIGN STANDARDS	FUTURE IMPROVEMENT PHASES DESIGN CRITERIA – ARTERIALS, COLLECTORS, AND LOCAL STREETS					
	ALTA DRIVE	OAKLEY BOULEVARD	WESTERN AVENUE	RANCHO DRIVE	WESTWOOD DRIVE	HIGHLAND AVENUE
Functional Classification	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Minor Urban Arterial	Urban Collector	Urban Collector
Ownership	City	City	City	City	City	City
Design Speed (mph)	40	35	25	25	20	20
Posted Speed (mph)	35	35	25	25	20	20
Design Vehicle	SU/WB-62	SU/WB-62	SU/WB-62	SU	SU	SU
Stopping Sight Distance (feet)	305	250	155	155	115	115
GEOMETRY						
Horizontal						
Minimum Horizontal Radius Curve (feet)	762	510	198	198	107	107
Maximum Superelevation - Emax (%)	N/C	N/C	N/C	N/C	N/C	N/C
Vertical						
Maximum Grade (%) - Maximum	7	7	6	9	9	9
Minimum Grade (%) - Minimum	0.4	0.4	0.4	0.4	0.4	0.4
Rate of Vertical Curvature (Ksag - Design)	64	49	26	26	17	17
Rate of Vertical Curvature (Kcrest - Design)	44	29	12	12	7	7
Minimum Length of Vertical Curve (feet) - Minimum	120	105	100	100	100	100
Vertical Clearance - New Roadway Structures	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"

Technical Provisions – Attachment 09-2
 Arterials, Collectors, and Local Streets Design Criteria

ATTACHMENT 09-2						
DESIGN STANDARDS	FUTURE IMPROVEMENT PHASES DESIGN CRITERIA – ARTERIALS, COLLECTORS, AND LOCAL STREETS					
	ALTA DRIVE	OAKY BOULEVARD	WESTERN AVENUE	RANCHO DRIVE	WESTWOOD DRIVE	HIGHLAND AVENUE
Design Vehicle (Inside Lane/Outside Lane)	SU/WB-50	SU/WB-62	SU/WB-62	SU	SU	SU
Pedestrian Access	YES	YES	YES	YES	YES	YES
Bike Facility	YES	YES	YES	NO	NO	NO
CROSS-SECTION						
No. of Thru Lanes –Each Direction	3	2	2	1	1	1
Travel Lane Width (feet) -Minimum	10	11	11	11	11	11
Turn Lane Width (feet)- Minimum	10	10	10	10	10	10
Bike Lane (LT/RT)	YES/YES	YES/YES	YES/YES	NO/NO	NO/NO	NO/NO
Bike Lane Width (feet)-Minimum	4	4	4	N/A	N/A	N/A
Shared Use Lane Width (feet) - Minimum	—	—	—	—	—	—
Cross-Slope						
Normal Crown (%)	2	2	2	2	2	2
Concrete Barrier Rail						
Lateral Offset from Vehicular Lane to Face of Barrier(feet)-Minimum	2	2	2	2	2	2
Median						
Width (feet) Minimum	2	2	3	N/A	N/A	N/A
Sidewalk						
Sidewalk (LT/RT)	YES/YES	YES/YES	YES/YES	YES/NO	YES/NO	NO/YES

Technical Provisions – Attachment 09-2
Arterials, Collectors, and Local Streets Design Criteria

ATTACHMENT 09-2						
DESIGN STANDARDS	FUTURE IMPROVEMENT PHASES DESIGN CRITERIA – ARTERIALS, COLLECTORS, AND LOCAL STREETS					
	ALTA DRIVE	OAKY BOULEVARD	WESTERN AVENUE	RANCHO DRIVE	WESTWOOD DRIVE	HIGHLAND AVENUE
Width (feet) – Minimum (Note 3)	5	5	10 (Note 1)	5	5	5
Amenity strip -5' park strip with 10' Minimum Sidewalk (LT/RT)	NO/NO	NO/NO	YES/YES (Note 2)	NO/NO	NO/NO	NO/NO
Cut and Fill Slopes						
Depth of Cut - Back Slope Ratio (feet/ratio) (horiz./vert.)	4:1	2:1	2:1	2:1	4:1	4:1
Height of Fill - Slope Ratio (feet/ratio) (horiz./vert.)	4:1	2:1	2:1	2:1	4:1	4:1
Roadside Safety						
Clear Zone Distance (feet) - Minimum	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ	BOW or CZ
Lateral Clearance with Curb and Gutter (feet)- Minimum	6	6	6	2	2	2
NOTES						
<ol style="list-style-type: none"> 1. 5-foot minimum sidewalk required between Highland Ave and Oakey Blvd. 2. Along Western Avenue between Oakey Blvd and Grand Central Parkway. 3. 2-foot minimum lateral offset required to walls, barrier rails, piers, guardrails, and buildings. 						

Technical Provisions – Attachment 09-2
Arterials, Collectors, and Local Streets Design Criteria

This page intentionally left blank.

**ATTACHMENT 09-3
DESIGN EXCEPTIONS AND DEVIATIONS**

This page intentionally left blank.

Attachment 09-3

Design Exceptions

Location:	Description:	Lane Width
I-15 Mainline NB "MN" 745+08 to "MN" 765+83 Length: 2,075 feet	Minimum width for the three left-side general-purpose lanes may be reduced to 11 feet for the initial build. A 12-foot minimum lane width shall be provided for the I-15 Freeway Future Improvements.	
I-15 Mainline NB "MN" 749+81 to "MN" 765+83 Length: 1,602 feet	Minimum width for the two right-side lanes (general-purpose and auxiliary lanes) may be reduced to 11 feet for the initial build. A 12-foot minimum lane width shall be provided for the I-15 Freeway Future Improvements.	
Sahara Avenue NB Entrance "SA2" 746+00 to "SA2" 750+15 Length: 415 feet	Minimum width for lanes may be reduced to 11 feet for the initial build. A 12-foot minimum lane width shall be provided for the I-15 Freeway Future Improvements.	
US 95 WB "L" 1134+30 to "L" 1200+72 Length: 6,642 feet	Minimum width for the three left-side general-purpose lanes may be reduced to 11 feet.	
US 95 EB "L" 1134+00 to "L" 1194+80 Length: 6,080 feet	Minimum width for the three left-side general-purpose lanes may be reduced to 11 feet.	
Location:	Description:	Shoulder Width
I-15 Mainline SB "MS" 728+68 to "MS" 743+75 Length: 1,507 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 728+68 to 742+81 – 4-foot shoulder 742+81 to 743+75 – 4-foot to 8-foot shoulder transition	
I-15 Mainline SB "MS" 850+65 to "MS" 853+62 Length: 297 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 2 feet. 850+65 to 852+89 – 8-foot to 2-foot shoulder transition 852+89 to 853+62 – 2-foot to 4-foot shoulder transition	
I-15 Mainline NB "MN" 731+25 to "MN" 745+30 Length: 1,405 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 731+25 to 734+00 — 8-foot' to 4-foot' shoulder transition 734+00 to 741+08 — 4-foot' shoulder 741+08 to 741+28 — 4-foot' to 6-foot' shoulder transition 741+28 to 745+30 — 6-foot' shoulder	
I-15 Mainline NB Various Spot Locations	Minimum width for the left-side shoulder may be reduced to provide a width of 4 to 2 feet at locations where overhead sign foundations, bridge columns, and light foundations are located.	
I-15 Mainline SB Various Spot Locations	Minimum width for the left-side shoulder may be reduced to provide a width of 4 to 2 feet at locations where overhead sign foundations, bridge columns, and light foundations are located.	

Technical Provisions – Attachment 09-3
Design Exceptions and Deviations

Attachment 09-3	
Design Exceptions	
I-15 NB to WB I-515 Connector “NE” 848+44 to “NE” 849+68 Length: 124 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 3 feet. 848+44 to 849+08 – 6-foot to 3-foot shoulder transition 849+08 to 849+36 – 3-foot shoulder 849+36 to 849+68 – 3-foot to 6-foot shoulder transition
US 95 EB “L” 1173+84 to “L” 1177+34 Length: 350 feet	Minimum width for the left-side shoulder may be reduced to provide a width of 4 to 2 feet.
US 95 EB “L” 1165+29 to “L” 1178+10 Length: 1,281 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 1165+29 to 1167+60 – 8-foot to 4-foot shoulder transition 1167+60 to 1169+15 – 4-foot to 6-foot shoulder transition 1169+15 to 1172+00 – 6-foot to 5-foot shoulder transition 1172+00 to 1173+35 – 5-foot shoulder 1173+35 to 1178+10 – 5-foot to 6-foot shoulder transition
US 95 WB “L” 1175+29 to “L” 1178+41 Length: 312 feet	Minimum width for the left-side shoulder may be reduced to provide a width of 4 to 2 feet.
US 95 WB “L” 1157+32 to “L” 1162+55 Length: 523 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 1157+32 to 1158+05 – 8-foot to 4-foot shoulder transition 1158+05 to 1158+30 – 4-foot to 7-foot shoulder transition 1158+30 to 1160+55 – 7-foot to 6-foot shoulder transition 1160+55 to 1161+21 – 8-foot to 4-foot shoulder transition 1161+21 to 1162+55 – 4-foot shoulder
US 95 WB “L” 1167+00 to “L” 1176+90 Length: 990 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 1167+00 to 1168+81 – 8-foot to 4-foot shoulder transition 1168+81 to 1176+90 – 4-foot shoulder
US 95 WB “L” 1178+45 to “L” 1187+90 Length: 945 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 8 to 4 feet. 1178+45 to 1186+05 – 4-foot shoulder 1186+05 to 1187+90 – 4-foot to 8-foot shoulder transition
Rancho Drive EB Entrance “RD-2” 73+10 to “RD-2” 75+96 286 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 4 feet. 73+10 to 73+49 – 4-foot to 6-foot shoulder 74+54 to 75+96 – 5-foot shoulder

Attachment 09-3		
Design Exceptions		
I-515 EB to SB I-15 Connector “MS” 851+99 to “MS” 853+75 Length: 176 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 2 feet.	
MLK-515 Connector Ramp “MLK-515” 50+00 to “MLK-515” 59+80 Length: 980 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 4 feet.	
MLK-515 Connector Ramp “MLK-515” 62+85 to “MLK-515” 69+05 Length: 620 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 2 feet.	
“SA4” 721+73 to “SA4” 723+84 Length: 211 feet	Minimum width for the right-side shoulder may be reduced to provide a width of 6 to 5 feet.	
Location:	Description:	Bridge Width
I-15 Mainline SB “MS” 850+65 to “MS” 851+99 Length: 134 feet	Bridge width and minimum shoulder width for the right-side shoulder may be reduced to provide a width of 8 to 3 feet. 850+65 to 851+20 – 8-foot to 3-foot shoulder transition 851+20 to 851+99 – 3-foot shoulder	
I-15 NB to WB I-515 Connector “NE” 848+44 to “NE” 849+68 Length: 124 feet	Bridge width and minimum shoulder width for the right-side shoulder may be reduced to provide a width of 6 to 3 feet. 848+44 to 849+08 – 6-foot to 3-foot shoulder transition 849+08 to 849+36 – 3-foot shoulder	
Location:	Description:	Horizontal Alignment
I-15 Mainline NB “MN” 850+00 to “MN” 857+34 Length: 734 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
I-15 Mainline NB “MN” 857+34 to “MN” 859+34 Length: 200 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
I-15 Mainline SB “MS” 849+74 to “MS” 852+30 Length: 256 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
Grand Central Slip Ramp “CH-GC” 804+93 to “CH-GC” 807+86 Length: 293 feet	Alignment centerline radius may be reduced to 156 feet with a maximum superelevation rate of 8%.	

Technical Provisions – Attachment 09-3
Design Exceptions and Deviations

Attachment 09-3		
Design Exceptions		
Location:	Description:	Stopping Sight Distance
HOV Direct Connector "MC" 846+50 to "MC" 866+00 Length: 1,950 feet	For the barrier sight distance obstruction, a minimum stopping sight distance of 316 feet may be used through this location for the left-side shoulder for the NB to WB direction of travel and for the right-side shoulder for the EB to SB direction of travel. For the NB to WB direction of travel the left and right shoulder widths have been exchanged to provide adequate shoulder widths for the sight distance requirements. The minimum left and right shoulder width criteria are met.	
MLK-515 Connector Ramp "MLK-515" 60+50 to "MLK-515" 63+30 Length: 280 feet	For the barrier sight distance obstruction, a minimum stopping sight distance of 183 feet may be used through this location for the left-side shoulder. Advisory speed warning signs for 25 mph shall be installed for the ramp.	
MLK-515 Connector Ramp "MLK-515" 64+30 to "MLK-515" 69+50 Length: 520 feet	For the barrier sight distance obstruction, a minimum stopping sight distance of 183 feet may be used through this location for the left-side shoulder. Advisory speed warning signs for 25 mph shall be installed for the ramp.	
US 95 Mainline EB "L" 1159+00 to "L" 1175+70 Length: 1,670 feet	For the barrier sight distance obstruction, a minimum stopping sight distance of 536 feet may be used through this location for the left-side shoulder.	
Rancho Drive EB Entrance "RD-2" 71+40 to 73+20 Length: 180 feet	For the barrier and bridge column sight distance obstruction, a minimum stopping sight distance of 377 feet may be used through this location for the right-side shoulder.	
Location:	Description:	Superelevation
I-15 Mainline NB "MN" 850+00 to "MN" 857+34 Length: 734 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
I-15 Mainline NB "MN" 857+34 to "MN" 859+34 Length: 200 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
I-15 Mainline SB "MS" 849+74 to "MS" 852+30 Length: 293 feet	The existing roadway horizontal curvature and superelevation rates may be used through these limits.	
Grand Central Exit "CH-CG" 804+93 to "CH-CG" 807+86 Length: 293 feet	The minimum radii used for design shall be measured from the inner edge of the traveled way. Horizontal curvature and superelevation rates shall provide for a minimum of a 25-mph design speed for a design superelevation rate $e_{max} = 6\%$. Advisory speed warning signs shall be installed for the ramp.	
MLK-515 Connector Ramp "MLK-515" 60+13 to "MLK-515" 60+93 Length: 80 feet	The superelevation transition length for this location may be a minimum of 79 feet.	

Attachment 09-3		
Design Exceptions		
Location:	Description:	High-Occupancy Vehicle (HOV) Buffer Width
I-15 HOV Southbound "MS" 714+00 to "MS"763+00	The buffer width between HOV lanes and I-15 general-purpose lanes may be reduced to 0 foot for the initial build.	
I-15 HOV Northbound "MN" 739+00 to "MN"760+00	The buffer width between HOV lanes and I-15 general-purpose lanes may be reduced to 0 foot for the initial build.	
Notes: Station limits are derived from the Reference Information Documents (RIDs) and are approximate.		

Technical Provisions – Attachment 09-3
Design Exceptions and Deviations

Attachment 09-3	
Deviations	
Location:	Description: Lane Width
Alta Drive "AL" 26+15 to "AL" 30+75 Length: 460'	Minimum width for left-outside general purpose lanes may be reduced to 10 feet for the initial build. A 12-foot minimum lane width shall be provided for the Future Improvements.
Alta Drive "AL" 28+19 to "AL" 38+03 Length: 984'	Minimum width for left-outside general purpose lanes may be reduced to 10 feet for the initial build. A 12-foot minimum lane width shall be provided for the Future Improvements.
Alta Drive "AL" 66+77 to "AL" 72+20 Length: 543'	Minimum width for left-outside general purpose lanes may be reduced to 10 feet for the initial build. A 12-foot minimum lane width shall be provided for the Future Improvements.
Charleston Blvd "CH" 34+60 to "CH" 36+00 Length: 140'	Transition lane widths from 11 feet to match existing.
Charleston Blvd "CH-RT" 45+60 to "CH-RT" 46+00 Length: 140'	Transition lane widths from 11 feet to match existing.
Location:	Description: Urban Trails (10' Sidewalk with 5' Amenity Zone)
Charleston Blvd "CH" 31+14 to "CH" 35+30 Length: 416'	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Charleston Blvd "CH" 30+95 to "CH" 34+82 Length: 387'	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.
Charleston Blvd "CH" 31+58 to "CH" 36+12 Charleston Blvd "CH-RT" 45+86.79 to end MLK Blvd "MLK" 20+89 to "MLK" 22+99 Length: 210'	Minimum general purpose lanes may be reduced less than 11.0 feet to match into existing general purpose lanes at UPRR crossing. Minimum k-value may be reduced to match into existing at UPRR crossing. Minimum width for left-side amenity zone may be reduced to 0 feet.
MLK Blvd "MLK" 47+87 to "MLK" 50+27 Length: 240'	Minimum width for left-side amenity zone may be reduced to 0 feet.
MLK Blvd "MLK" 62+77 to "MLK" 64+22 Length: 145'	Minimum width for left-side amenity zone may be reduced to 0 feet.
MLK Blvd "MLK" 49+83 to "MLK" 51+51 Length: 168'	Minimum width for right-side amenity zone may be reduced to 0 feet.

Technical Provisions – Attachment 09-3
Design Exceptions and Deviations

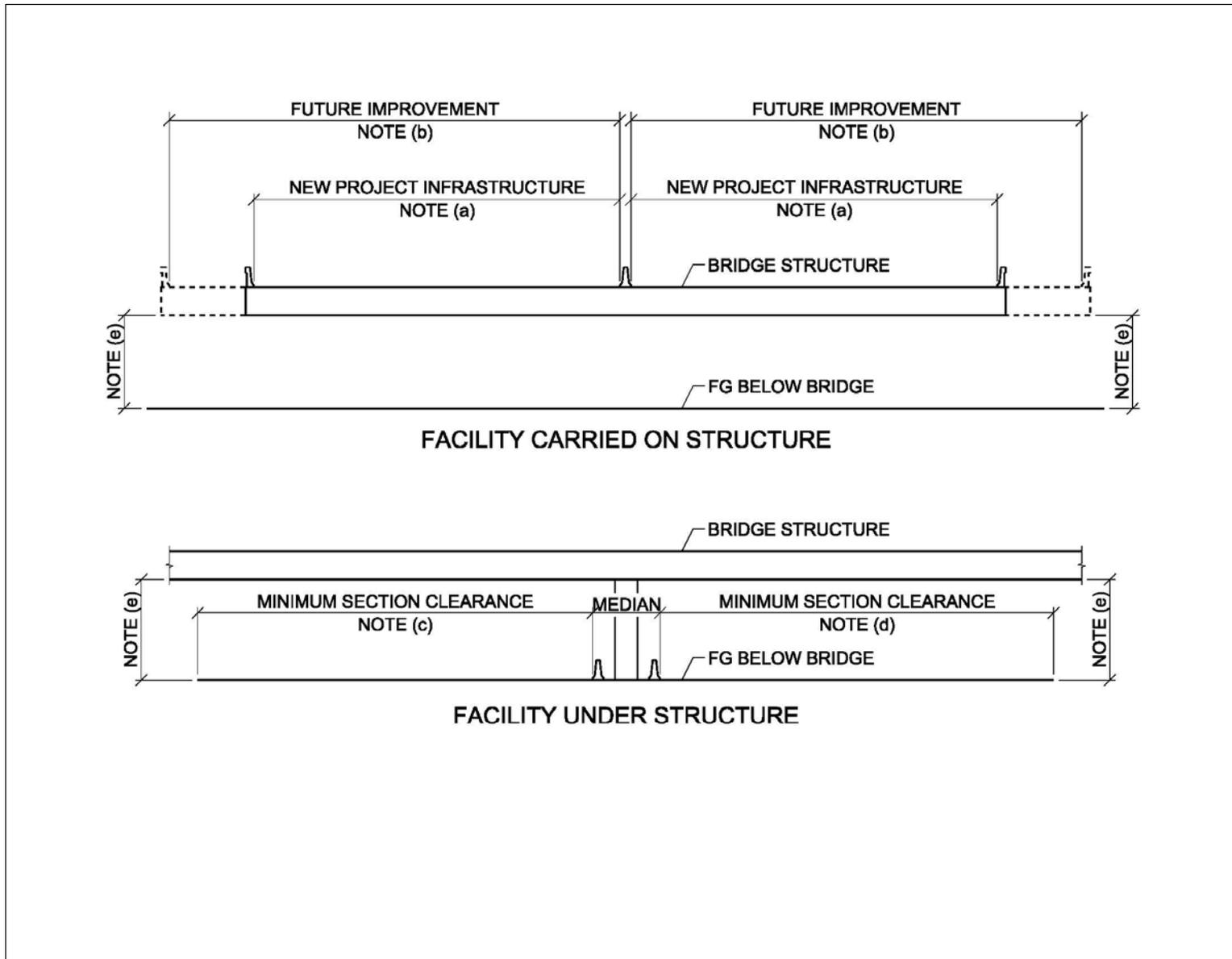
Attachment 09-3	
Deviations	
MLK Blvd “MLK” 70+84 to “MLK” 72+08 Length: 124’	Minimum width for right-side amenity zone may be reduced to 0 feet.
Grand Central Parkway “GC” 41+26 to “GC” 42+36 Length: 110’	Minimum width for left-side amenity zone may be reduced to 0 feet for the initial build. A 5-foot minimum amenity zone shall be provided for the Future Improvements. Minimum width for left-side sidewalk may be reduced to 5 feet for the initial build. A 10-foot minimum sidewalk and a 5-foot Amenity Zone shall be provided for the Future Improvements.
Grand Central Parkway “GC” 33+68 to “GC” 34+09 Length: 41’	Minimum width for left-side sidewalk may be reduced to 5 feet for the initial build. A 10-foot minimum sidewalk and a 5-foot Amenity Zone shall be provided for the Future Improvements.
Grand Central Parkway “GC” 41+22 to “GC” 44+52 Length: 330’	Minimum width for right-side amenity zone may be reduced to 0 feet for the initial build. A 5-foot minimum amenity zone shall be provided for the Future Improvements. Minimum width for right-side sidewalk may be reduced to 5 feet for the initial build. A 10-foot minimum sidewalk and a 5-foot Amenity Zone shall be provided for the Future Improvements.
Western Blvd “W” 38+91 to “W” 43+58 Length: 467’	Minimum width for left-side amenity zone may be reduced to 0 feet for the initial build. A 5-foot minimum amenity zone shall be provided for the Future Improvements. Minimum width for left-side sidewalk may be reduced to 5 feet for the initial build. A 10-foot minimum sidewalk and a 5-foot Amenity Zone shall be provided for the Future Improvements.
Western Blvd “W” 39+21 to “W” 43+02 Length: 381’	Minimum width for right-side amenity zone may be reduced to 0 feet for the initial build. A 5-foot minimum amenity zone shall be provided for the Future Improvements. Minimum width for right-side sidewalk may be reduced to 5 feet for the initial build. A 10-foot minimum sidewalk and a 5-foot Amenity Zone shall be provided for the Future Improvements.
Bearden Dr “B” 11+19 to “B” 13+99 Length: 280’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Bearden Dr “B” 10+00 to “B” 14+30 Length: 430’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.
Desert Ln “DL” 10+08 to “DL” 10+93 Length: 85’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Desert Ln “DL” 10+45 to “DL” 10+81 Length: 36’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.

Technical Provisions – Attachment 09-3
Design Exceptions and Deviations

Attachment 09-3	
Deviations	
Hastings Ave “H” 13+25 to “H” 13+65 Length: 40’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Hastings Ave “H” 13+25 to “H” 13+43 Length: 18’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.
Oakey Blvd “OW” 11+64 to “OW” 13+75 Length: 211’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Oakey Blvd “OW” 15+94 to “OW” 24+85 Length: 891’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Alta Dr “AL” 41+20 to “AL” 42+20 Length: 100’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Alta Dr “AL” 45+24 to “AL” 48+60 Length: 336’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Alta Dr “AL” 49+50 to “AL” 50+61 Length: 111’	Minimum width for left-side amenity zone may be reduced to 0 feet. Minimum width for left-side sidewalk may be reduced to 5 feet.
Alta Dr “AL” 41+51 to “AL” 42+67 Length: 116’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.
Alta Dr “AL” 45+11 to “AL” 48+29 Length: 318’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.
World Market Driveway “WM” 10+70 to “WM” 12+68 Length: 198’	Minimum width for right-side amenity zone may be reduced to 0 feet. Minimum width for right-side sidewalk may be reduced to 5 feet.

ATTACHMENT 09-4
BRIDGE REPLACEMENTS I-937, I-938, G-941, AND I-945

This page intentionally left blank.



Technical Provisions – Attachment 09-4
 Bridge Replacements I-937, I-938, G-941, and I-945

Bridge No I-937
Note (a). Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for southbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (a) Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for northbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (b). Southbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions. Northbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, one auxiliary lane, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (c). Eastbound US95, Design-Builder’s bridge replacement shall provide a minimum section clearance width to provide for the Existing Project Infrastructure and for future improvements providing for three general purpose lanes, one auxiliary lane, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (d). Westbound US95, Design-Builder’s bridge replacement shall provide a minimum section clearance width to provide for the Existing Project Infrastructure and for future improvements providing for three general purpose lanes, one auxiliary lane, one HOV lane, and one ramp lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (e). Design-Builder’s bridge design and configuration shall provide minimum vertical clearance in accordance with the Project Standards compatible with the future improvements.

Bridge No I-938
Note (a). Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for southbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (a). Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for northbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (b). Southbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions. Northbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, one auxiliary lane, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (c). Design-Builder’s bridge replacement shall provide a minimum section clearance width to provide for the Existing Project Infrastructure including one ramp lane, shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions. Width to provide for horizontal sight distance criteria shall be included in the minimum section width.

Technical Provisions – Attachment 09-4
Bridge Replacements I-937, I-938, G-941, and I-945

Bridge No I-938
Note (e). Design-Builder’s bridge design and configuration shall provide minimum vertical clearance in accordance with the Project Standards compatible with the future improvements.
Bridge No. G-941
Note (a). Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for southbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (a) Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for northbound I-15 in accordance with the Project Standards and these Technical Provisions.
Note (b). Southbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions. Northbound I-15, Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for four general purpose lanes, one auxiliary lane, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (c). Design-Builder’s bridge replacement shall provide a minimum horizontal clearance in accordance with Project Standards and these Technical Provisions.
Note (e) Design-Builder’s bridge design and configuration shall provide minimum vertical clearance in accordance with the Project Standards and these Technical Provisions.
Bridge No I-945
Note (a). Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for eastbound US 95 in accordance with the Project Standards and these Technical Provisions.
Note (a) Design-Builder’s bridge replacement shall provide for the New Project Infrastructure for westbound US 95 in accordance with the Project Standards and these Technical Provisions.
Note (b). Design-Builder’s bridge design and configuration shall be compatible with future improvements providing for three general purpose lanes, one auxiliary lane, and one HOV lane including shoulders, buffers, barrier, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (c) Design-Builder’s bridge replacement shall provide a minimum section clearance width to provide for three general purpose lanes, two left turn lanes, bike lane, curb, sidewalks, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (d). Design-Builder’s bridge replacement shall provide a minimum section clearance width to provide for three general purpose lanes, two left turn lanes, bike lane, curb, sidewalks, medians, and other features in accordance with the Project Standards and as defined in these Technical Provisions.
Note (e). Design-Builder’s bridge design and configuration shall provide minimum vertical clearance in accordance with the Project Standards compatible with the future improvements.

This page intentionally left blank.

ATTACHMENT 10-1
ASPHALTIC CONCRETE FRICTION COURSE

This page intentionally left blank.

ASPHALTIC CONCRETE FRICTION COURSE

01 Description

01.01 General. This work consists of furnishing all materials, mixing at a plant, hauling, and placing a mixture of aggregate materials, mineral filler, and bituminous material (asphalt-rubber) to form a pavement course, in accordance with the details shown on the plans and the requirements of these specifications, and as directed.

Design-Builder shall be responsible for all adjustments to equipment necessary to properly accommodate the use of asphalt-rubber as a bituminous material.

The Design-Builder shall perform mix designs in accordance with Arizona Test Method 814, modified as necessary for Asphaltic Concrete Friction Course (Asphalt-Rubber).

01.02 Qualifications. Qualified Design-Builders must have performed satisfactory mixing and placement of asphalt rubber-asphaltic concrete friction course/dense grade for a minimum of 3 years on at least three projects and a minimum of 200,000 square yards.

Design-Builder's onsite paving foreman shall have a minimum of 3 years' experience, including demonstrated experience supervising the mixing and placement of a minimum of 200,000 square yards of asphaltic concrete friction course, and shall be present on the job site during all mixing and placement activities. Each member of the paving crew shall have experience performing similar paving work for a minimum of 10 lane miles of asphaltic concrete friction course placement. The person in charge of the blending operation for the crumb rubber and the asphaltic binder shall have worked on a minimum of 3 similar jobs previously.

01.03 Pre-paving Coordination. Before developing a mix design, Design-Builder shall perform the following tasks with concurrence from the Lead Engineer:

- (a) Design-Builder's qualifications and reference list, which includes project name, location of work, client name, current contact phone numbers, and a brief description of work performed, including equipment used and total area of placed asphalt rubber-asphaltic concrete friction course/dense grade in square yards.
- (b) A list identifying the onsite project manager and all paving crew personnel who will be assigned to the project, including a summary of each individual's experience that is complete enough for the Lead Engineer to assess whether each individual has satisfied the required qualifications.
- (c) A detailed work plan for the blending and placement operation, which includes the following items:
 - 1. The proposed construction sequence and schedule
 - 2. The types of equipment and tools to be used
 - 3. The number of personnel to be employed on the project
 - 4. The sequence of the proposed asphaltic concrete blending operation

02 Materials

02.02 Bituminous Material. Design-Builder shall provide asphalt rubber conforming to the requirements of the asphalt rubber specifications. When producing the asphalt rubber, asphalt cement type PG64-16 and crumb rubber gradation Type B, conforming to the requirements of the asphalt rubber specifications, shall be used.

Design-Builder shall not dilute the asphalt-rubber with extender oil, kerosene, or other solvents. Contaminated asphalt-rubber will be rejected.

Design-Builder shall purge any kerosene or other solvents used in to clean equipment from the system before any subsequent use of that equipment.

02.03 Mix Design. Design-Builder shall develop a mix design with at least 600 pounds of produced mineral aggregate, in proportion to the anticipated bin percentages and the following materials:

- (a) 5-pound of crumb rubber proposed for use
- (b) 1 gallon of asphalt cement from the intended supplier
- (c) 3 gallons of the proposed mixture of asphalt and rubber
- (d) 1-gallon can of the hydrated lime to be used in the asphaltic concrete

Design-Builder shall submit a letter of explanation to the Lead Engineer or mix producer that details the methods of producing aggregate, including wasting, washing, blending, proportioning, etc., and any special or limiting conditions it may propose. The sources of mineral aggregate, the source of asphalt cement and crumb rubber, the asphalt-rubber supplier, and the source and type of mineral filler shall be stated in the letter.

02.04 Mix Design Revisions. Design-Builder shall not change methods of crushing, screening, washing, or stockpiling from those used during production of material used for mix design purposes without developing a new mix design.

During production of asphaltic concrete, the job mix formula may be modified if determined necessary by the Lead Engineer.

If unapproved changes are made in the source of bituminous material, sources of mineral aggregate, production methods, or proportional changes in violation of approved mix design stipulations, stop production until a new job mix formula or mix design is developed, or the Design-Builder complies with the approved job mix formula.

If, during production and on the basis of testing, the Lead Engineer concludes that a change in the job mix formula is necessary, the Design-Builder shall issue a revised job mix formula.

Before beginning full production of asphaltic concrete, Design-Builder shall produce 200 tons of asphaltic concrete and place on the outside shoulder. Production of asphaltic concrete shall be suspended for a maximum of 3 working days or until all test results are available.

02.05 Acceptance of Materials. Design-Builder shall produce aggregate that is free of deleterious materials, clay balls, and adhering films or other material that may prevent thorough coating of the aggregate with the bituminous material.

During asphaltic concrete production, obtain and test samples of aggregate for the determination of the sand equivalent and fractured faces. Should such testing present results that do not meet the requirements for sand equivalent or fractured coarse aggregate particles, Design-Builder shall cease operations and either develop a new mix design or correct deficiencies in the aggregate stockpiles.

02.06 Drying and Heating. A moisture content of 0.5 percent in the asphaltic concrete shall not be exceeded. The moisture content will be calculated in accordance with Arizona Test Method 406. Drying and heating shall be accomplished such that the mineral aggregate is precluded from becoming coated with fuel oil or carbon.

02.07 Placing and Finishing. Before placing asphaltic concrete, Design-Builder shall thoroughly remove striping, clean the surface to be paved by means of vacuum sweep truck or other approved equipment, and tack with asphalt cement.

03 Construction

03.04 Rollers. Design-Builder shall provide a minimum of three static steel wheel rollers, with drums of sufficient width that, when staggered, two rollers can cover the entire width of the mat with one pass. Design-Builder shall provide self-propelled rollers weighing not less than 9.1 metric tons (10 tons) that operate with the drive wheel in the forward position. Vibratory rollers may be used in the static mode only.

03.03 Pavers. Design-Builder shall use a material transfer vehicle (MTV) for all mainline paving operations. The MTV shall be self-propelled and able to operate independently of the paver. The MTV shall have an internal chamber for remixing, including multi-pitch augers, a covered conveyor system to prevent heat loss, and a capacity of 15 to 25 tons. In conjunction with the MTV, Design-Builder shall use a paver hopper insert that prevents the paver wings from being closed and increases hopper capacity.

03.05 Weather Limitations. Design-Builder shall not place asphaltic concrete (asphaltic-rubber) between November 1 and April 1.

Design-Builder shall place asphaltic concrete (asphaltic-rubber) only when the atmospheric temperature and the pavement surface temperature are above 29 °C (85 °F).

03.12 Joints. Design-Builder shall construct longitudinal joints only on the shoulders, or at the edge of travel lanes.

Before a surface course is placed in contact with a cold transverse construction joint, Design-Builder shall trim the cold existing asphaltic concrete to a vertical face by cutting the existing asphaltic concrete back for its full depth and exposing a fresh face. After placement and finishing of the new asphaltic concrete, both sides of the joint should be dense and the joint well-sealed. Design-Builder shall produce a surface in the area of the joint that conforms to the requirements hereinafter specified for surface tolerances when tested with the straightedge placed across the joint.

03.13 Surface Tolerances. Design-Builder shall produce completed surfacing that meets the requirements of Section 10.4.

Technical Provisions – Attachment 10-1
Asphaltic Concrete Friction Course

03.18 Compaction. The temperature of asphaltic concrete just before compaction shall be a minimum of 275 °F.

The wheels of compactors shall be wetted with water, or if necessary soapy water, or other product to prevent the asphaltic concrete from sticking to the steel wheels during rolling. If needed, change the rolling procedure to prevent the asphaltic concrete from being picked up.

Design-Builder shall perform compactive rolling, with a minimum of two complete coverages of the mat by each roller, or as directed. A complete coverage is defined as a roller pass forward and back within a given area.

Two compactors shall be used for initial breakdown and shall be maintained no more than 300 feet behind the paving machine. The rollers for final compaction shall follow as closely behind the initial breakdown as possible. As many passes as possible shall be made with the compactors before the temperature of the asphaltic concrete falls below 220 °F.

Bituminous Materials

Asphalt Cement, Grade PG 64-16 shall conform to the following:

TEST	TEST METHOD	REQUIREMENT
Tests on Original Binder:		
Flash point, °C	AASHTO T48	230 Min.
Viscosity @ 135 °C, Pa•s	AASHTO T316	3.00 Max.
Dynamic Shear, G*/sin δ, Test Temp 64 °C @ 10 rad/s, kPa	AASHTO T315	1.00 Min.
Solubility	Nev. T44	99.0 Min.
Tests on Residue from R.T.F.O., AASHTO T240:		
Mass Loss, %	AASHTO T240	1.00 Max.
Dynamic Shear, G*/sin δ, Test Temp 64 °C @ 10 rad/s, kPa	AASHTO T315	2.20 Min.
Tests on Residue from Pressure Aging Vessel, AASHTO R28 @ 100 °C :		
Dynamic Shear, G*/sin δ, Test Temp 25 °C @ 10 rad/s, kPa	AASHTO T315	5000 Max.
Creep Stiffness, S, Test Temp -6 °C @ 60 sec, MPa	AASHTO T313 ^a	300 Max.
Creep Stiffness, m-value, Test Temp -6 °C @ 60 sec	AASHTO T313 ^a	0.300 Min.

^a If the creep stiffness is below 300 MPa, the direct tension test is not required. If the creep stiffness is between 300 and 600 MPa, the direct tension failure strain can be used in lieu of the creep stiffness requirement. The m-value requirement must be satisfied in both cases.

Asphalt Cement, Grade PG 64-16 not conforming to the requirements specified herein will not be accepted.

The aggregate shall conform to the following requirements:

Sieve Size	Percent Passing by Mass
9.5 millimeter (3/8 inch)	100
4.75 millimeter (No. 4)	30-45
(No. 8)	4-8
75 micrometer (No. 200)	0-2.5

Mineral aggregate shall conform to the requirements in the following table when tested in accordance with the applicable test methods.

Tests on aggregates outlined in the following table, other than abrasion, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation. Abrasion shall be performed separately on samples from each source of mineral aggregate. All sources shall meet the requirements for abrasion:

MINERAL AGGREGATE CHARACTERISTICS

Characteristic	Test Method	Requirement
Combined Bulk Specific Gravity	Arizona Test Method 814	2.35 – 2.85
Combined Water Absorption	Arizona Test Method 814	0-2.5%
Sand Equivalent Method 242	Arizona Test	Minimum 45
Fractured Faces Method 212	Arizona Test fractured faces)	Minimum 90 % (two
Flakiness Index Method 233	Arizona Test	Maximum 25
Abrasion 500 Rev., Max 37%	AASHTO T96	100 Rev., Max 9%

The allowable range of percent absorbed asphalt-rubber shall be 0 to 1.0, when tested in accordance with the applicable section of Arizona Test Method 815.

Asphalt Rubber

Asphalt cement shall conform to the following requirements for the types and grades designated.

Sampling of asphalt cement shall conform to the requirements of AASHTO T 40. Samples shall be taken by Design-Builder and witnessed by the Lead Engineer. The Lead Engineer shall specify the point of sampling and the number of samples.

Design-Builder shall provide convenient facilities for obtaining accurate samples of asphalt cement.

Technical Provisions – Attachment 10-1
Asphaltic Concrete Friction Course

At least 7 working days before the start of asphaltic concrete production, Design-Builder shall obtain a Certificate of Analysis showing complete AASHTO M 320 asphalt cement testing. Laboratory-prepared samples will not be acceptable. Asphaltic concrete production shall not begin until the Lead Engineer evaluates the acceptability of the proposed asphalt cement.

If, during asphaltic concrete production, testing shows that asphalt cement fails to meet the requirements of AASHTO M320 for the specified grade, the asphaltic concrete represented by the corresponding test results shall be evaluated for acceptance. Should the asphaltic concrete be allowed to remain in place, the Design-Builder shall perform an engineering analysis of the expected performance of the asphaltic concrete in which the asphalt cement is incorporated. The analysis shall detail any proposed corrective action and the anticipated effect of such corrective action on the performance. Within 3 working days, the Lead Engineer shall decide whether or not to accept Design-Builder's proposal. If the proposal is rejected, the asphaltic concrete shall be removed and replaced with asphaltic concrete meeting the requirements of the applicable specifications. If Design-Builder's proposal is accepted, the asphalt concrete shall remain in place and any necessary corrective action shall be performed.

During production of asphalt rubber, Design-Builder shall test the blended and cured asphalt rubber for rotational viscosity before incorporating it into the mixture. Design-Builder shall provide a certified tester and a calibrated rotational viscometer to perform this testing. The blended and cured asphalt rubber shall meet the rotational viscosity requirements.

Physical Properties and Tests

Asphalt cement shall be PG64-16 conforming to the requirements of AASHTO M 320. The pressure aging temperature shall be 100 °C.

Crumb rubber shall meet the following gradation requirements when tested in accordance with Arizona Test Method 714.

Sieve Size	Percent Passing
	Type B
No. 10	100
No. 16	65 - 100
No. 30	20 - 100
No. 50	0 - 45
No. 200	0 - 5

The rubber shall have a specific gravity of 1.15 ± 0.05 and shall be free of wire or other contaminating materials, except that Type A rubber shall contain no more than 0.1 percent fabric and Type B shall contain no more than 0.5 percent fabric. Calcium carbonate, up to 4 percent by weight of the granulated rubber, may be added to prevent the particles from sticking together.

Certificates of Compliance shall be submitted confirming that the rubber is a crumb rubber, derived from processing whole scrap tires or shredded tire materials; and that the tires from

which the crumb rubber is produced are taken from automobiles, trucks, or other equipment owned and operated in the United States. The certificates shall also verify that the processing does not produce, as a waste product, casings or other round tire material that can hold water when stored or disposed of above ground.

The asphalt-rubber shall contain a minimum of 20 percent ground rubber by the weight of the asphalt cement.

Asphalt-rubber shall conform to the following:

Property	Requirement
	Type 1
Grade of base asphalt cement	PG 64-16
Rotational Viscosity: 350 °F; pascal seconds (AASHTO T316)	1.5 - 4.0
Penetration: 39.2 °F, 200 g, 60 sec. (AASHTO T49); minimum	10
Softening Point:(AASHTO T 53); °F, minimum	135
Resilience: 77 °F(ASTM D 5329); %, minimum	30

During production of asphalt-rubber, Design-Builder shall combine materials in conformance with the asphalt-rubber design unless otherwise approved by the Lead Engineer.

The temperature of the asphalt-cement shall be between 350 °F and 400 °F at the time of addition of the ground rubber. No agglomerations of rubber particles in excess of 2 inches in the least dimension shall be allowed in the mixing chamber. The ground rubber and asphalt-cement shall be accurately proportioned in accordance with the design and thoroughly mixed before the beginning of the 1-hour reaction period. Design-Builder shall document that the proportions are accurate and that the rubber has been uniformly incorporated into the mixture. Design-Builder shall also demonstrate that the rubber particles have been thoroughly mixed such that they have been "wetted." The occurrence of rubber floating on the surface or agglomerations of rubber particles shall be evidence of insufficient mixing. The temperature of the asphalt-rubber immediately after mixing shall be between 325 °F and 375 °F. The asphalt-rubber shall be maintained at such temperature for 1 hour before being used.

Before use, the viscosity of the asphalt-rubber shall be tested by the use of a rotational viscotester, which is to be furnished by Design-Builder or the supplier.

Once the asphalt-rubber has been mixed, it shall be kept thoroughly agitated during periods of use to prevent settling of the rubber particles. During the production of asphaltic concrete, the temperature of the asphalt-rubber shall be maintained between 325 °F and 375 °F. However, in no case shall the asphalt-rubber be held at a temperature of 325 °F or above for more than 10 hours. Asphalt-rubber held for more than 10 hours shall be allowed to cool and gradually reheated to a temperature between 325 °F and 375 °F before use. The cooling and reheating shall not be allowed more than once. Asphalt-rubber shall not be held at temperatures above 250 °F for more than 4 days.

Technical Provisions – Attachment 10-1
Asphaltic Concrete Friction Course

For each load or batch of asphalt-rubber, Design-Builder shall provide the Lead Engineer with the following documentation:

- (1) The source, grade, amount, and temperature of the asphalt cement before the addition of rubber.
- (2) The source and amount of rubber and the rubber content expressed as percent by the weight of the asphalt cement.
- (3) Times and dates of the rubber additions and resultant viscosity test.
- (4) A record of the temperature, with time and date reference for each load or batch. The record shall begin at the time of the addition of rubber and continue until the load or batch is completely used. Readings and recordings shall be made at every temperature change in excess of 20°F, and as needed to document other events that are significant to batch use and quality.

ATTACHMENT 10-2
PLANTMIX BITUMINOUS GAP-GRADED SURFACE

This page intentionally left blank.

Note: References in this Attachment 10-2 to Sections and Subsections not contained herein shall be understood to refer to the corresponding Section or Subsection in the *Uniform Standard Specifications (USS) for Public Works Construction Off-Site Improvements, Clark County Area Nevada*. See Section 26 (Standards and References).

SECTION 413

PLANTMIX BITUMINOUS GAP-GRADED SURFACE

01 DESCRIPTION

413.01.01 GENERAL

- A. This work shall consist of placing a gap-graded wearing course, bonded to the surface, in accordance with these specifications and in conformity with the lines, grades, thickness, and the typical cross sections shown on the plans or established by the Engineer.
- B. The bonded wearing course shall consist of an application of a warm polymer modified asphalt emulsion to create a polymer modified membrane (PMM) followed immediately with a hot gap-graded ultra-thin asphalt concrete surface course (UTACS).
- C. This work shall not be started until the Contractor has completed all heavy equipment work or any other work that could scar or mar the finished gap-graded surface.
- D. The requirements of Section 401, "Plantmix Bituminous Pavements – General," shall be applicable to this work, except as hereinafter specified.

413.01.02 REFERENCE CODES AND STANDARDS

- A. Related Interagency Quality Assurance Committee (IQAC) procedures at:

http://www.clarkcountynv.gov/Depts/public_works/construction_mgmt/Pages/Materials.aspx

413.01.03 REQUIREMENTS

- A. Persons involved with the placement of UTACS shall be trained by the manufacturer and/or the Nevada T2 Program.

02 MATERIALS

413.02.01 GENERAL MATERIALS

- A. The materials shall conform to Subsection 401.02.01, "Composition of Mixtures," with the following exceptions:
 - 1. Prior to starting work, the Contractor shall submit a proposed job-mix formula in writing for review and approval by the Engineer.
 - 2. The proposed job-mix formula shall be determined by an AASHTO certified testing laboratory, using Nevada Alliance for Quality Transportation Construction

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

(NAQTC) certified technicians, based on the tests required to determine the gradation and surface capacity for coarse aggregate.

3. The gradation shall be Type S1, S2, or S3 in accordance with Subsection 705.03.08, "Plantmix and Roadmix Asphalt Concrete Surface Course UTACS Type S1 through S3," and the contract Special Provisions.
 4. The bituminous materials shall be PG76-22CC in accordance with Section 703.03.02, "Asphalt Cements."
- B. Prior to the production of the UTACS gap-graded mix material, all of the contract aggregate quantity shall be stockpiled and shall be tested by the Contractor. The tests are to be submitted to the Engineer no earlier than two weeks prior to placement and may be used only after the Engineer has taken no exception to the results.

413.02.02 COMPOSITION OF GAP-GRADED (UTACS) MIXTURE

- A. The plantmix gap-graded Ultra-Thin Asphalt Concrete Surface (UTACS) mixture shall be composed of aggregates and bituminous materials as described in these specifications. The criteria for the design is based on Subsection 413.02.01, "General Materials," above and the following:
1. Film Thickness (μm):
 - a. Gradation surface area factor using the film thickness calculation based on effective asphalt content and aggregate surface area according to Asphalt Institute MS 2 Table 6.1.
 - b. The minimum film thickness shall be 10 μm .
 2. Specimens for AASHTO T283 testing shall be compacted using the Superpave gyratory compactor applying 100 gyrations or using the Marshall compactor applying 50 blows on each side of the 4 inch diameter sample.
 - a. Use mix quantity necessary to obtain compacted samples 2.5 inches \pm 0.05 inch in height.
 - b. Further test compacted samples regardless of air void levels achieved after 100 gyrations or 50 blows on each side.
 - c. Apply vacuum to samples to be conditioned for 20 seconds and proceed without calculating percent saturation.
 - d. Mixing and compaction temperatures are to be recommended by the binder supplier.
 - e. The minimum moisture susceptibility shall be 80 percent retained strength.
 3. The minimum air voids shall be 4 percent and the maximum aggregate surface shall be 26 square feet per pound.

4. Marshall stabilities are not required.
5. Gradation shall be in accordance with Subsection 705.03.08, "Plantmix and Roadmix Asphalt Concrete Surface Course UTACS Type S1 through S3" of Section 705, "Aggregates for Bituminous Courses."
6. The binder type shall be PG76 22CC as described in Section 703, "Bituminous Materials."

413.02.03 POLYMER MODIFIED MEMBRANE

- A. The UTACS pavement shall consist of an application of a warm polymer modified membrane (PMM) asphalt emulsion, as specified under Section 703, "Bituminous Materials," followed immediately with an ultra-thin surface course of quality hot mix asphalt concrete.
- B. The PMM emulsion shall be sprayed immediately prior to the application of the surface course so that no wheel or other part of the paving machine comes in contact with the PMM before the surface course is applied.
- C. The process of applying the PMM, placement of the surface course, and screed compacting shall be performed in under 5 seconds during normal paving speeds, resulting in a homogeneous surface that can be opened to traffic immediately upon sufficient cooling to 160 degrees F or below.
- D. The PMM target design application rate shall be in accordance with Table 1. The PMM application rates shall be adjusted in the field to account for the texture of the existing pavement, traffic, and project uniqueness.

TABLE 1 – PMM APPLICATION RATES

Gradation Type	Application Rate
S1	0.13 gal/sq yd
S2	0.15 gal/sq yd
S3	0.17 gal/sq yd

03 CONSTRUCTION

413.03.01 GENERAL CONSTRUCTION

- A. The construction shall conform to Subsection 401.03.01, "Bituminous Mixing Plant," through Subsection 401.03.16, "Surfacing Miscellaneous Areas," with the exceptions below.

413.03.02 GAP-GRADED UTACS PAVING EQUIPMENT

- A. The Contractor shall use a self-priming paver, designed and built for the purpose of applying the PMM bond and the UTACS pavement.
 1. All other equipment and tools shall be approved by the Engineer.

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

2. All equipment and tools shall be maintained in satisfactory working condition at all times.
- B. The self-priming machine shall meet the following requirements:
1. Be capable of spraying the PMM emulsion, applying the surface course overlay, and providing a smooth surface to the mat in 1 pass at the rate of 35.5 to 92 feet/minute.
 2. Shall incorporate a receiving hopper, feed conveyor, insulated storage tank for PMM emulsion, electronic device to determine rate of emulsion application, metered PMM emulsion system, spray bar, and variable width.
 3. The integrated distributor-paver shall be equipped with a full-width, heated vibratory screed that can spread and finish the bonded wearing course to the required cross section and grade that produces a uniformly finished surface free from tearing or other blemishes.
- C. At all times during paving, the sump pump for excess spray bar emulsion shall be operating as indicated by the required warning light to prevent overflow of the tray. The screed shall have the ability to be crowned at the center, both positively and negatively, and have vertically adjustable extensions to accommodate the desired pavement profile.
- D. The PMM shall be applied in accordance with the following:
1. With a mechanical pressure spray bar.
 2. Within a tolerance of 0.018 gallon per square yard of the application rate.
 3. At a uniform rate for the full paving width.
- E. Rollers:
1. Rolling of the wearing course shall consist of a minimum of 2 passes with a steel double drum asphalt roller of minimum weight of 10 tons, before the material temperature has fallen below 185 degrees F.
 2. At no time shall the roller or rollers be allowed to remain stationary on the freshly placed asphalt concrete.
 3. Rolling shall immediately follow the placement of the UTACS with approved asphalt rollers.
 4. Rollers shall be monitored to ensure the rollers are not picking up material and that the setting process is completed while the mat is above 185 degrees F.
 5. Rollers shall be well maintained in reliable operating condition and be equipped with functioning water system and scrapers to prevent adhesion of the fresh mix onto the roller drums.
 6. Adequate roller units shall be supplied so the rolling will be accomplished promptly following the placement of the material.

7. A release agent (added to the water system) may be required to prevent adhesion of the fresh mix to the roller drum and wheels.
 8. Rolling shall normally be done in the static mode.
- F. Sweepers: The Contractor shall have a minimum of 1 approved sweeper available at all times during the construction of the surface course to pick up loose material.
- G. Material Transfer Vehicle (MTV): An MTV shall be used when placing UTACS, and shall meet the following requirements:
1. Able to remix the UTACS mixture to eliminate truck end segregation, minimize material temperature loss, and deliver a uniform mixture to the paver.
 2. Self-propelled machine totally independent of the paver.
 3. High-capacity truck unloading system to receive UTACS mix from the haul units.
 4. Minimum 25 ton surge capacity to minimize paver start/stops and maximize trucking efficiency.
 5. Equipped with a pivoting paver loading conveyor able to swing 55 degrees to either side to allow off-lane paving.

413.03.03 APPLICATION OF GAP-GRADED UTACS SURFACE

- A. The UTACS pavement shall not be placed on wet pavement. The pavement surface temperature shall not be less than 50 degrees F and the ambient temperature shall not be less than 50 degrees F and rising.
- B. The PMM shall be sprayed by a metered mechanical pressure spray bar at a temperature of 140 degrees F –180 degrees F.
1. The sprayer shall accurately and continuously monitor the rate of spray and provide a uniform application across the entire width to be overlaid.
 2. The machine will be equipped with an electronic device by which the rate of emulsion application can be determined while the paver is in operation.
 3. The PMM shall be applied manually where the screed extension or handwork is required outside the range of the machine mounted spray bar.
 4. Over-application or double application of emulsion on the existing base shall not be permitted.
 5. The mix design target PMM shot rate shall be adjusted based upon the existing pavement surface conditions, traffic, and project uniqueness, with the approval of the Engineer.
 6. The PMM field-adjusted shot rate shall be reduced by 0.03 gallon/square yard within 150 feet of the intersection, to minimize the risk of flushing under the

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

action of standing and slow moving traffic, unless a full-width mill transition has been specified in the plans.

7. The Contractor and Engineer shall establish an acceptable range for the spray rate.
 8. The PMM shall have a minimum of 2 daily yield verifications to be reported to the Engineer, 1 at midway production and 1 at the end of production.
 9. These reports shall be the sum of the rates documented each 100 linear foot by the Contractor QC Inspector.
- C. The PMM application rate may be adjusted as directed by the Engineer based on the texture depth of the existing pavement measured according to ASTM E965, "Measuring Pavement Macrottexture Depth Using a Volumetric Technique." Suggestions to adjust the PMM application rate as a function of texture depth of the existing pavement are shown in Table 2.
- D. No wheel or other part of the paving machine shall come in contact with the PMM before the surface course is applied. Contractor shall use placement operations and equipment that:
1. Keep surfaces clean and free of contamination and debris prior to placement of the polymer modified asphalt emulsion membrane.
 2. Prevent tracking through the polymer modified asphalt emulsion membrane prior to placement of the gap-graded polymer modified asphalt concrete.
- E. The surface course shall be applied at a temperature of 302 degrees F – 330 degrees F and shall be spread over the PMM less than 5 seconds after the application of the PMM during normal paving speeds.

TABLE 2 – PMM RATE ADJUSTMENTS DUE TO PAVEMENT TEXTURE

Pavement Type - Texture Description	Texture Depth Range (mm)	PMM Rate Correction	
		l/m2	gal/yd2
Flushed asphalt	<0.5	-0.04 to -0.27	-0.01 to -0.06
Black asphalt	0.5 to 1.0	0	0
Smooth asphalt, non-porous	1.0 to 1.2	0	0
Absorbent asphalt, slightly porous, oxidized	1.2 to 1.7	0.09	0.02
Slightly pocked asphalt, porous, oxidized	1.7 to 2.0	0.18	0.04
Badly pocked asphalt, porous, oxidized	>2.0	0.27	0.06
Asphalt milled surface	N/A	0	0
Asphalt within 150 ft of intersection without mill	N/A	-0.13	-0.03
Asphalt within 150 ft of intersection with mill	N/A	0	0

- F. When filling the emulsion tank, no emulsion shall overflow into the paver hopper.
 - 1. Should emulsion be spilled into the paver hopper, paving shall stop and all contaminated material shall be removed from the paver hopper.
 - 2. Under no circumstances shall the contaminated material be placed on the roadway.
- G. Overlapping or hot lapping of the bonded wearing course shall not be permitted when paving miscellaneous areas in order to achieve project layout requirements.
- H. Material that has been placed through the paving screed or over the polymer modified asphalt emulsion membrane shall not be reintroduced into the paving process.
 - 1. UTACS shall be applied at a thickness such that no aggregate is fractured.
 - 2. The S3 mix shall be applied at a minimum 3/4 inch thickness.
 - 3. The S2 mix shall be applied at a minimum 5/8 inch thickness.
 - 4. The S1 mix shall be applied at a minimum of 9/16 inch thickness.

413.03.04 SURFACE PREPARATION FOR UTACS

- A. The following items shall be performed prior to the commencement of paving operations and paid for under the appropriate bid item numbers:
 - 1. Manhole covers, drains, grates, catch basins, and similar utility structures shall be protected and covered with building felt prior to paving, and shall also be clearly referenced for location and adjustment after paving.
 - 2. Thermoplastic traffic markings shall be removed.
 - 3. Pavement cracks and joints greater than 0.25 inches wide shall be cleaned and filled using an approved material and method.
 - a. There shall be no over-banding of cracks which will be covered by UTACS.
 - b. Crack sealing shall be completed at least 7 days prior to paving.
 - 4. Surface irregularities greater than 1 inch deep shall be milled and/or filled with a material approved by the Engineer. All repairs shall be completed 1 week prior to paving or as recommended by the sealant manufacturer or the Engineer.
 - 5. The entire pavement surface to be overlaid shall be thoroughly cleaned, giving special attention to accumulated mud and debris. Pressurized water and/or vacuum systems may be required to ensure a clean surface.
 - 6. Cold planing shall be completed as specified herein.

413.03.05 JOINTS

- A. Longitudinal joints shall be constructed only on the shoulders or at the edge of the travel lanes.

413.03.06 QUALITY CONTROL ASPECTS

- A. PMM application rate shall be checked twice per day using random sample location techniques.
- B. Determination of the application rate of the PMM shall be as follows:
1. At the location to be sampled, immediately adjacent to the paving area, use 2 pads approximately 15-inches wide by 20 inches long, placed side by side, to determine the PMM application rate based on the average of 2 application rate measurements.
 2. Capture the tare weight of each pad to be used prior to capturing the PMM sample.
 3. Place the first pad 5 feet in front of spray bar on the spray paver.
 4. Place the second pad in front of the first pad farther away in the travel direction.
 5. Set the machine in automatic mode; do not use manual mode when calibrating emulsion application rate.
 6. Circulate the emulsion through the spray bars for approximately 5 minutes before spray calibration in order to purge the system.
 7. Select the machine ground speed/production rate to be no less than 30 feet per minute.
 8. Select the desired emulsion application rate and take a sample at this setting.
 9. Weigh each pad that has been sprayed with the PMM.
 10. Calculate the net weight of emulsion and convert it into gallons using the PMM weight-per-gallon information provided by the emulsion manufacturer.
 11. Divide the gallons of PMM by the pad area and compare with the target application rate in gallon per square yard.
- C. A minimum of 3 daily samples of the bituminous wearing course shall be tested for asphalt content and gradation.
1. If the average of the daily test results vary from the job-mix formula by more than the tolerance indicated in Subsection 705.03.08, "Plantmix and Roadmix Asphalt Concrete Surface Course UTACS Type S1 through Type S3," production shall stop.

2. The Contractor shall identify the cause and document what corrective action will be taken.
 3. The job-mix formula may be adjusted only as approved by the Engineer.
- D. A minimum of 2 daily UTACS mixture yield checks shall be completed, 1 at midday during production and 1 at the end of the day's production, to ensure that mixture application rate requirements defined in Subsection 413.03.03, "Application of Gap-Graded UTACS Surface," are met.
- E. Placement Limitations: The UTACS and/or PMM shall not be placed on pavement that has visible surface moisture.
- F. The Contractor shall immediately cease operations if any precipitation occurs. If any material is placed during the precipitation event, such material shall be removed and replaced, as directed by the Engineer, at no additional cost to the Contracting Agency.
- G. Place UTACS and/or PMM only when the pavement surface temperature is 50° F and rising and the ambient temperature is 50 degrees F and rising.
- H. The UTACS shall not be placed if the forecast low from the National Weather Service is 32 degrees F or lower for the night following any single day's paving operation.
- I. Because of the minimal depth of the surface course being placed, the course may be damaged if opened to traffic too quickly. Therefore, the new UTACS pavement shall not be opened to traffic until the rolling operation is complete and the material has cooled sufficiently to resist damage (approximately 160 degrees F).
- J. No more than 15 minutes shall be allowed to elapse between the delivery trucks carrying the UTACS mix to the paver or 3 cold joints per 1/2 mile. Cold joints are defined as when the last delivery truck leaves the paver, the paver has stopped more than 15 minutes before the next delivery truck is brought to the paver.

413.03.07 SURFACE TOLERANCES FOR UTACS

- A. The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities.
1. Any ridges, indentations, or other objectionable marks left in the surface of the bituminous mixture by blading or other equipment shall be removed by rolling or other means.
 2. The use of equipment that leaves ridges, indentations, or other objectionable marks in the bituminous mixture shall be discontinued, and other acceptable equipment shall be furnished by the Contractor.
- B. The Contractor shall produce completed surfacing which meets the requirements of Subsection 402.03.03.D, "Profilograph Measurement," when required by the Contracting Agency, with the following additions and exceptions to the profilograph measurement:

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

1. The Contractor shall furnish and operate a profilograph as specified in the subsection noted above at the time and date ordered by the Engineer.
2. Any requirement for grinding shall have a depth selected so that at least 80 percent of the original UTACS thickness is preserved in order to minimize the risk of localized bleeding.
3. Liquidated damages may be assessed, as required by the Contracting Agency, for each such high point that is allowed to remain in place.
4. The profile index requirements herein shall not apply to the pavement within 30 feet of either end of a concrete bridge deck (including approach slabs). The finished surface of such pavement shall, however, meet all other requirements of this section.

413.03.08 UTACS PAVEMENT REPAIRS

- A. The Contractor shall pay all costs of UTACS pavement repair activities and implementation, except as otherwise provided herein.
- B. The Contractor shall have the right to use such pavement repairs deemed necessary to bring the UTACS pavement up to the performance criteria established in Subsection 413.03.07, "Surface Tolerances for UTACS."

SECTION 703

BITUMINOUS MATERIALS

01 SCOPE

703.01.01 MATERIALS COVERED

- A. This specification covers the quality of asphalt cement, liquid asphalt, emulsified asphalt, cationic emulsion, anionic emulsion and rubber-asphalt crack sealant.

02 REQUIREMENTS

703.02.01 CONTRACTOR'S RESPONSIBILITY

- A. Bituminous material failing the test requirements of this section, including tolerances, shall be subject to Subsection 109.02, "Scope of Payment."

703.02.02 MATERIAL SOURCE RESPONSIBILITY

- A. Bituminous materials supplied under these specifications shall be provided from a source authorized by the Engineer and/or IQAC. The process for authorization may be obtained from the Contracting Agency's Public Works Construction Management Division.

703.02.03 SHIPPING NOTICE

- A. Shipping notices shall be mailed upon making shipment and shall contain the following information:
1. Consignee and destination,
 2. Agency contract number,
 3. Delivery point,
 4. Date shipped,
 5. Car initials or number of truck transport delivery ticket number,
 6. Type and grade of material,
 7. Quantity loaded,
 8. Loading temperature,
 9. Net quantity,
 10. Signature of shipper or authorized representative,
- B. When shipments of materials arrive on the project after normal working hours, the Contractor shall notify the Engineer sufficiently in advance to make arrangements for an

Technical Provisions – Attachment 10-2
 Plantmix Bituminous Gap-Graded Surface

inspector to be present when the material is sampled. All sampling by the Vendor or Contractor shall be performed or observed by an NAQTC certified technician.

- C. Three copies of the shipping notice shall be mailed to the Contracting Agency.

03 PHYSICAL PROPERTIES AND TESTS

703.03.01 REFINERY TEST REPORT

- A. Refinery test reports shall be mailed to the Engineer as soon as tests have been completed, and the report shall contain the following data:
 - 1. Date of shipment,
 - 2. Car initials or number of truck transport delivery ticket number,
 - 3. Destination and consignee,
 - 4. Contracting Agency contract number (or purchase order number, if applicable),
 - 5. Type and grade of material,
 - 6. Certificate of grade (certify that material conforms to these specifications, and itemize results on tests performed and date of test),
 - 7. Signature of refinery's authorized representative,
- B. The certificate of compliance shall be used as a basis of permitting immediate use of the material on the job and shall represent conditional acceptance only. The certificate of compliance shall include a copy of the tests for that lot shipment.

703.03.02 ASPHALT CEMENTS

- A. Asphalt cement shall be prepared by the distillation of crude petroleum. This asphalt shall be homogeneous, free from water, and shall not foam when heated to 347 degrees F.
- B. These specifications cover the following viscosity grades: AC 2.5, AC 5, AC 10, AC 20, AC 30, AC 40 and the Superpave Performance Grades (PG) for the Southern Nevada region as listed in Table 1, Table 2, Table 2A, and Table 2B.

TABLE 3 – LOCATION OF BITUMINOUS GRADE USE	
Location	Viscosity Grades
Clark County Region below 5,000 feet elevation	PG 76-22CC, AC-30 ¹ , or PG 64-22* ¹
Roads at and above 5,000 feet elevation	PG 64-34CC

1. For use in detours, below PCCP, permanent pavement patches, or other locations as determined by the Engineer.

- C. The various grades set forth above shall conform to the requirements and the methods of testing shown in Table 2, Table 2A, and Table 2B.
1. Performance grade material must have been prepared from crude petroleum product.
 2. The asphalt cements shall be homogenous, free from water and shall not foam when heated to 347 degrees F.
 3. Blending of asphalt cements to produce a specified performance grade shall result in a uniform, homogenous blend with no separation.
 4. Modified binders shall be blended at the source of supply and delivered as a completed mixture to the job site.
 5. It shall not be transported via railroad car.
 6. Only elastomeric Styrene Butadiene Styrene (SBS), Styrene-Butadiene (SB), Styrene-Butadiene Rubber (SBR), and Styrene Ethylbutylene Styrene (SEBS) rubber shall be added to the base binder asphalt cement, to produce a binder that complies with specification requirements.

703.03.03 LIQUID ASPHALTS

- A. Liquid asphalts shall consist of materials conforming to the following classifications:
1. Rapid curing (RC) products: Paving asphalt with a penetration of approximately 85 to 100 fluxed or blended with a naphtha solvent.
 2. Medium curing (MC) products: Paving asphalt fluxed or blended with a kerosene solvent.
 3. Slow curing (SC) products: Natural crude oils or residual oils from crude asphaltic petroleum.
- B. When tested in accordance with the standard methods of AASHTO and ASTM, the grades of liquid asphalt shall conform to the requirements specified in Table 2, Table 3, and Table 4.

703.03.04 EMULSIFIED ASPHALT

- A. Emulsified asphalt for slurry seal shall conform to CQS 1h as specified in Table 6 when tested in accordance with AASHTO and ASTM.

703.03.05 SLURRY SEAL

- A. The slurry seal and its components shall conform to the requirements of Table 7 when tested in accordance with AASHTO, ASTM, and ISSA procedures.

703.03.06 MICROSURFACING

- A. The microsurfacing and its components shall conform to the requirements of Table 8 when tested in accordance with AASHTO, ASTM, and International Slurry Seal Association (ISSA) procedures.

703.03.07 POLYMER MODIFIED EMULSION MEMBRANE

- A. This material shall consist of a polymer modified asphalt emulsion. Its role is to form a water impermeable seal at the existing pavement surface and to bond the new hot mix to the existing surface. The product shall be smooth and homogeneous and conform to the requirements in Table 10.

**TABLE 2 – NEVADA TABLE 2 REQUIREMENTS
 FOR ASPHALT CEMENT GRADED BY VISCOSITY AT 140°F
 (Grading Based on Original Asphalt)**

Test	AASHTO Test Method	VISCOSITY GRADE					
		AC-2.5	AC-5	AC-10	AC-20	AC-30	AC-40
Viscosity at 140°F poise	T202	200 - 300	400 - 600	800 - 1,200	1,600 - 2,400	2,400 - 3,600	3,200 - 4,800
Viscosity at 275°F cSt, minimum	T201	125	175	250	300	350	400
Penetration at 77°F 100 g/5 seconds, minimum	T49	220	140	80	60	50	40
Flash point (C.O.C., °F minimum)	T48	325	350	425	450	450	450
Solubility in Trichloroethylene (percent, minimum)	T44	99	99	99	99	99	99
Ductility at 39°F 1 cm/min. cm minimum	T51	50	25	15	5	--	--
Tests on Residue From RTFO							
Loss on heating, percent maximum	T240	--	1	0.5	0.5	0.5	0.5
Viscosity at 140°F poise maximum	T202	1,000	2,000	4,000	8,000	12,000	16,000

TABLE 2A – PERFORMANCE GRADE FOR ORIGINAL MATERIALS

Test	Test Method	PG 76-22CC Modified	PG 64-34CC Modified	PG 64-22
Original Materials				
Flash Point Degrees (°C) - minimum	AASHTO T48	230		
Viscosity (Brookfield) @135°C, Pa·s Maximum	ASTM D4402	3.0	3.0	3.0
Dynamic Shear G*/sin α = minimum @ 10 rad/s at Grade Test Temp. °C	AASHTO T315	1.3	1.0	1.0
Ductility at 4°C, 5 cm/min. cm - minimum	NDOT T746	20	30	30
#10 Sieve Test, Particulates retained	NDOT T730	0		
Solubility in Trichloroethylene, percent (%) - minimum	AASHTO T44	99		
Polymer Content, % by mass minimum	(¹)	3.0	3.0	N/A
Toughness in-lb – minimum(²)	NDOT T745	150	75	N/A
Tenacity in-lb - minimum	NDOT T745	100	50	N/A
If T&T fails, Elastic Recovery, percent (%) - minimum	AASHTO T 301	60	60	N/A

(1) Certificates of compliance provided for the material shall certify that the minimum polymer content is present.

(2) NV T 745 Method of Toughness and Tenacity: Scott Tester (or equivalent), inch-pounds @ 77° F., 20 inches per minute pull with tension head 7/8-inch diameter.

TABLE 2B – PERFORMANCE GRADE FOR RTFO AND PAV CONDITIONING

Tests On Residue From RTFO NDOT T728				
Test	Test Method	PG 76-22CC Modified	PG 64-34CC Modified	PG 64-22
Ductility at 5°C, 5cm/min. cm - minimum	NDOT T746	10	10	10
Mass Loss, Percent (%) - maximum	NDOT T728	1.0	1.0	1.0
Dynamic Shear, G*/sin α = minimum kPa @ 10 rad/s at Test Temp. in °C	AASHTO T315	2.2	2.2	2.2
Test On Residue After PAV				
PAV, Test Temp. in °C	AASHTO R28	110	100	100
Dynamic Shear, G*/sin α = Max kPa @ 10 rad/s at Grade Test Temp. in °C	AASHTO T315	5,000	5,000	5,000
BBR - Creep Stiffness, S -MPa maximum @ 60 sec, atGrade Test Temp. in °C	AASHTO T313	300	300	300
BBR m-value = minimum @ 60s, at Grade Test Temp. in °C	AASHTO T313	0.300	0.300	0.300
Direct Tension, Failure Strain = % minimum @ 1.0 mm/min, at Grade Test Temp. in °C	AASHTO T314	1.0	1.0	1.0

**TABLE 3 – UNIFORM PACIFIC COAST SPECIFICATIONS FOR
 RAPID CURING (RC) LIQUID ASPHALTS**

Test	AASHTO Test Method	ASTM Test Method	GRADES							
			RC-70		RC-250		RC-800		RC-3000	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Kinematic Viscosity at 140°F cSt	--	D2170	70	140	250	500	800	1,600	3,000	6,000
Flash Point (Tag Open Cup), °F	T79	D1310	--	--	80	--	80	--	80	--
Distillation										
Distillate percent of total distillate to 680°F	--	--	10	--	--	--	--	--	--	--
to 437°F	T78	D402	50	--	30	--	15	--	--	--
to 500°F	--		70	--	60	--	45	--	25	--
to 600°F	--	--	85	--	80	--	75	--	70	--
Residue from distillation to 680°F, volume percent by difference	--	--	55	--	65	--	75	--	80	--
Test on Reside from Distillation										
Penetration, 77°F, 100g/5 seconds	T49	D5	80	120	80	120	80	120	80	120
Ductility, 77°F, cm*	T51	D113	100	--	100	--	100	--	100	--
Solubility in Trichloroethylene, %	T44	D2042	99.5	--	99.5	--	99.5	--	99.5	--
Water, %	T55	D95	--	0.2	--	0.2	--	0.2	--	0.2
GENERAL REQUIREMENT: The material shall not foam when heated to application temperature recommended by the Asphalt Institute.										

* If ductility is less than 100, material will be accepted if ductility at 60°F is 100 minimum at a pull rate of 5 cm/min

**TABLE 4 – UNIFORM PACIFIC COAST SPECIFICATIONS FOR
MEDIUM CURING (MC) LIQUID ASPHALTS**

Test	AASHTO Test Method	ASTM Test Method	GRADES							
			MC-70		MC-250		MC-800		MC-3000	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Kinematic Viscosity at 140°F cSt	T201	D2170	70	140	250	500	800	1,600	3,000	6,000
Flash Point (Tag Open Cup), °F	T79	D1310	100	--	150	--	150	--	150	--
Distillation										
Distillate percent of total distillate to 680°F	--	--	--	--	--	--	--	--	--	--
to 437°F	--	--	--	20	--	10	--	--	--	--
to 500°F	T78	D402	20	60	15	55	--	35	--	15
to 600°F	--	--	65	90	60	87	45	80	15	75
Residue from distillation to 680°F, volume percent by difference	--	--	55	--	67	--	75	--	80	--
Test on Reside from Distillation										
Penetration, 77°F, 100g/5 seconds	T49	D5	120	250	120	250	120	250	120	250
Ductility, 77°F, cm*	T51	D113	100	--	100	--	100	--	100	--
Solubility in Trichloroethylene, %	T44	D2042	99.5	--	99.5	--	99.5	--	99.5	--
Water, %	T55	D95	--	0.2	--	0.2	--	0.2	--	0.2
GENERAL REQUIREMENT: The material shall not foam when heated to application temperature recommended by the Asphalt Institute.										

* If penetration of residue is more than 200 and ductility at 77°F is less than 100, material will be accepted if ductility at 60°F is 100+

**TABLE 5 – UNIFORM PACIFIC COAST SPECIFICATIONS FOR
SLOW CURING (MC) LIQUID ASPHALTS**

Test	AASHTO Test Method	ASTM Test Method	GRADES							
			SC-70		SC-250		SC-800		SC-3000	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Kinematic Viscosity at 140°F cSt	T201	D2170	70	140	250	500	800	1,600	3,000	6,000
Flash Point (Tag Open Cup), °F*	T48	D1310	150	--	175	--	200	--	250	--
Distillation										
Total Distillate to 680°F, % by volume	T78	D402	10	30	4	20	2	12	--	5
Tests on Residue From Distillation										
Kinematic Viscosity of Distillation Residue at 140°F, stokes	T201	D2170	4	70	8	85	20	140	40	350
Ductility at 77°F, 5cm/min., cm	T51	D113	100	--	100	--	100	--	100	--
Solubility in Trichloroethylene, %	T44	D2042	99.5	--	99.5	--	99.5	--	99.5	--
Water, %	T55	D95	--	0.5	--	0.5	--	0.5	--	0.5

* Flash point by Cleveland Open Cup may be used for products having a flash point greater than 175°F

TABLE 6 – UNIFORM PACIFIC COAST SPECIFICATIONS FOR ANIONIC EMULSIFIED ASPHALTS

Test	AASHTO Test Method	ASTM Test Method	Rapid Setting				Slow Setting			
			RS-1		RS-2		SS-1		SS-1h	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Test on Emulsions										
Viscosity SSF @ 77°F, sec.	T72	D88	20	100	--	--	20	100	20	100
Viscosity SSF @ 122°F, sec.	T72	D88	--	--	75	400	--	--	--	--
Settlement, 5 days, % ¹	T59	D244	--	5	--	5	--	5	--	5
Storage Stability, 1 day, % ²	T59	D244	--	1	--	1	--	1	--	1
Demulsibility, 35ml .02N, Calcium Chloride. % ³	T59	D244	60	--	60	--	--	--	--	--
Cement Mixing Test, %	T59	D244	--	--	--	--	--	2.0	--	2.0
Sieve Test, %	D59	D244	--	0.10	--	0.10	--	0.10	--	0.10
Residue by distillation, %	T59	D244	55	--	63	--	57	--	57	--
Test on Residue from Distillation Test ⁴										
Penetration @ 77°F, 100g, 5sec.	T49	D5	100	200	100	200	100	200	40	90
Ductility @ 77°F, 5m/min., cm	T51	D113	40	--	40	--	40	--	40	--
Solubility in Trichloroethylene, %	T44	D2042	97.5	--	97.5	--	97.5	--	97.5	--

¹ The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days' time, or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.

² The 24-hour 1-day storage stability test may be used instead of the 5-day settlement test.

³ The demulsibility test shall be made within 30 days from the date of shipment.

⁴ A harder base asphalt meeting current paving asphalt specifications may be specified with the provision that the test requirements on the Residue from Distillation be waived.

**TABLE 7 – UNIFORM PACIFIC COAST SPECIFICATIONS FOR
CATIONIC EMULSIFIED ASPHALTS**

Test	Test Method		Rapid Setting				Medium Setting				Slow Setting				Quick Setting ⁶				
	AASHTO	ASTM	CRS-1		CRS-2		CMS-2S		CMS-2		CMS-2H		CSS-1		CSS-1h		CQS-1h		
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Test on Emulsions																			
Viscosity SSF @ 77°F, sec.	T72	D88	--	--	--	--	--	--	--	--	--	--	20	100	20	100	20	100	
Viscosity SSF @ 122°F, sec.	T72	D88	20	100	100	400	50	450	50	450	50	450	--	--	--	--	--	--	
Settlement, 5 days, % ¹	T59	D244	--	5	--	5	--	5	--	5	--	5	--	5	--	5	--	5	
Storage Stability, 1 day ²	T59	D244	--	1	--	1	--	1	--	1	--	1	--	1	--	1	--	1	
Demulsibility, 35 ml 0.8% sodium dioctyl sulfosuccinate, % ³	T59	D244	40	--	40	--	--	--	--	--	--	--	--	--	--	--	--	--	
Coating Ability/Water Resistance:	T59	D244	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Coating, dry aggregate			--	--	--	--	Good	--	Good	--	Good	--	--	--	--	--	--	--	--
Coating, after spraying			--	--	--	--	Fair	--	Fair	--	Fair	--	--	--	--	--	--	--	--
Coating, wet aggregate			--	--	--	--	Fair	--	Fair	--	Fair	--	--	--	--	--	--	--	--
Coating, after spraying			--	--	--	--	Fair	--	Fair	--	Fair	--	--	--	--	--	--	--	--
Particle Charge Test	T59	D244	Positive		Positive		Positive		Positive		Positive		Positive ⁵		Positive ⁵		Positive		
Sieve Test, %	T59	D244	--	0.10	--	0.10	--	0.10	--	0.10	--	0.10	--	0.10	--	0.10	--	0.10	
Cement Mixing Test, %	T59	D244	--	--	--	--	--	--	--	--	--	--	--	2.0	--	2.0	--	--	
Distillation																			
Oil Distillate by volume of emulsion, %	T59	D244	--	3	--	3	--	20	--	12	--	12	--	--	--	--	--	--	
Residue, %	T59	D244	60	--	65	--	60	--	65	--	65	--	57	--	57	--	60	--	
Tests on Residue from Distillate Test ⁴																			
Penetration, 77°F, 100g, 5sec.	T49	D5	100	250	100	250	100	250	100	250	40	90	100	250	40	90	45	60	
Ductility, 77°F, 5cm/min., cm	T51	D113	40	--	40	--	40	--	40	--	40	--	40	--	40	--	40	--	
Solubility in Trichloroethylene, %	T44	D2042	97.5	--	97.5	--	97.5	--	97.5	--	97.5	--	97.5	--	97.5	--	97.5	--	

¹ The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5 days' time, or the purchaser may require that the settlement test be run from the time the sample is received until it is used, if the elapsed time is less than 5 days.

² The 24-hour 1-day storage stability test may be used instead of the 5-day settlement test.

³ The demulsibility test shall be made within 30 days from the date of shipment.

⁴ A harder base asphalt meeting current paving asphalt specifications may be specified with the provision that the test requirements on the Residue from Distillation be waived.

⁵ Must meet a PH requirement of 6.7 maximum (ASTM E70) if the Particle Charge Test result is inconclusive.

⁶ Does not apply to polymer modified emulsion.

TABLE 8 – SPECIFICATION FOR SLURRY SEAL MIX

TEST ON MIXTURE	TEST METHOD	REQUIREMENTS
Residual Asphalt, % of dry wt. of aggregate	--	7.5 - 13.5
Consistency, flow	ASTM D3910/ISSA T106	2 - 3 cm
Wet Cohesion, 30-minute set	ISSA T139	12 -13 kg/cm
Wet Cohesion, 60-minute set	ISSA T139	20 - 21 kg/cm
Set Time, 30 minutes	ASTM D3910	Negative
Excess Asphalt by LWT and Sand Adhesion	ASTM T109	50 g/ft ² max.
Wet Stripping, % coating	ASTM T114	90 min.
Wet track Abrasion (6-day soak)	ASTM D3910/ISSA T100	75 g/ft ² max.
Wet track Abrasion (1-hour soak)	ASTM D3910/ISSA T100	75 g/ft ² max.
System Compatibility	ISSA T115	Pass
Mix time @ 77°F	ASTM D3910/ISSA T113	Controllable to 180 sec. minimum

TABLE 9 – SPECIFICATION FOR MICRO-SURFACING MIX

TEST ON MIXTURE	TEST METHOD	REQUIREMENTS
Residual Asphalt, % of dry wt. of aggregate	--	5.5 - 9.5
Wet Cohesion, 30-minute set	ISSA T139	12 kg/cm
Wet Cohesion, 60-minute set	ISSA T139	20 kg/cm
Excess Asphalt by LWT and Sand Adhesion	ISSA T109	50 g/ft ² max.
Wet Stripping, % coating	ISSA T114	90 min.
Wet track Abrasion (6-day soak)	ASTM D3910/ISSA T100	75 g/ft ² max.
Wet track Abrasion (1-hour soak)	ASTM D3910/ISSA T100	50 g/ft ² max.
Mix time @ 77°F	ASTM D3910/ISSA T113	Controllable to 120 sec minimum
Mix time @ 104°F	ASTM D3910/ISSA T113	Controllable to 120 sec minimum
Lateral Displacement	ISSA T147	5% max.
Classification Compatibility	ISSA T144	(AAA, BAA) 11 grade points minimum

Table 10 – SPECIFICATION FOR POLYMER MODIFIED EMULSION MEMBRANE

TEST ON EMULSION	Method	Min.	Max.
VISCOSITY @ 77°F, SSF	ASTM D88	20	100
SIEVE TEST, %	AASHTO T59	--	0.05
24-Hour Storage Stability, % ¹	AASHTO T59	--	1
Residue from Distillation @ 400°F, %	AASHTO T59	63	--
Oil portion from distillation ml of oil per 100 g emulsion ²	AASHTO T59	63	--
TEST ON RESIDUE FROM DISTILLATION			
Solubility in TCE, % ³	AASHTO T44	97.5	--
Elastic Recovery @ 50°F, % ⁴	AASHTO T301	58	--
Penetration @ 77°F, 100 g, 5 sec, dmm	AASHTO T49	60	150

¹ After standing undisturbed for 24 hours, the surface shall show no white, milky colored substance, but shall be a smooth homogeneous color throughout.

² ASTM D244 with modifications to include a 400°F ± 10°F maximum temperature to be held for a period of 15 minutes. Alternatively, ASTM D244 (Sections 21-27) Residue by Evaporation may be utilized as a surrogate procedure. However, Residue by Distillation is preferred and shall be used as the reference procedure.

³ ASTM D5546, "Standard Test Method for Solubility of Asphalt Binders in Toluene by Centrifuge," may be substituted where polymers block the filter in Method D2042.

⁴ ASTM D5976, "Standard Specification for Type I Polymer Modified Asphalt Cement for Use in Pavement Construction," Section 6.2 with exception that the elongation is 20 cm and the test temperature is 50°F.

SECTION 704

BASE AGGREGATES

01 SCOPE

704.01.01 MATERIALS COVERED

- A. This specification covers the quality and size of mineral materials used in base courses, trench backfill, or other construction locations.
- B. The term Source shall mean any of the following:
 - 1. A permanent commercial location.
 - 2. Contractor manufactured material either commercial or on-site.

704.01.02 REFERENCE CODES AND STANDARDS:

- A. Related Interagency Quality Assurance Committee (IQAC) procedures at:

http://www.clarkcountynv.gov/Depts/public_works/construction_mgmt/Pages/Materials.aspx

(IQAC website)

02 REQUIREMENTS

704.02.01 GENERAL

- A. The mineral aggregate shall be the crushed and screened product from approved aggregate deposits, except that Type I aggregate base need not be crushed. The Engineer reserves the right to prohibit the use of aggregates from any source when:
 - 1. The character of the material is such, in the opinion of the Engineer, as to make improbable the furnishing of aggregates conforming to the requirements of these specifications.
 - 2. The character of the material is such, in the opinion of the Engineer, that undue additional costs may be accrued by the Contracting Agency.
- B. The mineral aggregate shall be clean, hard, durable, free from any frozen lumps, deleterious matter, and harmful adherent coatings. Crushed Portland cement concrete and asphaltic concrete pavement will be permitted, subject to the requirements of these specifications. No materials subject to regulation as hazardous wastes as defined in the Nevada Administrative Code 444.8565 shall be allowed.

704.02.02 IQAC SOURCE QUALIFICATION

- A. For expediting of material source and type approvals, a listing of qualified materials has been provided on the IQAC website.

- B. Any listed material is considered qualified for use without a material testing submittal. However, this does not relieve the Contractor of project testing of the material as required in these specifications.
- C. The IQAC posted materials indicated in Table 1 are subject to reapproval annually for continued posting on the IQAC website. The procedure is annotated in Subsection 704.04.02, "IQAC Annual Material Prequalification."

Table 1 – IQAC Materials that Require Annual Qualification

Type II Aggregate Base
Type II Controlled Low Strength Material (CLSM)

Table 2 – Materials that Require 6-Month Qualification

Type II blended with recycled Portland Cement Concrete
--

704.02.03 DEFICIENCIES

- A. If the product of a deposit is deficient in material passing the No. 16 sieve, filler from other approved deposits may be added at the crushing and screening plants. This is not to be construed as a waiver of any of the requirements contained herein.

03 PHYSICAL PROPERTIES AND TESTS

704.03.01 PLASTIC LIMITS

- A. When specified, aggregates shall conform to the applicable requirements of the following table:

Table 3 – Plastic Limits

Percentage by Weight Passing 200 Sieve	Plasticity Index Maximum
0.1 to 3.0	15
3.1 to 4.0	12
4.1 to 5.0	9
5.1 to 8.0	6
8.1 to 11.0	4
11.1 to 15.0	3

704.03.02 DRAIN BACKFILL

- A. This aggregate shall conform to the following requirements:

Table 4 – Drain Rock Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve		
	3-Inch Size	2-Inch Size	3/4-Inch Size
3-Inch	100	--	--
2-Inch	90-100	100	--
1-1/2-Inch	70-100	95-100	--
3/4-Inch	0-50	50-100	100
1/2-Inch	--	--	95-100
3/8-Inch	0-10	0-55	70-100
No. 4	--	0-25	0-70
No. 8	0-5	0-15	--
No. 200	0-3	0-3	0-3

- B. Unless otherwise specified in the contract documents, the Contractor may use any of the sizes.

Table 5 – Drain Backfill Durability Acceptance Limits

Source Requirement Test	3-Inch Size	2-Inch Size	3/4-Inch Size
Percentage of Wear (500 Rev.)	45% Maximum	45% Maximum	45% Maximum

704.03.03 TYPE I AGGREGATE BASE

- A. This aggregate shall conform to the following requirements:

Table 6 – Type I Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve	
	3-Inch Size	2-Inch Size
3-Inch	100	--
2-Inch	90-100	100
1-1/2-Inch	--	95-100
1-Inch	--	70-90
No. 4	30-65	30-65
No. 16	15-40	15-40
No. 200	2-12	2-12

Table 7 – Type I Acceptance Limits

Project Control Test	Test Method	Requirements
Sieve Analysis	AASHTO T27	Table 6
Sampling Aggregate from Calibrated Conveyor stream or belt cut ¹	AASHTO T2	--
Plasticity Index	AASHTO T90 ²	Table 3
Liquid Limit	AASHTO T89	35 Maximum
Resistance (R Value)	ASTM D2844	60 Minimum
Percentage of Wear (500 Rev.)	AASHTO T96	45% Maximum

704.03.04 TYPE II AGGREGATE BASE

A. This aggregate shall conform to the following requirements:

Table 8 – Type II Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve
1-Inch	100
3/4-Inch	90-100
No. 4	35-65
No. 16	15-40
No. 200	2-10

Table 9 – Type II Acceptance Limits

Quality Control Test	Test Method	Requirements
Sieve Analysis	AASHTO T27	Table 8
Sampling Aggregate from Calibrated Conveyor stream or belt cut ³	AASHTO T2	--
Fractured Faces	Nev. T230	70% Minimum
Plasticity Index	AASHTO T90 ⁴	Table 3
Liquid Limit	AASHTO T89	35 Maximum
Resistance (R Value) or Resilient Modulus	ASTM D2844	78 Minimum for road base
	AASHTO T307	35,000 psi minimum for road base
Percentage of Wear (500 Rev.)	AASHTO T96	45% Maximum
Total Available Water Soluble Sulfates ⁵	ASTM D2791 AWWA 4550 E	Less than 0.3% by dry weight of soil.

¹ Sampling from a stockpile permitted only after approval of the Engineer; the conveyor device shall be calibrated every 3 months and record attached to sample document.
² Test specimens shall be prepared following the dry preparation procedure AASHTO T87.
³ Sampling from a stockpile permitted only after approval of the Engineer; the conveyor device shall be calibrated every 3 months and record attached to sample document.
⁴ Test specimens shall be prepared following the dry preparation procedure AASHTO T87.
⁵ Required only for placement around waterline pipe.

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

- B. Type II Plantmix Aggregate as specified in Subsection 705.03.01, "Plantmix and Roadmix Bituminous Base and Surface Aggregate, Types Two Fine and Coarse and Three," may be used in lieu of Type II Base Aggregate as specified above.

704.03.05 TYPE III AGGREGATE

- A. The soluble sulfate content shall not exceed 0.3 percent by dry weight of soil. The mineral shall be clean, hard, durable, free from any frozen lumps, deleterious matter, and harmful coatings. In addition thereto, the material shall conform to the gradation requirements of Type II aggregate base in accordance with Subsection 704.03.04, "Type II Aggregate Base," with the following property testing:

Table 10 – Type III Acceptance Limits

Quality Control Test	Test Method	Requirements
Sieve Analysis	AASHTO T27	Table 8
Sampling Aggregate from Calibrated Conveyor stream of belt cut ⁶	AASHTO T2	--
Plasticity Index	AASHTO T 90 ⁷	Table 3
Liquid Limit	AASHTO T 89	35 Maximum
No. 200 Sieve	AASHTO T 27	2-15%
Total Available Water Soluble Sulfates ⁸	AWWA 3500-NaD AWWA 4550 E	Less than 0.3% by dry weight of soil

704.03.06 CRUSHED ROCK

- A. Crushed rock shall be the product from approved aggregate deposits and shall only be used as directed by the Contracting Agency. The mineral aggregate shall be clean, hard, durable, free from any frozen lumps, deleterious matter, and harmful coatings. In addition thereto, the material shall conform to the following gradation requirements:

Table 11 – Crushed Rock Gradation Acceptance Limits

Sieve Sizes	Percentage of Weight Passing
3/8-Inch	100
No. 4	20-80
No. 200	0-15

⁶ Sampling from a stockpile permitted only after approval of the Engineer.

⁷ Test specimens shall be prepared following the dry preparation procedure AASHTO T87.

⁸ Required only for placement around waterline pipe.

Table 12 – Crushed Rock Acceptance Limits

Quality Control Test	Test Method	Requirements
Sieve Analysis	AASHTO T 27	Table 11
Sampling Aggregate From Calibrated Conveyor stream of belt cut ⁹	AASHTO T 2	-----
Fractured Faces	Nev. T 230	90% Minimum
Plasticity Index	AASHTO T 90 ¹⁰	Table 3
Liquid Limit	AASHTO T 89	35 Maximum
Percentage of Wear (500 Rev.)	AASHTO T 96	45% Maximum
Total Available Water Soluble Sulfates ¹¹	AWWA 3500-NaD AWWA 4550 E	Less than 0.3% by dry weight of soil

704.03.07 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

A. CLSM shall consist of a low-strength, self-leveling concrete material composed of various combinations of cement, fly ash, aggregate, water, and chemical admixtures. CLSM shall have a design compressive strength at an age of 28 days within the ranges required below for the specified class:

1. Class I - (50 to 150 psi): Specified where the maximum strength is of primary concern due to the desire to have material that can be excavated in the future with relative ease.
2. Class II – (100 to 300 psi): Specified where the minimum strength is of primary concern for pipe support.
3. Class Special (as shown in project specifications or drawings): Specified where project unique criteria, such as erosion control, are the primary concern.
4. Class I and II CLSM:
 - a. The mix shall result in a product having a slump in the range of 6 to 10 inches at the time of placement.
 - b. The Source of Contractor shall submit a mix design for approval by the Engineer prior to placement.
 - c. The mix design shall be supported by laboratory test data verifying the potential of the mix to comply with the requirements for these specifications.

B. CLSM shall be proportioned in general compliance with the methods outlined in ACI 211.1-91, reapproved 1997, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete." The following materials shall be used:

⁹ Sampling from a stockpile permitted only after approval of the Engineer; the conveyor device shall be calibrated every 3 months and record attached to sample document.
¹⁰ Test specimens shall be prepared following the dry preparation procedure AASHTO T87.
¹¹ Required only for placement around waterline pipe.

Technical Provisions – Attachment 10-2
Plantmix Bituminous Gap-Graded Surface

1. Cement shall meet the requirements of Section 701, "Hydraulic Cement." Type V cement shall be used unless otherwise specified.
 2. Fly ash shall meet the requirements of Section 729, "Fly Ash." Fly ash not meeting the requirements of Section 729, "Fly Ash," may be used if prior testing indicates to the satisfaction of the Engineer the ability of the CLSM with this fly ash to meet these specifications.
 3. Water shall meet the requirements of Section 722, "Water."
 4. Aggregates shall have 100 percent by total weight of the aggregate passing the 1 inch screen and 15 percent or less passing the No. 200 sieve. The aggregate shall meet the plastic limits requirements of Subsection 704.03.01, "Plastic Limits."
 5. Chemical admixtures shall meet the requirements of Subsection 702.03.02, "Air-Entraining Admixtures," and Subsection 702.03.03, "Admixtures Other Than Air-Entraining."
 - a. Other admixtures specifically approved for CLSM may be used.
 - b. All materials proportions shall be measured and the CLSM mixed in accordance with Section 501, "Portland Cement Concrete."
 - c. Other proportion measuring and CLSM mixing systems are acceptable, if control can be demonstrated to be satisfactory to the Engineer.
 - d. These other methods include continuous feed, volumetric measurement of proportions, and pug mill and continuous mixing plants.
- C. If the CLSM mix does not produce a flowable consistency or exhibits excessive bleeding, the mix shall be adjusted.
1. Excessive bleeding is considered to occur when water flows from the CLSM in a manner that causes disturbance or displacement of the exposed surface of the CLSM.
 2. Mix adjustments shall include, but not be limited to: aggregate gradation, cementitious material content, admixtures, water content, or a combination of adjustments.
- D. The testing procedures for approval of CLSM mix designs by the IQAC or if required in the contract special provisions shall be as follows:
1. The material Source, which may be the Contractor, shall cast one set of six each 4 inch diameter by 8 inch high specimens in split cylinders.
 2. No rodding method shall be used for the placement of the CLSM into the cylinders.

3. All field curing and environmental protection shall conform to AASHTO T23, "Test Methods for Making and Curing Concrete Test Specimens in the Field."
 4. The cast specimens shall then be laboratory-cured in a 100 percent humidity, temperature-controlled concrete cure room (cure tanks shall not be used).
 5. Compressive strength testing shall be performed in accordance with AASHTO T22 and T23 with samples from each set at the ages of 7, 28, and 90 days.
 6. A report of the results shall be submitted to the Engineer.
- E. Class Special: The compressive strength testing procedures shall be as specified in the project specifications or on the project drawings.
- F. Bonded Aggregate Fill (BAF):
1. This material is a crushed rock-cement slurry consistency.
 2. BAF may be used only with the prior approval of the Engineer.
 3. The material Source shall have it designed under the responsible charge of a Nevada PE, and the mix shall consist of a gap-graded 1/2 inch maximum nominal size crushed gravel with a 1 sack minimum Type V cement and water slurry.
 4. The material shall be plant mixed and placed from a truck.
 5. Due to the gap-graded nature of the material, it shall not be used where water drainage is an issue and in all cases shall use dams as specified in Subsection 208.03.16, "Drain Backfill."
 6. This procedure does not require concrete cylinder break testing; however, it does require a visual inspection and shall be documented in a report to the Engineer summarizing the inspection to be performed as follows:
 - a. After the first batch is placed and initially cured, excavate to the bottom of the pipe or structure.
 - b. If a self-supporting vertical face is maintained, the material is functioning properly.

704.03.08 AGGREGATE FOR PORTLAND CEMENT TREATED BASE

- A. This aggregate shall conform to the following requirements:

Table 13 – Portland Cement Treated Base Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve
3-Inch	100
2-Inch	90-100
No. 4	35-75
No. 200	20

Table 14 – Portland Cement Treated Base Acceptance Limits

Test	Test Method	Requirements
Sieve Analysis	AASHTO T27	Table 13
Sampling Aggregate from Calibrated Conveyor stream or belt cut ¹²	AASHTO T2	1/1000 Tons per day or portion thereof
Percentage of Wear (500 Rev.)	AASHTO T96	45% Maximum

- B. Aggregate for cement or lime treated bases will be sampled as follows:
1. Where the material is being mixed at a stationary plant, samples will be taken from the conveyors just prior to delivery to the mixer and prior to adding lime or cement.
 2. Where material is being mixed on the roadbed, samples will be taken after the material has been placed on the roadbed and processed and prior to adding cement or lime.

704.03.09 SHOULDERING MATERIAL

- A. This aggregate shall conform to the following requirements:

Table 15 – Shouldering Material Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve
1-Inch	100
3/4-Inch	90-100
No. 4	35-65
No. 16	15-40
No. 200	2-6

704.03.10 AGGREGATE BASE MATERIAL WITH RECYCLED ASPHALT PAVEMENT (RAP) AND CONCRETE

- A. The use of recycled asphalt pavement or recycled concrete for Type II Aggregate Base is permitted with the following requirements:

¹² Sampling from a stockpile permitted only after approval of the Engineer. The conveyor device shall be calibrated every 3 months and record attached to sample document.

1. The material must conform to the requirements of Subsection 704.03.04 "Type II Aggregate Base
 2. The maximum ratio of crushed concrete to Type II Aggregate Base is 50%. Recycled materials must be substantially free of foreign matter including but not limited to asphalt, base, dirt, reinforcing steel, and have at most 1.5% deleterious material.
 3. The maximum ratio of the crushed recycled asphalt concrete pavement (RAP) to Type II Aggregate Base is 30%. The mean oil content shall be 1.2% with a +0.3% tolerance. The Total Oil Content of the blended material (virgin aggregate and RAP) shall not exceed 1.5%.
- B. The maximum qualification period is six (6) months for aggregate base materials blended with recycled aggregates. The entire qualification process must be completed prior to the first day of April and the first day of October of each calendar year. The report format, as outlined in Subsection 704.04.05 "Report Format" shall include the sieve analysis for RAP or recycled concrete stockpile, Blended aggregated, the RAP binder content and blended binder content.

04 SOURCE QUALITY CONTROL TESTING

704.04.01 GENERAL

- A. There are 2 testing aspects to Source material acceptance.
1. Testing by the Source for annual posting on the IQAC website of qualified materials.
 2. Contractor project quality control Source testing for non-qualified materials.
- B. The acceptance of the Source material shall be at the production plant while the acceptance of the Contractor-placed material is at the project site.
- C. Any laboratory submitting to an agency shall be R 18 AASHTO accredited in the appropriate test method in accordance with Table 16, "Source Quality Control Testing Requirements," where applicable and testing reviewed and stamped by a Nevada professional engineer who has responsible charge of the work. The use of a professional engineer by the Source could be the Source staff engineer or third party, but the professional engineer must have responsible charge of the testing and/or inspection.

704.04.02 IQAC ANNUAL MATERIAL PREQUALIFICATION

- A. Each individual location or "pit" shall be referred to as a "Source." The responsibility for testing and inspection is the material Source. Material shall be tested, inspected, and certified in accordance with Table 16 "Source Quality Control Testing Requirements." The Source shall submit to the IQAC agency engineer assigned for that Source. The reviewing agency is listed on the IQAC website page next to the Source material.
- B. Test data shall be included with the certifying document.

This page intentionally left blank.

**ATTACHMENT 12-1
CONSTRUCTION CLOSURE TABLES**

This page intentionally left blank.

Table 12-1 Permitted Construction Closures During Peak Periods and Off-Peak Periods

I-15 Southbound						
Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
1-15SB	US 95	Alta Drive	3	0	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Construction Work to erect the new H-3055 Bridge over the I-15 Southbound lanes.
2-15SB	D Street	Alta Drive	3	2	A maximum of two Construction Closure with a duration not to exceed a cumulative of 450 total days. Construction Closure shall begin no earlier than Tuesday proceeding the NASCAR Special Event and end no later than November 15th of the current year.	No limitations.
	Alta Drive	2400' south of Sahara Ave	4	3		
<p>(1) The minimum number of travel lanes to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure. The minimum number includes auxiliary lanes between ramps but does not include parallel ramps.</p> <p>(2) The minimum number of travel lanes to be open to traffic at all time during the Construction Work for the Permitted Construction Closures. The minimum number does not include auxiliary lanes between ramps or parallel ramps.</p>						

Table 12-2 Permitted Construction Closures During Peak Periods and Off-Peak Periods

I-15 Northbound						
Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
1-15NB	2400' south of Sahara Ave	Alta Drive	5	3	A maximum of two Construction Closures with a duration not to exceed a cumulative of 450 total days. Construction Closure shall begin no earlier than Tuesday proceeding the NASCAR Special Event and end no later than November 15th of the current year.	No limitations.
	Alta Drive	Symphony Park Ave	5	2		
	Symphony Park Ave	D Street Exit	3	2		
2-15NB	Symphony Park Ave	US 95	3	2	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday. A minimum of 3 lanes shall be open to traffic for all other hours.	Construction Work to erect the new H-3055 Bridge over the I-15 Southbound lanes.
<p>(1) The minimum number of travel lanes to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure. The minimum number includes auxiliary lanes between ramps but does not include parallel ramps.</p> <p>(2) The minimum number of travel lanes to be open to traffic at all time during the Construction Work for the Permitted Construction Closures. The minimum number does not include auxiliary lanes between ramps or parallel ramps.</p>						

Table 12-3 Permitted Construction Closures During Peak Periods and Off-Peak Periods

US 95 Eastbound						
Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
1-95EB	Martin Luther King Blvd	I-15	3	0	A maximum of eight Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Construction Work to erect the new H-3055 Bridge over the US 95 eastbound lanes and Construction Work to erect the new I-937 Bridge over the US 95 eastbound lanes.
2-95EB	Rancho Drive	Martin Luther King Blvd	4	2	A maximum of three Construction Closures with a duration not to exceed a cumulative of 300 days total.	No limitations.
	Martin Luther King Blvd	I-15	3	2		
US 95 Westbound						
1-95WB	I-15	Martin Luther King Blvd	3	0	A maximum of six Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Construction Work to erect the new I-937 Bridge over the US 95 westbound lanes.
2-95WB	I-15	Martin Luther King Blvd	3	2	A maximum of three Construction Closures with a duration not to exceed a cumulative of 300 days total.	No limitations.
	Martin Luther King Blvd	Rancho Drive	4	2		
<p>(1) The minimum number of travel lanes to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure. The minimum number includes auxiliary lanes between ramps but does not include parallel ramps.</p> <p>(2) The minimum number of travel lanes to be open to traffic at all time during the Construction Work for the Permitted Construction Closures. The minimum number does not include auxiliary lanes between ramps or parallel ramps.</p>						

Table 12-4 Permitted Construction Closures During Peak Periods and Off-Peak Periods

I-15 and US 95/I-515 System Interchange Ramps						
Permitted Closure Number	Directional Movement		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
1-NE Ramp	NB I-15	EB US 95 / I-515	2	0	A maximum of one Construction Closure not to exceed a duration of 30 consecutive days.	Construction Work to demolish and erect the northbound H-936N grade separation structure.
1-WS Ramp	WB US 95 / I-515	SB I-15	2	0	A maximum of one Construction Closure not to exceed a duration of 30 consecutive days.	Construction Work to erect the southbound I-2138 grade separation structure.
1-SW Ramp	SB I-15	WB US 95	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 180 days total.	No limitations.
1-SE Ramp	SB I-15	EB US 95/I-515	1	0	A maximum of one Construction Closure not to exceed a duration of 30 consecutive days. The exit ramp to MLK from the SE Ramp maybe closed as part of this Construction Closure.	No limitations.
1-EN Ramp	EB US 95	NB I-15	2	0	A maximum of four Construction Closures with a duration not to exceed a cumulative of 300 days total. The entrance ramp from MLK to the EN Ramp maybe closed as part of this Construction Closure.	No limitations.
1-NW Ramp	NB I-15	WB US 95	2	1	A maximum of one Construction Closure not to exceed a duration of 120 consecutive days.	No limitations.

Table 12-4 Permitted Construction Closures During Peak Periods and Off-Peak Periods

I-15 and US 95/I-515 System Interchange Ramps						
1-ES Ramp	EB US-95	SB- I-15	2	1	A maximum of one Construction Closure not to exceed a duration of 120 consecutive days.	Construction Work to widen bridge I-2139.
1-WN Ramp	WB US-95/I-515	NB- I-15	1	0	A maximum of one Construction Closure not to exceed a duration of 30 consecutive days.	No limitations.
<p>(1) The minimum number of travel lanes to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure.</p> <p>(2) The minimum number of travel lanes to be open to traffic at all time during the Construction Work for the Permitted Construction Closures.</p>						

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
1-R	I-15 SB	SB I-15 exit ramp to Spring Mountain Road	2	1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
2-R	I-15 SB	Sahara Ave entrance ramp to SB I-15	2	1	A maximum of two Construction Closures with a duration not to exceed a cumulative of 150 days total.	No limitations.
3-R	I-15 SB	SB I-15 exit ramp to Sahara Ave, includes all three connecting ramps.	2	0	A maximum of one Construction Closures not to exceed a duration of 10 consecutive days. Construction Closures shall begin no earlier than Tuesday proceeding the NASCAR Special Event and end no later than November 15th of the current year.	Sound Walls and Pavement
4-R	I-15 SB	SB I-15 exit ramp to Sahara Ave includes all three connecting ramps.	2	1	A maximum of two Construction Closures with a duration not to exceed a cumulative of 150 days total. Access to eastbound and westbound Sahara Avenue shall be open to traffic at all times.	No limitations.
5-R	I-15 SB	Charleston Blvd entrance ramp to SB I-15	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 200 days total.	No limitations.
6-R	I-15 SB	SB I-15 exit ramp to Charleston Blvd	1	0	If the Construction Work for the new HOV direct local street connection (Neon Gateway) is complete, Design-Builder may utilize the new Neon Gateway access for temporary ramp access to Charleston Boulevard. The temporary access including left-hand exit and	No limitations.

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
					entrances may be utilized during the Construction Work for Charleston Boulevard ramps. A maximum of three Construction Closures with a duration not to exceed a cumulative of 200 days total.	
7-R	I-15 SB	D St entrance ramp to SB I-15	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
8-R	I-15 SB	SB I-15 exit ramp to D St/Washington Ave	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
9-R	I-15 NB	Spring Mountain Road entrance ramp to NB I-15	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
10-R	I-15 NB	NB I-15 exit ramp to Sahara Ave	2	1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 150 days total.	No limitations.
11-R	I-15 NB	Sahara Ave entrance ramp to NB I-15	3	1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 150 days total.	No limitations.
12-R	I-15 NB	NB I-15 exit ramp to Charleston EB	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 200 days total.	No limitations.
13-R	I-15 NB	NB I-15 exit ramp to Charleston Blvd WB	1	0	If the Construction Work for the new HOV direct local street connection (Neon Gateway) is complete, Design-Builder may utilize the new Neon Gateway	No limitations.

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
					access for temporary ramp access Charleston Boulevard. The temporary access including left-hand exit and entrances may be utilized during the Construction Work for Charleston Boulevard ramps A maximum of three Construction Closure with a duration not to exceed a cumulative of 200 days total.	
14-R	I-15 NB	Charleston Blvd entrance ramp to NB I-15	2	0	If the Construction Work for the new HOV direct local street connection (Neon Gateway) is complete, Design-Builder may utilize the new Neon Gateway access for temporary ramp access to Charleston Boulevard. The temporary access including left-hand exit and entrances may be utilized during the Construction Work for Charleston Boulevard ramps. A maximum of three Construction Closure with a duration not to exceed a cumulative of 200 days total.	No limitations.
15-R	NB I-15	NB I-15 exit ramp to Martin Luther King Blvd	1	0	A maximum of six Construction Closures not to exceed a duration of 2 consecutive days per Construction Closure.	Construction Work to erect the new I-938 Bridge over the N I-15 to MLK Ramp.
16-R	NB I-15	NB I-15 exit ramp to Martin Luther King Blvd	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations
17-R	NB I-15	NB I-15 exit ramp to D St	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
18-R	NB I-15	D St/Washington Ave entrance ramp to NB I-15	2	1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
19-R	US 95 EB	Valley View Blvd entrance ramp to EB US 95	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
20-R	US 95 EB	EB US 95 exit ramp to Rancho Dr	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
21-R	US 95 EB	Rancho Dr entrance ramp to EB US 95	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
22-R	US 95 EB	Rancho Dr entrance ramp to SB I-15 (ES Ramp)	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
23-R	US 95 EB	EB US 95 to SB I-15 (ES Ramp) exit ramp to Martin Luther King Blvd	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
24-R	US 95 EB	Martin Luther King Blvd entrance ramp to SB I-15 (ES Ramp)	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
25-R	US 95 EB	Martin Luther King Blvd entrance ramp to EB US 95 / I-515	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 150 days total.	No limitations.

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
26-R	US 95 EB	EB US 95 exit ramp to N Casino Center Blvd	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
27-R	US 95 EB	EB US 95 exit ramp to Las Vegas Blvd	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
28-R	US 95 EB	Las Vegas Blvd entrance ramp to EB US 95	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
29-R	US 95 WB	WB US 95 exit ramp to Valley View Blvd	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
30-R	US 95 WB	Rancho Dr entrance ramp to WB US 95	2	1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
31-R	US 95 WB	WB US 95 exit ramp to Rancho Dr	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
32-R	US 95 WB	Martin Luther King Blvd entrance ramp to WB US 95 / I-515	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.
33-R	US 95 WB	WB US 95 exit ramp to Martin Luther King Blvd	1	0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 125 days total.	No limitations.

Table 12-5 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Interchange Ramps						
Permitted Closure Number	Route	Movement	Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
34-R	US 95 WB	N Casino Center Blvd entrance ramp to WB US 95	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
35-R	US 95 WB	Las Vegas Blvd entrance ramp to WB US 95	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
36-R	US 95 WB	WB US 95 exit ramp to Las Vegas Blvd	1	0	A maximum of two Construction Closures with a duration not to exceed a cumulative of 60 days total.	No limitations.
<p>(1) The minimum number of travel lanes to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure.</p> <p>(2) The minimum number of travel lanes to be open to traffic at all time during the Construction Work for the Permitted Construction Closures.</p>						

Table 12-6 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
Martin Luther King Boulevard (Northbound and Southbound)						
1-MLK	Oakey Blvd	Las Vegas Fire Rescue Station 10		0	A maximum of three Construction Closure with a duration not to exceed a cumulative of 120 days total.	No limitations.
2-MLK	Charleston Blvd	Pinto Ln		0	A maximum of three Construction Closure with a duration not to exceed a cumulative of 420 days total. From Pinto Lane to Charleston Boulevard not inclusive of the Pinto Lane intersection. The Pinto Lane intersection shall remain open to traffic at all times.	No limitations.
3-MLK	Las Vegas Fire Rescue Station 10	Charleston Blvd		1	A maximum of one Construction Closure not to exceed a duration of 30 consecutive days.	No limitations.
4-MLK	Alta Drive	Bonanza Rd		1	A maximum of three Construction Closures with a duration not to exceed a cumulative of 300 days total.	No limitations.
5-MLK	Mineral Avenue	Bonanza Rd		0	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Demolition of existing bridges.
Desert Lane (3) (Northbound and Southbound)						
1-DL	Pinto Ln	Hastings Ave		0	A maximum of two Construction Closures not to exceed a duration of 60 consecutive days.	No limitations.
Pinto Ln (Eastbound and Westbound)						
1-PL	Martin Luther King Blvd	Desert Ln		0	A maximum of two Construction Closures not to exceed a duration of 60 consecutive days.	No limitations.

Table 12-6 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
Wall St (3) (Eastbound and Westbound)						
1-WS	Western Ave	Martin Luther King Blvd		0	A maximum of three Construction Closures with a duration not to exceed a cumulative of 210 days total.	No limitations.
Sahara Avenue (Westbound)						
1-SA	Rancho Dr	Western Ave		2	A maximum of one Construction Closures not to exceed a duration of 30 consecutive days.	No limitations.
Charleston Boulevard (Eastbound and Westbound)						
1-CH	Shadow Lane	Main St		2	A maximum of three Construction Closures with a duration not to exceed cumulative 150 days total.	No limitations.
2-CH	Desert Lane	Grand Central Parkway		0	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Demolition of existing bridges.
Grand Central Parkway (Northbound and Southbound)						
1-GP	Charleston Blvd	LV Premium Outlet Dr		2	A maximum of three Construction Closures with a duration not to exceed a cumulative 60 days total.	No limitations.
Alta Drive / Bonneville Avenue (Eastbound and Westbound)						
1-AB	Shadow Lane	Grand Central Parkway		1	A maximum of three Construction Closures with a duration not to exceed a cumulative 150 days total.	No limitations.
2-AB	Martin Luther King Blvd	Las Vegas Premium Outlet Intersection		0	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Demolition of existing bridges.

Table 12-6 Permitted Construction Closures During Peak Periods and Off-Peak Periods

Permitted Closure Number	Limits		Travel Lanes (1)	Travel Lanes (2)	Construction Closure Requirement	Allowable Construction Work Activity
Symphony Avenue (Eastbound and Westbound)						
1-SY	Martin Luther King Blvd	Grand Central Parkway		1	A maximum of three Construction Closures with a duration not to exceed a cumulative 150 days total.	No limitations.
2-SY	Martin Luther King Blvd	Grand Central Parkway		0	A maximum of two Construction Closure not to exceed a duration of 60 consecutive days.	No limitations.
Oakey Boulevard / Wyoming Avenue (Eastbound and Westbound)						
1-OW	Ivanhoe Way	Martin Luther King Blvd		1	A maximum of four Construction Closures with a duration not to exceed a cumulative 120 day total.	No limitations.
	Martin Luther King Blvd	Western Ave		1		
2-OW	Martin Luther King Blvd	Western Ave		0	A maximum of two Construction Closures. Work shall be performed beginning no earlier than 10:00 PM Friday and end no later than 5:00 AM Monday.	Demolition of existing bridges.
(1) The minimum number of travel lanes per direction of travel to be open to traffic at all time during the Construction Work unless specified as a Permitted Construction Closure shall meet or exceed the existing number of lanes as of the Setting Date. (2) The minimum number of travel lanes per direction of travel to be open to traffic at all time during the Construction Work for the Permitted Construction Closures. (3) Streets will be permanently closed after Construction Closure to accommodate new Local Agency Infrastructure.						

**ATTACHMENT 14-1
BRIDGE REHABILITATION WORK**

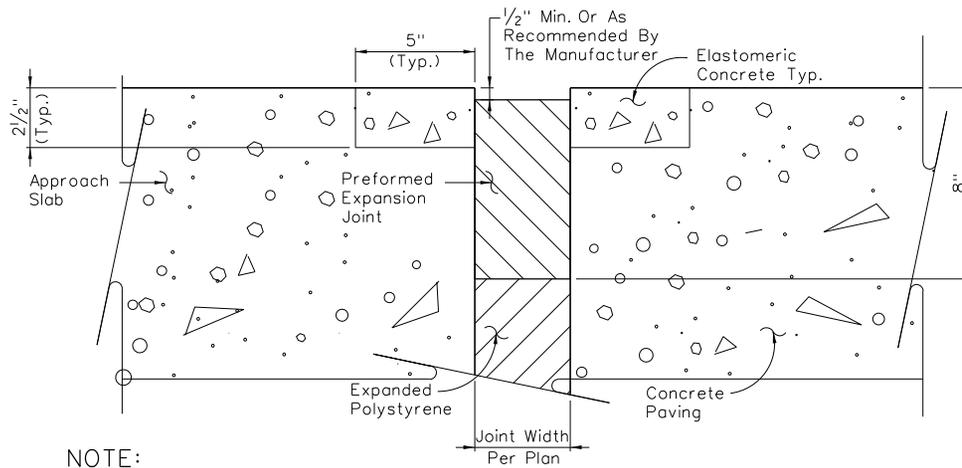
This page intentionally left blank.

Summary of Bridge Rehabilitation Work

Loc No.	Bridge No.	Structure Name	Assumed Quantities								
			Item No.	1	2	3	4	5	6	7	8
			Description	Concrete Bridge Deck Repair	Bridge Deck Preparation	Thin Bonded Multilayer Overlay	Replace Strip Seal Expansion Joint Gland	Replace Expansion Joint Headers and Strip Seal Assembly	Replace Pourable Joint Seal	Replace Relief Joint Seal	Barrier Rail Removal & Replacement
Unit	SQFT	SQYD	SQYD	LINFT	LINFT	LINFT	LINFT	LINFT	LINFT		
1	I-2139R	MLK ramp to I15S (over MLK)	798	1,773	1,773	27 ⁽¹⁾					
2	I-2139	US95 SB ramp to I15S (over MLK)	2,938	6,529	6,529	195 ⁽²⁾				39 ⁽³⁾	7
3	I-940	I15N to US95N flyover	4,682	10,403	10,403					70 ⁽⁴⁾	
4	I-2141	I15S to US95E flyover	2,578	5,729	5,729	27 ⁽⁵⁾				54 ⁽⁶⁾	
5	I-2141R	I15S to US95W (over ramp)	510	1,133	1,133						
6	I-940R	I15N to MLK flyover	2,357	5,238	5,238						
7	G-941R	US95 NB ramp to I15N (over RR)	247	548	548						
8	G-941L	I15 SB ramp to US95/MLK (over RR)	365	810	810		125 ⁽⁷⁾			37 ⁽⁸⁾	
9	I-939	US95N to I15S flyover	3,681	8,179	8,179						
10	I-2138	I15N/S (over US95E to I15N ramp)	1,070	2,377	2,377					300 ⁽⁷⁾	
11	H-946	I515N(US95N) over F St.	1,079	2,397	2,397				518 ⁽⁹⁾		
12	H-946R	US95N ramp to I15S (over F St.)	302	672	672						
13	I-837	I15N/S over Sahara	2,245	4,988	4,988	92 ⁽¹⁰⁾					
14	I-837R	I15S to Sahara E flyover	2,853	6,340	6,340						
15	I-2482	I15S to Sahara E tulip ramp	417	927	927						
Rounded Totals:			26,200	58,100	58,100	350	130	520	500	10	

Notes:

- | | |
|--|---|
| 1. Replace gland at east abutment (4" movement). | 6. At Abutments 1 and 2. |
| 2. Replace glands at all 5 joints (5" movement). | 7. At North and South Abutments. |
| 3. At Abutment 2. | 8. At South Abutment. |
| 4. At Abutment 1. | 9. Remove and replace at all joints. |
| 5. At Abutment 2 (4" movement). | 10. At Abutment 2 of Northbound I-15 (3" movement). |

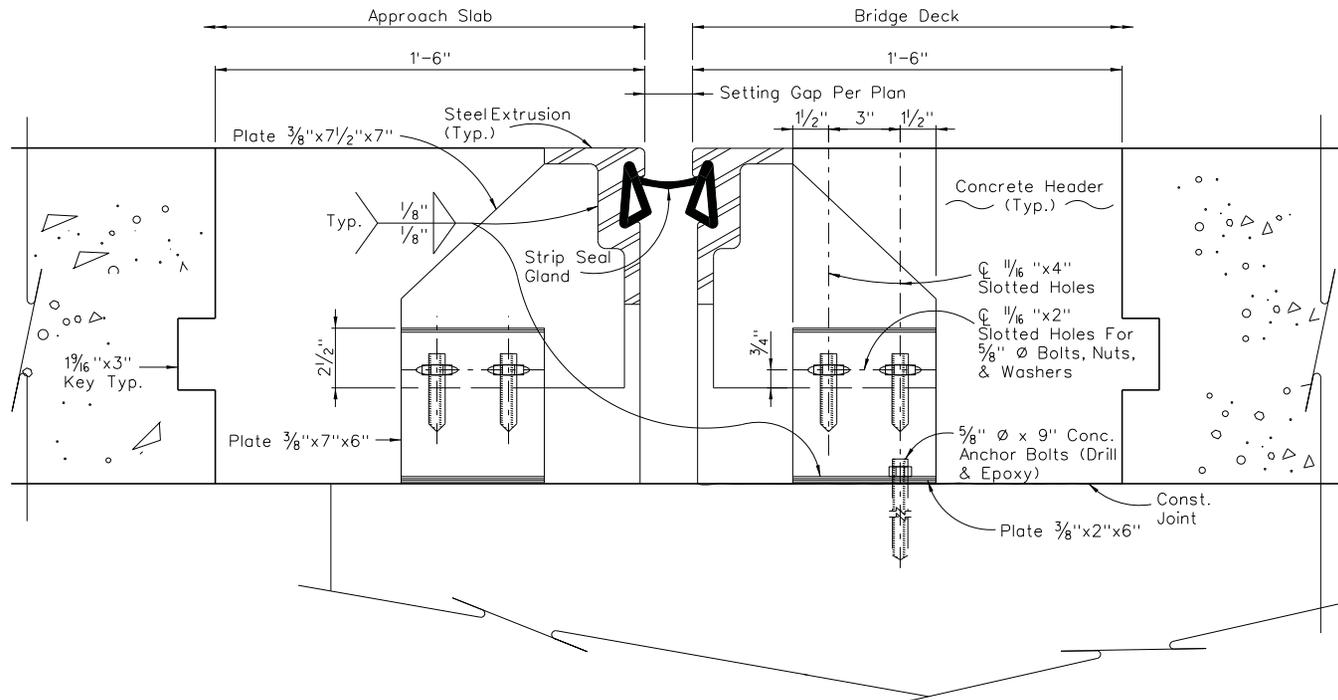


NOTE:

Maintain Joint Gap Between Bridge Rail
 And Barrier Rail When Applicable. Install
 Joint Filler Up Interior Face Of Rail A
 Minimum Of 6".

RELIEF JOINT

NEVADA DEPARTMENT OF TRANSPORTATION		
RELIEF JOINT		
Signed Original On File		
CHIEF BRIDGE ENGINEER	ADOPTED	REVISION



STRIP SEAL EXPANSION JOINT ASSEMBLY

NEVADA DEPARTMENT OF TRANSPORTATION		
STRIP SEAL EXPANSION JOINT		
Signed Original On File		
CHIEF BRIDGE ENGINEER	ADOPTED	REVISION

This page intentionally left blank.

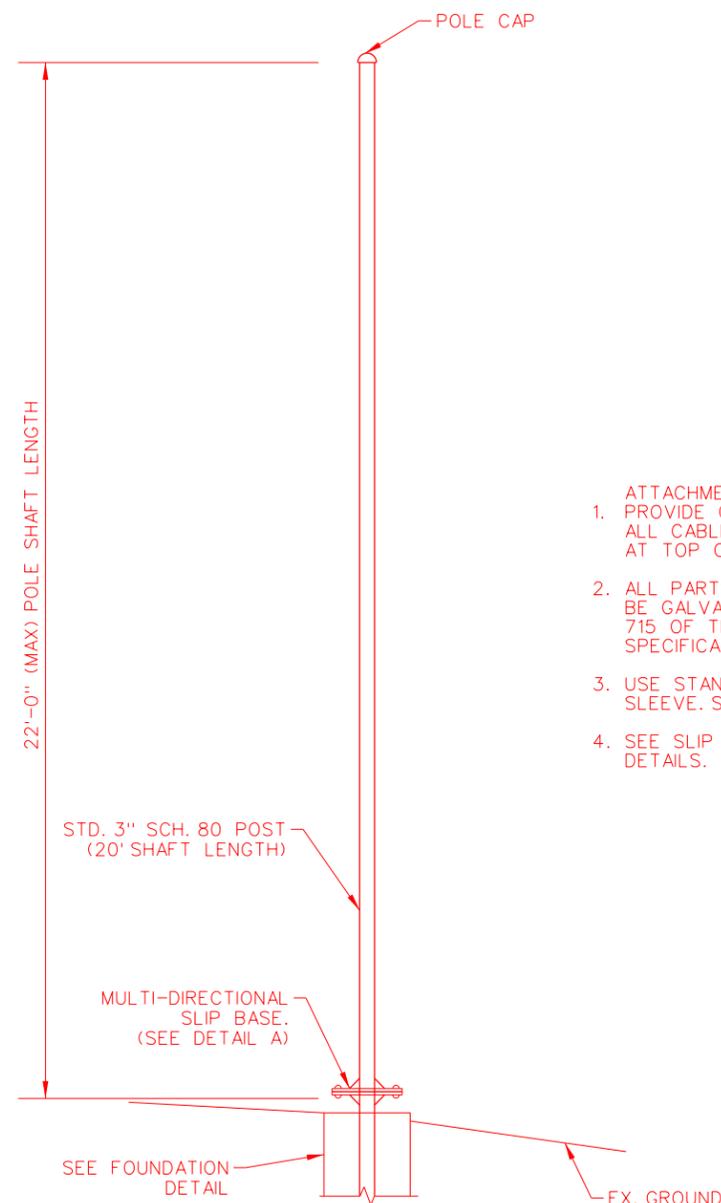
**ATTACHMENT 19-1
STANDARD DRAWINGS FOR ITS POLES,
CABINETS, CONDUITS, PULL BOXES, AND
COUNT STATION LOOPS**

This page intentionally left blank.

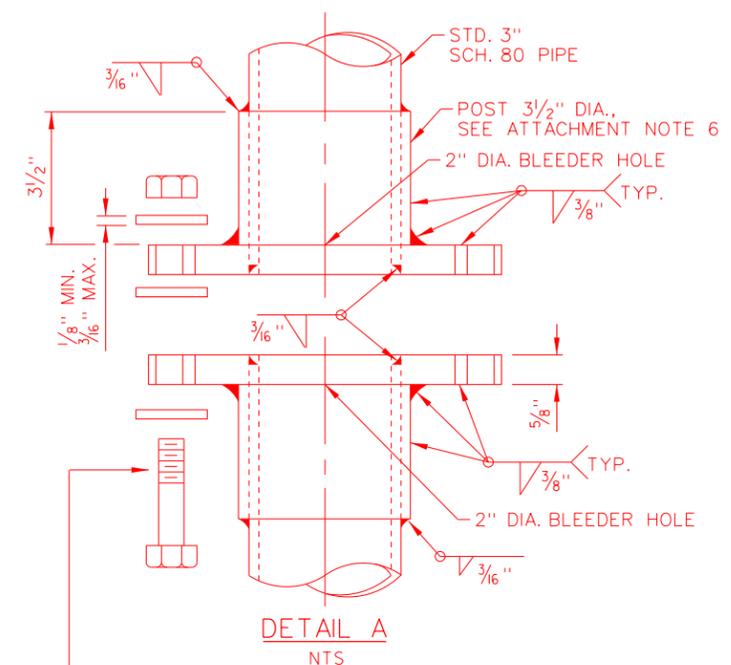
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

GENERAL NOTES:

- DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION 2009 WITH 2011 INTERIM REVISIONS.
- LOADING
 - IMPORTANCE FACTORS (If & Ir): 1.0
 - DRAG COEFFICIENT (Cd): 0.45 - 2.0 DEPENDING ON SHAPE OF MEMBER AND WIND VELOCITY
 - MAXIMUM WIND LOAD: $23.4 \text{ psf} * Cd * I$
 - NATURAL WIND GUSTS: $5.2 \text{ psf} * Cd * I$
 - WIND SPEED: 90 MPH
 - ICE LOAD: 3 psf
- STRUCTURAL STEEL
 - POLE MATERIAL IS ASTM A53 GRADE B STEEL (Fy = 35 Ksi).
 - HOT DIP GALVANIZE STRUCTURAL STEEL AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
 - HARDWARE SHALL BE GALVANIZED AS PER ASTM A153
- MATERIAL REQUIREMENTS
 - STRUCTURAL STEEL (OTHER THAN POST)(ASTM A36): Fy = 36 ksi
 - DRILLED SHAFT: F'c = 4000 psi
 - REINFORCING STEEL: ASTM A615 GRADE 60
ALL BENDS AND HOOKS SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION 2010 ARTICLE 5.10. ALL BEND DIMENSIONS FOR REINFORCING STEEL SHALL BE OUT-TO-OUT OF BARS. ALL PLACEMENT DIMENSIONS FOR REINFORCING STEEL SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.
- BOLTED CONNECTIONS.
 - ACCOMPLISH ALL STRUCTURAL HIGH STRENGTH BOLTING, USING AASHTO M164 BOLTS.
 - USE A HARDENED FLAT WASHER BETWEEN THE NUT AND THE CONNECTED PART.
 - USE HIGH STRENGTH BOLTS WITH DTI'S OR TENSION CONTROL INDICATORS INSTALLED PER SUBSECTION 506.03.07 OF THE STANDARD SPECIFICATIONS.
 - HOT-DIP GALVANIZE ALL STEEL PARTS IN ACCORDANCE WITH ASTM A153 (AASHTO M232).
 - HIGH STRENGTH BOLTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C, OR MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695, CLASS 50. WASHERS, NUTS, AND BOLTS IN ANY ASSEMBLY SHALL BE GALVANIZED BY THE SAME PROCESS. LUBRICATE THREADS WITH A DYED LUBRICANT.
- WELDED CONNECTIONS
 - WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED ON THE PLANS.
 - WELD IN ACCORDANCE WITH SECTION 506 OF THE STANDARD SPECIFICATIONS.
 - USE ONLY WELDERS QUALIFIED ACCORDING TO ANSI/AASHTO/AWS D1.1-2000, SECTION 4 FOR THE TYPE OF JOINT, ELECTRODE, POSITION OF THE JOINT, AND THE MATERIAL THICKNESS.
 - USE ONLY PREQUALIFIED JOINTS.
 - TEST ALL FULL PENETRATION GROOVE WELDS ULTRASONICALLY IN ACCORDANCE WITH SECTION 6, PART F OF ANSI/AASHTO/AWS D1.1-2000. ACCEPT OR REJECT EACH WELD DISCONTINUITY ON THE BASIS OF ITS INDICATION RATING AND ITS LENGTH IN ACCORDANCE WITH SECTION 9.3.
 - HAVE ALL FILLET WELDS VISUALLY INSPECTED BY QUALIFIED PERSONNEL. ANY WELDS FOUND TO HAVE INCOMPLETE FUSION, OVERLAP OR CRACKS WILL BE REJECTED.
- FOUNDATION: DRILLED SHAFT.
- GROUND ALL STRUCTURES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.
- DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.



- ATTACHMENT NOTES:**
- PROVIDE CABLE STRAIN RELIEF FOR ALL CABLES. ATTACH TO "J" HOOK AT TOP OF POLE, WHEN PROVIDED.
 - ALL PARTS AND HARDWARE SHALL BE GALVANIZED AS PER SECTION 715 OF THE NDOT STANDARD SPECIFICATIONS, EXCEPT AS NOTED.
 - USE STANDARD WEIGHT PIPE FOR SLEEVE. SEE ASTM A 53.
 - SEE SLIP BASE TOP AND BOTTOM PLATE DETAILS.



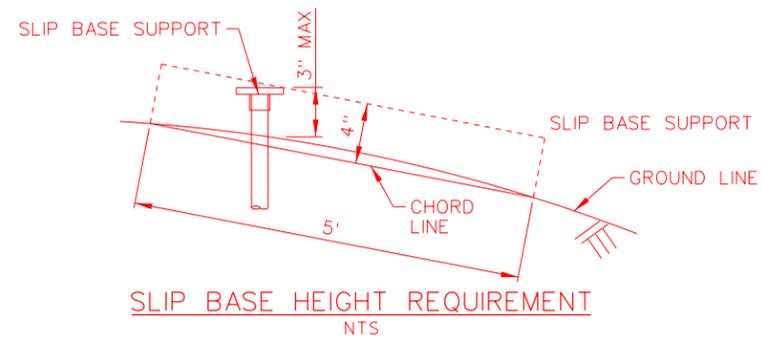
5/8"-11 x 3 1/8" BOLT, TYPE 1 ASTM A 325 OR TYPE 1 ASTM A 449 (GRADE 5); EACH WITH THREE USS THROUGH HARDENED WASHERS ASTM F 436 TYPE 1; AND ONE NYLON INSERT STOP NUT ASTM A 563 DH. ALL ITEMS SHALL BE GALVANIZED AS PER MANUFACTURER'S SPECIFICATIONS. TORQUE WITHIN THE RANGE OF 24-29 FT-LB. SEE BOLT DETAIL ON THIS SHEET.

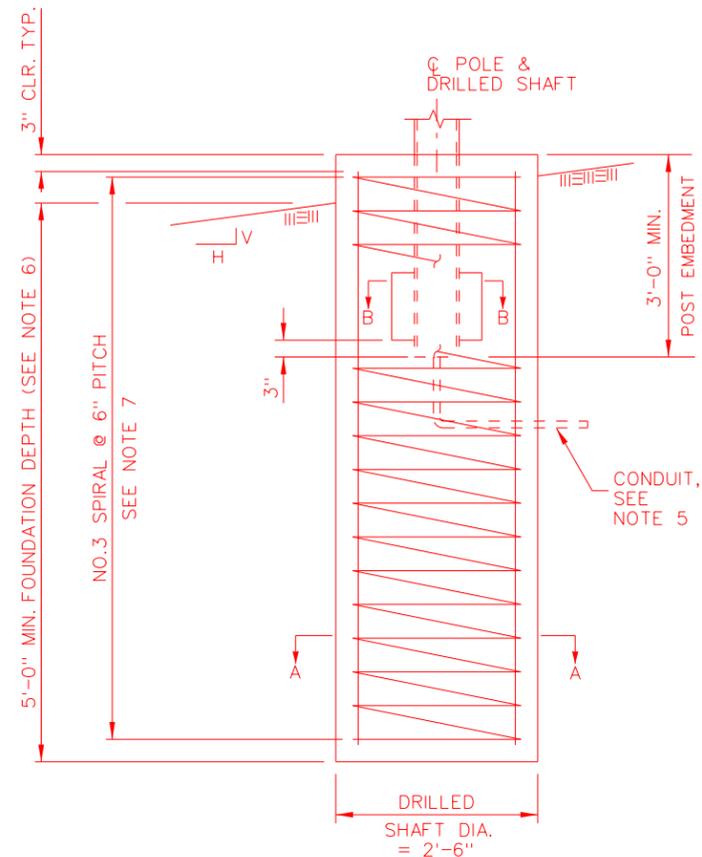
n = A TYPICAL MANUFACTURER'S IDENTIFICATION



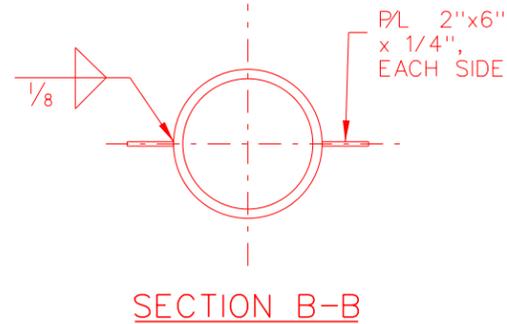
TYPE 1 ASTM A449 5/8" x 3-1/8" BOLT TYPE 1 ASTM A325 5/8" x 3-1/8" BOLT

TOP VIEW BOLT DETAIL

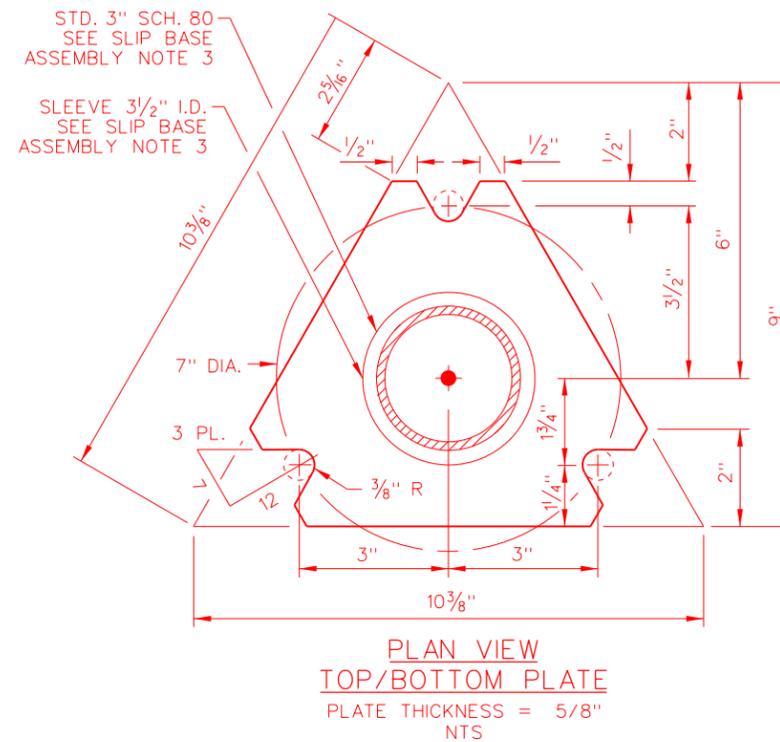




DETAIL 1

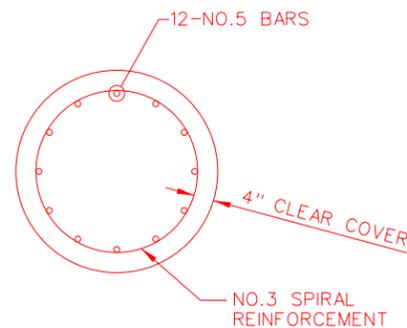


SECTION B-B



PLAN VIEW
TOP/BOTTOM PLATE
PLATE THICKNESS = 5/8 inch
NTS

- SLIP BASE ASSEMBLY NOTES:
1. ALL PARTS AND HARDWARE SHALL BE GALVANIZED AS PER SECTION 715 OF THE NEVADA DOT STANDARD SPECIFICATIONS, EXCEPT AS NOTED.
 2. MULTI-DIRECTIONAL SLIP BASES ARE NOT REQUIRED BEHIND CONCRETE BARRIER RAIL OR BEHIND GUARDRAIL WHERE THE SIGN POST IS GREATER THAN 2'-6" FROM THE BACK SIDE OF THE GUARDRAIL POST.
 3. USE STANDARD WEIGHT PIPE FOR PIPE AND SLEEVE, SEE ASTM A53.
 4. FOR DETAILS ON SIGN LOCATION POST TYPE PANEL BRACING AND SIGN ISLANDS, SEE STANDARD PLAN T-31.1.1 THRU T-31.1.6.
 5. STIFFENER SHALL BE 2 1/2" X 2 1/2" X 3/8" ON BOTH SIDES OF SLIP BOLTS, TOP AND BOTTOM.



SECTION A-A

GENERAL NOTES:

1. DRILLED SHAFT SHALL BE CLASS "S" PCC AS SPECIFIED IN THE SPECIAL PROVISIONS.
2. PRIOR TO ERECTION OF THE POLE, BACKFILL WHICH IS EQUIVALENT TO THE SURROUNDING MATERIAL SHALL BE IN PLACE AND COMPACTED ACCORDING TO CONTRACT STANDARDS.
3. PILE SHALL BE FORMED 6" MIN. BELOW GROUND SURFACE. REMAINDER TO BE PLACED AGAINST UNDISTURBED MATERIAL.
4. IF NATIVE SOILS ARE DISTURBED PRIOR TO ERECTION OF THE POLE, BACKFILL WHICH IS EQUIVALENT TO THE SURROUNDING MATERIAL SHALL BE IN PLACE AND COMPACTED ACCORDING TO CONTRACT STANDARDS.
5. FOR NUMBER AND SIZE OF CONDUIT IN FOUNDATION, SEE ELECTRICAL PLAN SHEETS.
6. DEPTH OF FOUNDATION (DRILLED SHAFT) WILL BE MEASURED FROM THE LOWEST POINT ON FINISHED GRADE AND LENGTH OF PILE WILL CHANGE ACCORDINGLY.
7. TERMINATE NO. 3 SPIRAL REINFORCEMENT WITH 135 DEGREE HOOK AROUND MAIN VERTICAL REINFORCEMENT, WITH 1/2 TURNS @ TOP & BOTTOM.
8. IF SOIL CONSISTS OF ORGANICS OR SATURATED SILT AND CLAY, CONTACT ENGINEER BEFORE PLACING FOUNDATION.
9. BONDING AND GROUNDING SHALL MEET THE NATIONAL ELECTRIC CODE AND NDOT STANDARDS. SEE POLE GROUNDING DETAIL ON NDOT STANDARD PLAN T-30.1.16.
10. STRUCTURAL BOLTS AND OTHER STEEL HARDWARE SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M 232 (ASTM A 153).

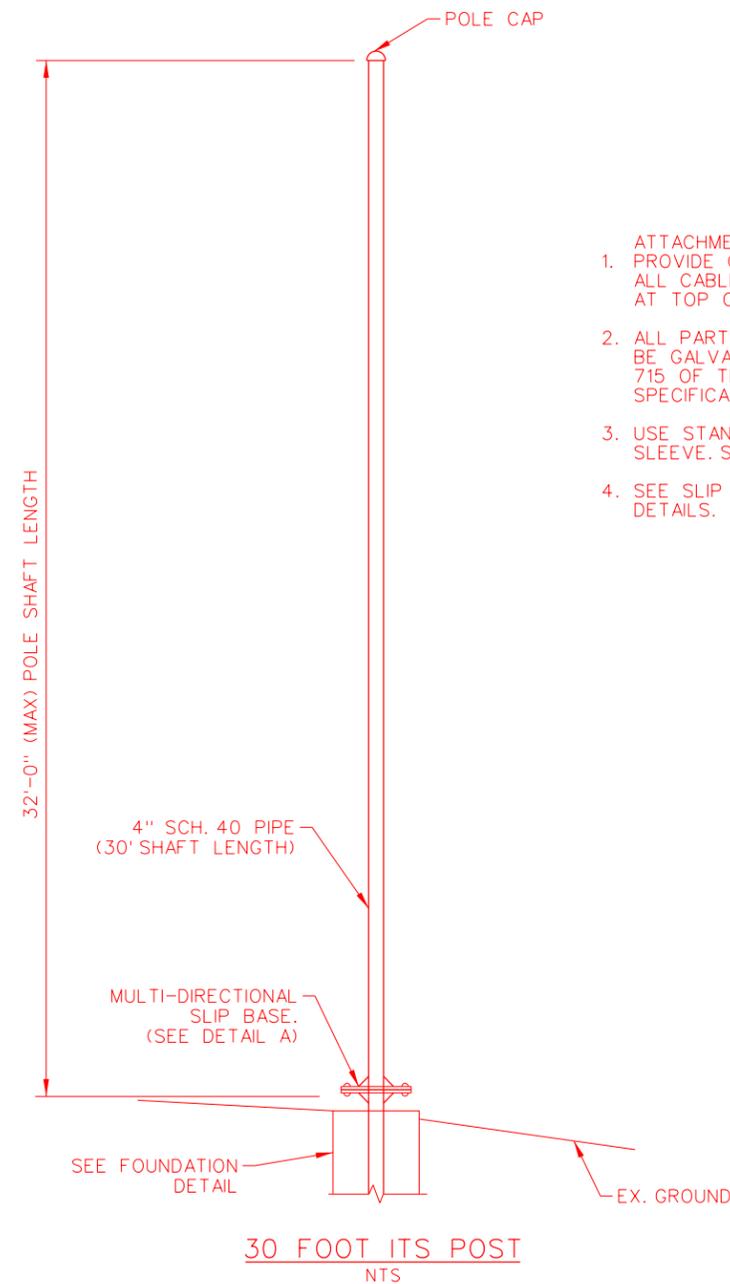
SOILS CONDITIONS (FLAT TO 2H:1V)					
SITE FOUNDATION MATERIAL	MINIMUM DRY UNIT WEIGHT (pcf)	INTERNAL FRICTION ANGLE (DEG)	P-Y MODULUS k, (lb/in ³)	COHESION (psf)	STRAIN E 50
CLAY	100	N/A	N/A	1000	0.007
SAND	100	30 (35*)	25	N/A	N/A

* IN CASE THE SLOPE OF 2H:1V TO 1.5H:1V

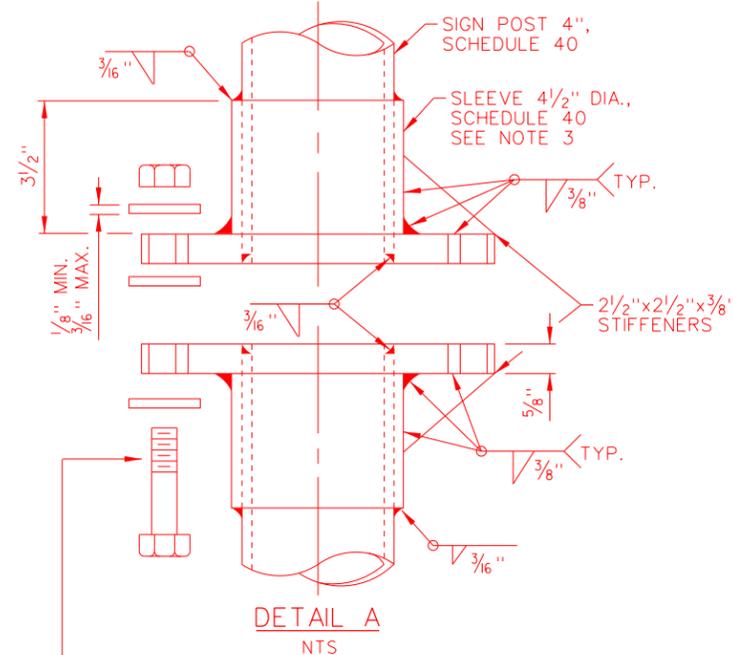
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

GENERAL NOTES:

- DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION 2009 WITH 2011 INTERIM REVISIONS.
- LOADING
 - IMPORTANCE FACTORS (If & Ir): 1.0
 - DRAG COEFFICIENT (Cd): 0.45 - 2.0 DEPENDING ON SHAPE OF MEMBER AND WIND VELOCITY
 - MAXIMUM WIND LOAD: 23.4 psf * Cd * I
 - NATURAL WIND GUSTS: 5.2 psf * Cd * I
 - WIND SPEED: 90 MPH
 - ICE LOAD: 3 psf
 - FATIGUE CATEGORY: II
- STRUCTURAL STEEL
 - POLE MATERIAL IS ASTM A53 GRADE B STEEL (Fy = 35 Ksi).
 - HOT DIP GALVANIZE STRUCTURAL STEEL AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
 - HARDWARE SHALL BE GALVANIZED AS PER ASTM A153
- MATERIAL REQUIREMENTS
 - STRUCTURAL STEEL (OTHER THAN POST)(ASTM A36): Fy = 36 ksi
 - DRILLED SHAFT: F'c = 4000 psi
 - REINFORCING STEEL: ASTM A615 GRADE 60
ALL BENDS AND HOOKS SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION 2010 ARTICLE 5.10. ALL BEND DIMENSIONS FOR REINFORCING STEEL SHALL BE OUT-TO-OUT OF BARS. ALL PLACEMENT DIMENSIONS FOR REINFORCING STEEL SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.
- BOLTED CONNECTIONS.
 - ACCOMPLISH ALL STRUCTURAL HIGH STRENGTH BOLTING, USING AASHTO M164 BOLTS.
 - USE A HARDENED FLAT WASHER BETWEEN THE NUT AND THE CONNECTED PART.
 - USE HIGH STRENGTH BOLTS WITH DTI'S OR TENSION CONTROL INDICATORS INSTALLED PER SUBSECTION 506.03.07 OF THE STANDARD SPECIFICATIONS.
 - HOT-DIP GALVANIZE ALL STEEL PARTS IN ACCORDANCE WITH ASTM A153 (AASHTO M232).
 - HIGH STRENGTH BOLTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C, OR MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695, CLASS 50. WASHERS, NUTS, AND BOLTS IN ANY ASSEMBLY SHALL BE GALVANIZED BY THE SAME PROCESS. LUBRICATE THREADS WITH A DYED LUBRICANT.
- WELDED CONNECTIONS
 - WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED ON THE PLANS.
 - WELD IN ACCORDANCE WITH SECTION 506 OF THE STANDARD SPECIFICATIONS.
 - USE ONLY WELDERS QUALIFIED ACCORDING TO ANSI/AASHTO/AWS D1.1-2000, SECTION 4 FOR THE TYPE OF JOINT, ELECTRODE, POSITION OF THE JOINT, AND THE MATERIAL THICKNESS.
 - USE ONLY PREQUALIFIED JOINTS.
 - TEST ALL FULL PENETRATION GROOVE WELDS ULTRASONICALLY IN ACCORDANCE WITH SECTION 6, PART F OF ANSI/AASHTO/AWS D1.1-2000. ACCEPT OR REJECT EACH WELD DISCONTINUITY ON THE BASIS OF ITS INDICATION RATING AND ITS LENGTH IN ACCORDANCE WITH SECTION 9.3.
 - HAVE ALL FILLET WELDS VISUALLY INSPECTED BY QUALIFIED PERSONNEL. ANY WELDS FOUND TO HAVE INCOMPLETE FUSION, OVERLAP OR CRACKS WILL BE REJECTED.
- FOUNDATION: DRILLED SHAFT.
- GROUND ALL STRUCTURES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.
- DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.



- ATTACHMENT NOTES:
- PROVIDE CABLE STRAIN RELIEF FOR ALL CABLES. ATTACH TO "J" HOOK AT TOP OF POLE, WHEN PROVIDED.
 - ALL PARTS AND HARDWARE SHALL BE GALVANIZED AS PER SECTION 715 OF THE NDOT STANDARD SPECIFICATIONS, EXCEPT AS NOTED.
 - USE STANDARD WEIGHT PIPE FOR SLEEVE. SEE ASTM A 53.
 - SEE SLIP BASE TOP AND BOTTOM PLATE DETAILS.

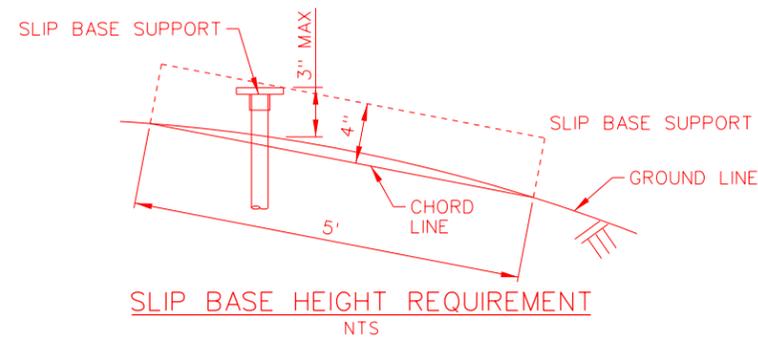


5/8"-11 x 3 1/8" BOLT, TYPE 1 ASTM A 325 OR TYPE 1 ASTM A 449 (GRADE 5); EACH WITH THREE USS THROUGH HARDENED WASHERS ASTM F 436 TYPE 1; AND ONE NYLON INSERT STOP NUT ASTM A 563 DH. ALL ITEMS SHALL BE GALVANIZED AS PER MANUFACTURER'S SPECIFICATIONS. TORQUE WITHIN THE RANGE OF 24-29 FT-LB. SEE BOLT DETAIL ON THIS SHEET.

n = A TYPICAL MANUFACTURER'S IDENTIFICATION



TOP VIEW BOLT DETAIL



SHEET 1 OF 2

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

30 FOOT ITS 4 INCH
POST

PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:09:05 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

GENERAL NOTES:

1. DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION 2009 WITH 2010 INTERIM REVISIONS.

2. LOADING

- A. IMPORTANCE FACTORS (I_f & I_r): 1.0
- B. DRAG COEFFICIENT (C_d): 0.45 - 2.0 DEPENDING ON SHAPE OF MEMBER AND WIND VELOCITY
- C. MAXIMUM WIND LOAD: $23.4 \text{ psf} * C_d * I$
- D. NATURAL WIND GUSTS: $5.2 \text{ psf} * C_d * I$
- E. WIND SPEED: 90 MPH
- F. ICE LOAD: 3 psf
- G. FATIGUE CATEGORY: I

3. SERVICEABILITY

MAXIMUM 1" DISPLACEMENT FOR 30MPH WIND SPEED.

4. STRUCTURAL STEEL

- A. POLE MATERIAL IS ASTM A572 GRADE 50 STEEL.
- B. STEEL TUBING SHALL CONFORM TO ASTM A500, GRADE C.
- C. HOT DIP GALVANIZE STRUCTURAL STEEL AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
- D. HARDWARE SHALL BE GALVANIZED AS PER ASTM A153

5. MATERIAL REQUIREMENTS

- A. STRUCTURAL STEEL : $F_y = 50 \text{ ksi}$
- B. DRILLED SHAFT: $F'_c = 4000 \text{ psi}$
- C. REINFORCING STEEL : ASTM A615 GRADE 60
ALL BENDS AND HOOKS SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION 2010 ARTICLE 5.10. ALL BEND DIMENSIONS FOR REINFORCING STEEL SHALL BE OUT-TO-OUT OF BARS. ALL PLACEMENT DIMENSIONS FOR REINFORCING STEEL SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.

6. BOLTED CONNECTIONS.

- A. ACCOMPLISH ALL STRUCTURAL HIGH STRENGTH BOLTING, EXCEPT ANCHOR BOLTS, USING AASHTO M164 BOLTS.
- B. USE A HARDENED FLAT WASHER BETWEEN THE NUT AND THE CONNECTED PART.
- C. USE HIGH STRENGTH BOLTS WITH DTI'S OR TENSION CONTROL INDICATORS INSTALLED PER SUBSECTION 506.03.07 OF THE STANDARD SPECIFICATIONS.
- D. FABRICATE ANCHOR BOLTS FROM MATERIAL CONFORMING TO ASTM F1554 GRADE 55.
- E. HOT-DIP GALVANIZE ALL STEEL PARTS IN ACCORDANCE WITH ASTM A153 (AASHTO M232), EXCEPT AS SPECIFIED FOR HIGH STRENGTH BOLTING.
- F. HIGH STRENGTH BOLTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C, OR MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695, CLASS 50. WASHERS, NUTS, AND BOLTS IN ANY ASSEMBLY SHALL BE GALVANIZED BY THE SAME PROCESS. DTI SHALL BE MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695. LUBRICATE THREADS WITH A DYED LUBRICANT.

7. WELDED CONNECTIONS

- A. WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED ON THE PLANS.
- B. WELD IN ACCORDANCE WITH SECTION 506 OF THE STANDARD SPECIFICATIONS.
- C. USE ONLY WELDERS QUALIFIED ACCORDING TO ANSI/AASHTO/AWS D1.1-2000, SECTION 4 FOR THE TYPE OF JOINT, ELECTRODE, POSITION OF THE JOINT, AND THE MATERIAL THICKNESS.
- D. USE ONLY PREQUALIFIED JOINTS.
- E. TEST ALL FULL PENETRATION GROOVE WELDS ULTRASONICALLY IN ACCORDANCE WITH SECTION 6, PART F OF ANSI/AASHTO/AWS D1.1-2000. ACCEPT OR REJECT EACH WELD DISCONTINUITY ON THE BASIS OF ITS INDICATION RATING AND ITS LENGTH IN ACCORDANCE WITH SECTION 9.3.
- F. HAVE ALL FILLET WELDS VISUALLY INSPECTED BY QUALIFIED PERSONNEL. ANY WELDS FOUND TO HAVE INCOMPLETE FUSION, OVERLAP OR CRACKS WILL BE REJECTED.

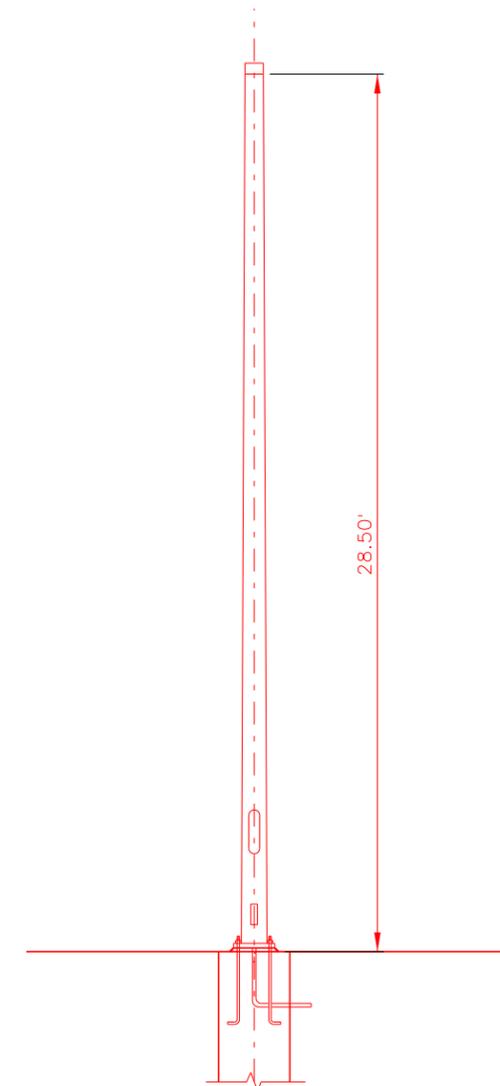
8. GROUTING

- A. SHIM BASE PLATES TO FINISH ELEVATION AND COMPLETELY FILL PLATE AREA WITH A HIGH STRENGTH, NON-FERROUS, NON-SHRINK GROUT.
- B. FORMULATE GROUT TO COMPLY WITH THE ASTM C1107.
- C. TAPER ALL FINISHED SURFACES AT 45 DEGREE +/-.

9. FOUNDATION: DRILLED SHAFT.

10. GROUND ALL STRUCTURES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.

11. DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.



30 FOOT ITS POLE
NTS

SHEET 1 OF 3

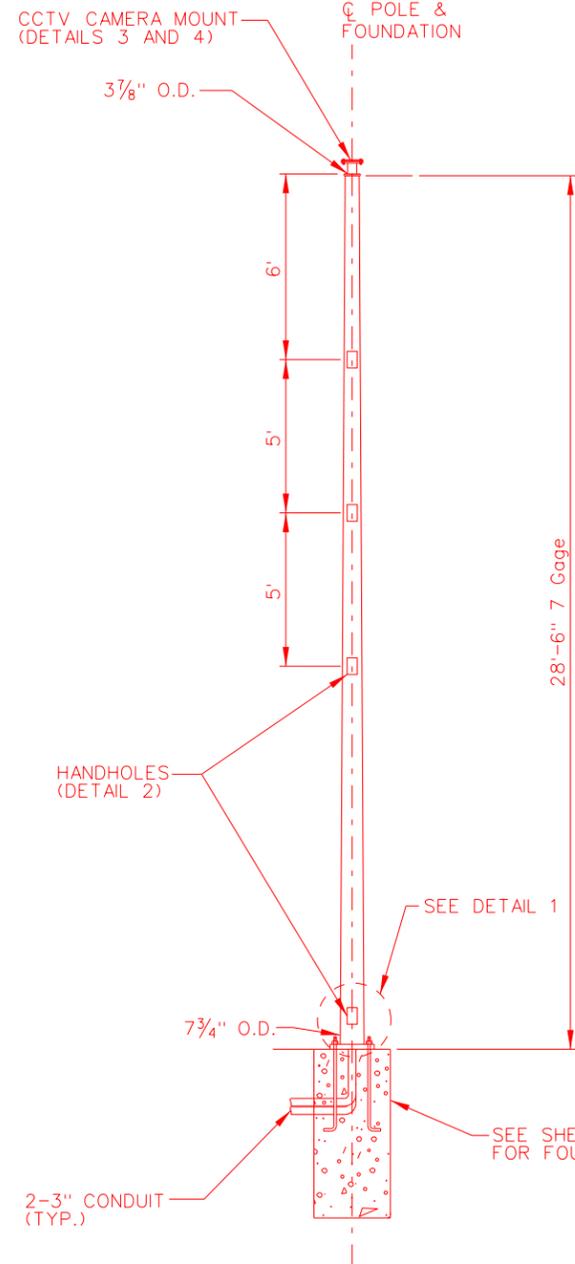
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

30 FOOT ITS POLE

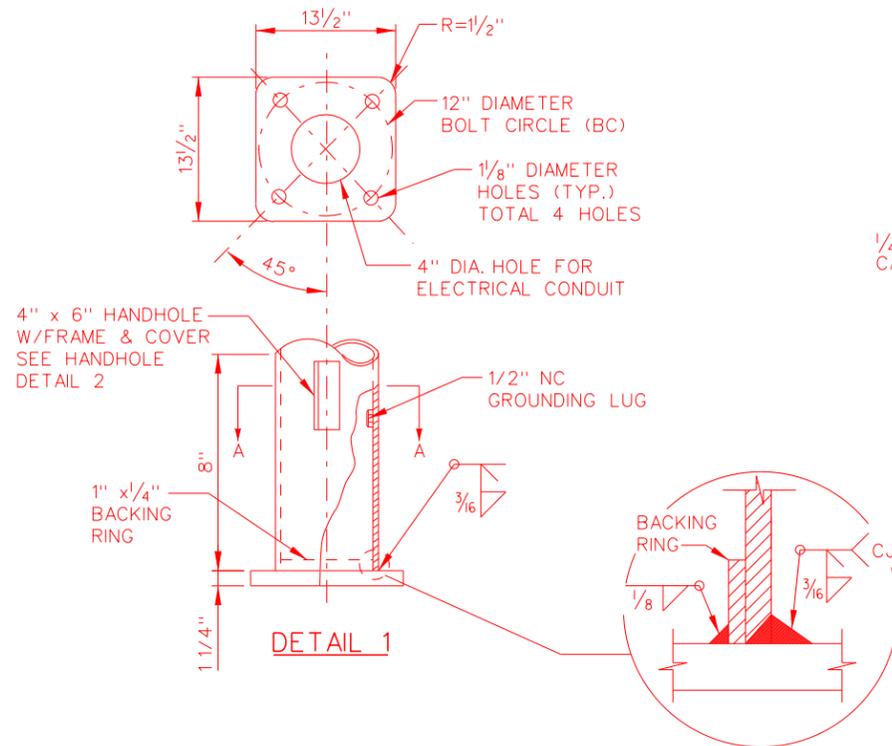
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

PRELIMINARY

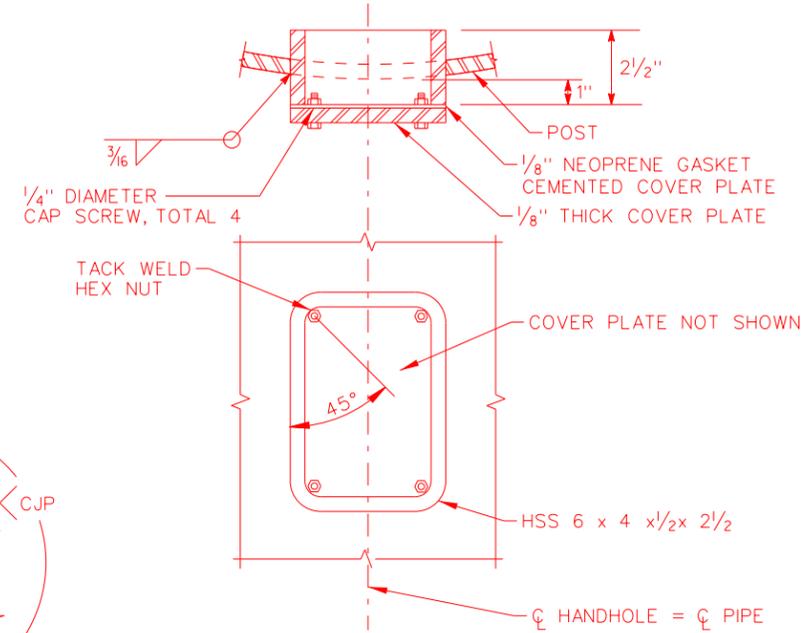
SUBJECT TO REVISION
2/3/2015 9:08:52 AM



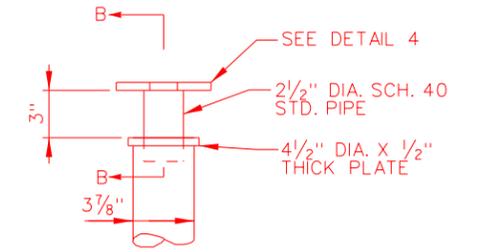
TYPICAL POLE ELEVATION



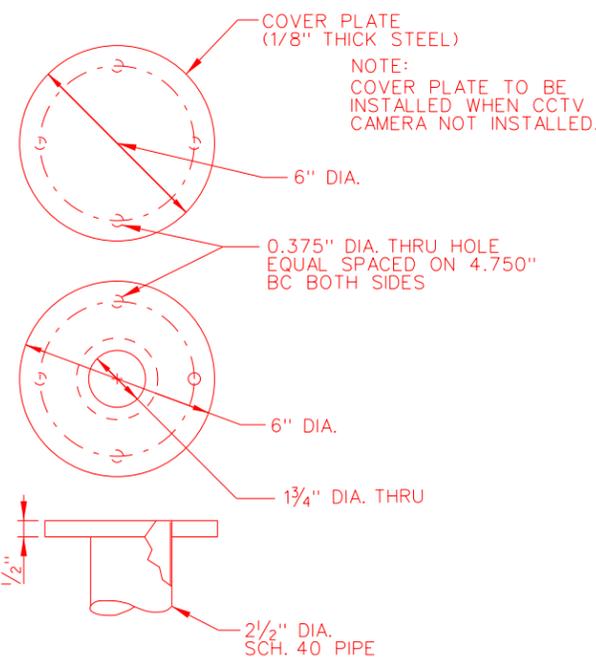
DETAIL 1



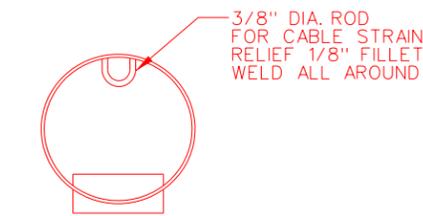
DETAIL 2
NTS



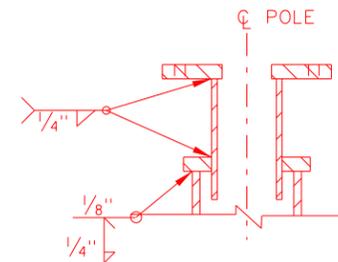
DETAIL 3
TYPICAL CCTV CAMERA MOUNT ASSEMBLY
(VARIES BY MANUFACTURER)
NTS



DETAIL 4
TYPICAL CCTV CAMERA MOUNT PLATE
(VARIES BY MANUFACTURER)
NTS



SECTION A-A
NTS



SECTION B-B
NTS

NOTES:

1. DEVICE MOUNT ASSEMBLIES TO BE INSTALLED AND MOUNTED PER MANUFACTURER'S SPECIFICATION AND RECOMMENDATIONS.
2. SEE PLAN SHEETS AND NETWORK DIAGRAMS FOR INSTALLATION LOCATIONS AND EQUIPMENT TO BE INSTALLED.
3. INSTALL STEEL RAIN TIGHT REMOVABLE CAP ON TOP OF POLE IF POLE TOP DEVICE IS NOT SPECIFIED IN PLANS.
4. SWEEPS FOR CONDUIT SHALL NOT BE LESS THAN MINIMUM BENDING RADIUS OF FIBER.

SHEET 2 OF 3

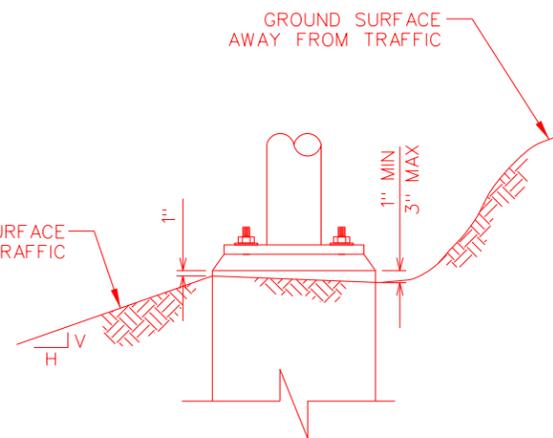
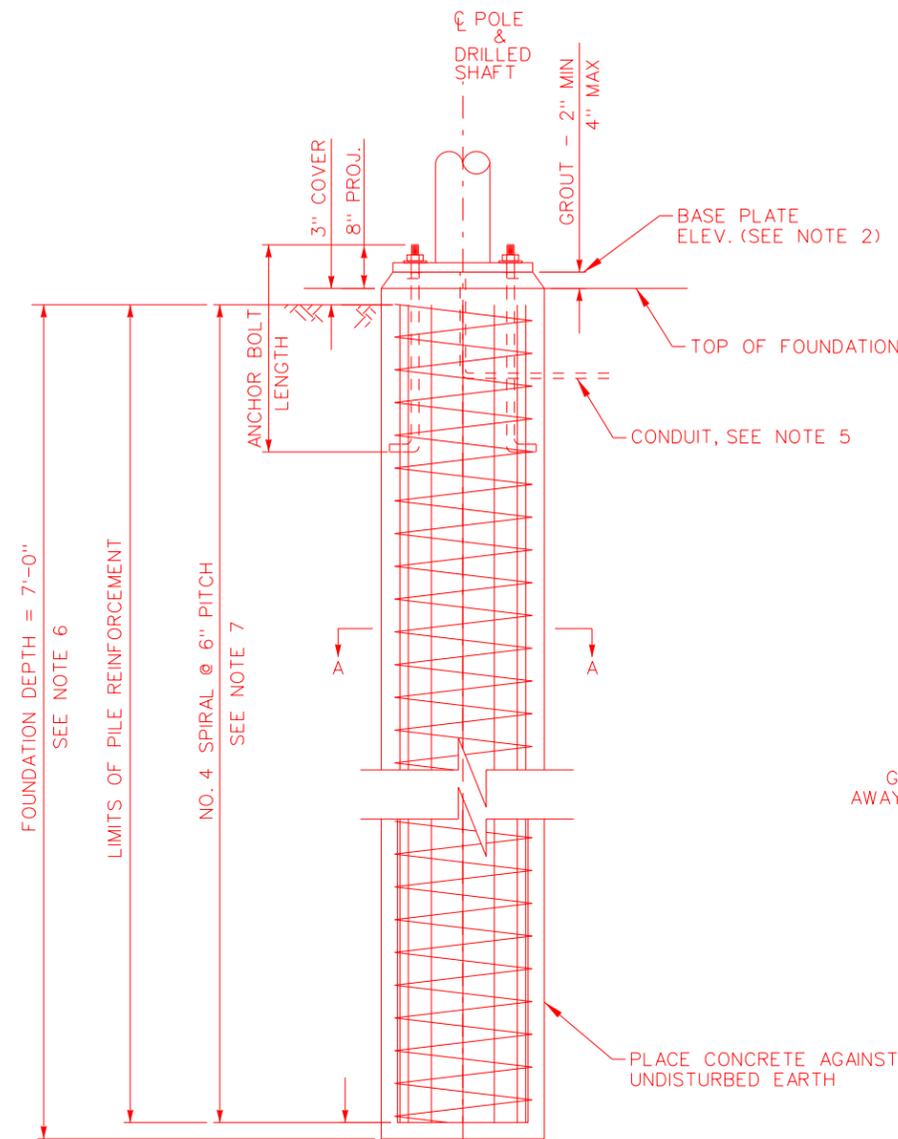
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

30 FOOT ITS POLE

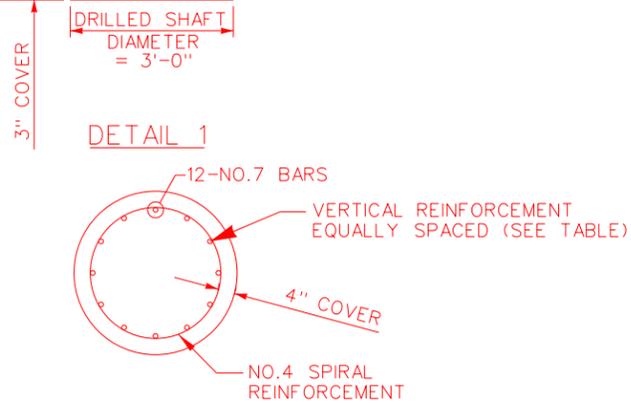
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:08:58 AM

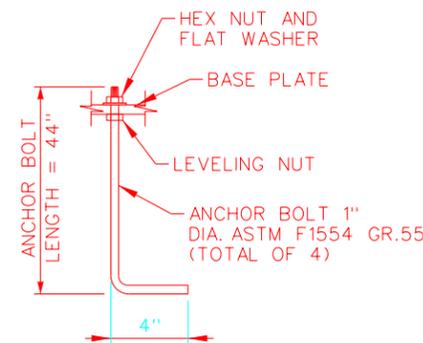
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



DETAIL 2



SECTION A-A



DETAIL 3
ANCHOR BOLT DETAIL (SEE NOTE 8)

ITS POLE	ANCHOR BOLTS DIA.	ANCHOR BOLT LENGTH	VERTICAL REINFORCING STEEL	DRILLED SHAFT DIAMETER	FOUNDATION DEPTH
30'	1"	44"	12 - NO. 7	36"	7'

NOTES:

- FOR ANCHOR BOLT LAYOUT, REFER TO POLE MANUFACTURER'S SPECIFICATIONS.
- CONFIRM BASE PLATE ELEVATION WITH ENGINEER PRIOR TO POURING OF FOUNDATION.
- DRILLED SHAFT SHALL BE CONSTRUCTED ACCORDING TO SECTION 623 OF THE STANDARD SPECIFICATIONS.
- PILE SHALL BE FORMED 6" MIN. BELOW GROUND SURFACE. REMAINDER TO BE PLACED AGAINST UNDISTURBED MATERIAL.
- FOR NUMBER AND SIZE OF CONDUIT IN FOUNDATION, SEE ELECTRICAL PLAN SHEETS, UNLESS NOTED OTHERWISE.
- DEPTH OF FOUNDATION (DRILLED SHAFT) WILL BE MEASURED FROM THE LOWEST POINT ON FINISHED GRADE AND LENGTH OF PILE WILL CHANGE ACCORDINGLY.
- TERMINATE NO. 4 SPIRAL REINFORCEMENT WITH 135 DEGREE HOOK AROUND MAIN VERTICAL REINFORCEMENT.
- ALL ANCHOR BOLTS AND NUTS SHALL CONFORM TO THE SPECIFICATIONS ASTM DESIGNATION F1554 GR.55 AND SHALL BE FURNISHED WITH COMMERCIAL QUALITY WASHERS.
- THREAD UPPER 8" OF ANCHOR BOLTS AND GALVANIZE ENTIRE BOLT IN ACCORDANCE WITH ASTM A153 (AASHTO M232).
- BEFORE PLACING THE FOUNDATION, CONTACT THE NDOT GEOTECHNICAL ENGINEERING SECTION FOR FURTHER INVESTIGATION WHEN THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED: (A) SOILS WITH HIGH ORGANIC CONTENT; (B) THE SITE CANNOT SUPPORT THE DRILL RIG; OR (C) FIRM BEDROCK IS ENCOUNTERED.
- BONDING AND GROUNDING SHALL MEET THE NATIONAL ELECTRIC CODE AND NDOT STANDARDS. SEE POLE GROUNDING DETAIL ON NDOT STANDARD PLAN T-30.1.16.
- STRUCTURAL BOLTS AND OTHER STEEL HARDWARE SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153 (AASHTO M232).

SHEET 3 OF 3

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

30 FOOT CCTV
CAMERA ITS POLE
FOUNDATION DETAILS

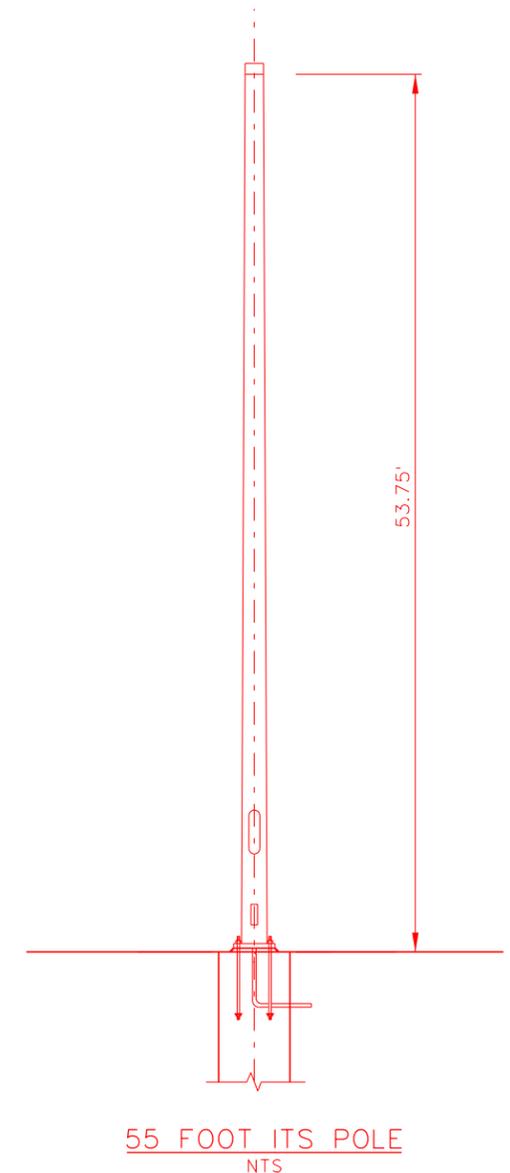
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:09:34 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

GENERAL NOTES:

- DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION 2009 WITH 2010 INTERIM REVISIONS.
- LOADING
 - IMPORTANCE FACTORS (If & Ir): 1.0
 - DRAG COEFFICIENT (C): 0.45 - 2.0 DEPENDING ON SHAPE OF MEMBER AND WIND VELOCITY
 - MAXIMUM WIND LOAD: 23.4 psf * Cd * I
 - NATURAL WIND GUSTS: 5.2 psf * Cd * I
 - WIND SPEED: 90 MPH
 - ICE LOAD: 3 psf
- SERVICEABILITY
MAXIMUM 1" DISPLACEMENT FOR 30MPH WIND SPEED.
- STRUCTURAL STEEL
 - POLE MATERIAL IS ASTM A36 STEEL.
 - STEEL TUBING SHALL CONFORM TO ASTM A500, GRADE C.
 - HOT DIP GALVANIZE STRUCTURAL STEEL AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
 - HARDWARE SHALL BE GALVANIZED AS PER ASTM A153
- MATERIAL REQUIREMENTS
 - STRUCTURAL STEEL: $F_y = 36$ ksi
 - DRILLED SHAFT: $F'_c = 4000$ psi
 - REINFORCING STEEL: ASTM A615 GRADE 60
ALL BENDS AND HOOKS SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION 2010 ARTICLE 5.10. ALL BEND DIMENSIONS FOR REINFORCING STEEL SHALL BE OUT-TO-OUT OF BARS. ALL PLACEMENT DIMENSIONS FOR REINFORCING STEEL SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.
- BOLTED CONNECTIONS.
 - ACCOMPLISH ALL STRUCTURAL HIGH STRENGTH BOLTING, EXCEPT ANCHOR BOLTS, USING AASHTO M164 BOLTS.
 - USE A HARDENED FLAT WASHER BETWEEN THE NUT AND THE CONNECTED PART.
 - USE HIGH STRENGTH BOLTS WITH DTI'S OR TENSION CONTROL INDICATORS INSTALLED PER SUBSECTION 506.03.07 OF THE STANDARD SPECIFICATIONS.
 - FABRICATE ANCHOR BOLTS FROM MATERIAL CONFORMING TO ASTM F1554 GRADE 36.
 - HOT-DIP GALVANIZE ALL STEEL PARTS IN ACCORDANCE WITH ASTM A153 (AASHTO M232), EXCEPT AS SHOWN FOR ONLY THE TOP 12" FOR ANCHOR BOLTS, AND AS SPECIFIED FOR HIGH STRENGTH BOLTING.
 - HIGH STRENGTH BOLTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C, OR MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695, CLASS 50. WASHERS, NUTS, AND BOLTS IN ANY ASSEMBLY SHALL BE GALVANIZED BY THE SAME PROCESS. DTI SHALL BE MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695. LUBRICATE THREADS WITH A DYED LUBRICANT.
- WELDED CONNECTIONS
 - WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED ON THE PLANS.
 - WELD IN ACCORDANCE WITH SECTION 506 OF THE STANDARD SPECIFICATIONS.
 - USE ONLY WELDERS QUALIFIED ACCORDING TO ANSI/AASHTO/AWS D1.1-2000, SECTION 4 FOR THE TYPE OF JOINT, ELECTRODE, POSITION OF THE JOINT, AND THE MATERIAL THICKNESS.
 - USE ONLY PREQUALIFIED JOINTS.
 - TEST ALL FULL PENETRATION GROOVE WELDS ULTRASONICALLY IN ACCORDANCE WITH SECTION 6, PART F OF ANSI/AASHTO/AWS D1.1-2000. ACCEPT OR REJECT EACH WELD DISCONTINUITY ON THE BASIS OF ITS INDICATION RATING AND ITS LENGTH IN ACCORDANCE WITH SECTION 9.3.
 - HAVE ALL FILLET WELDS VISUALLY INSPECTED BY QUALIFIED PERSONNEL. ANY WELDS FOUND TO HAVE INCOMPLETE FUSION, OVERLAP OR CRACKS WILL BE REJECTED.
- GROUTING
 - SHIM BASE PLATES TO FINISH ELEVATION AND COMPLETELY FILL PLATE AREA WITH A HIGH STRENGTH, NON-FERROUS, NON-SHRINK GROUT.
 - FORMULATE GROUT TO COMPLY WITH THE ASTM C1107.
 - TAPER ALL FINISHED SURFACES AT 45 DEGREE +/-.
- FOUNDATION: DRILLED SHAFT.
- GROUND ALL STRUCTURES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.
- DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.



SHEET 1 OF 4

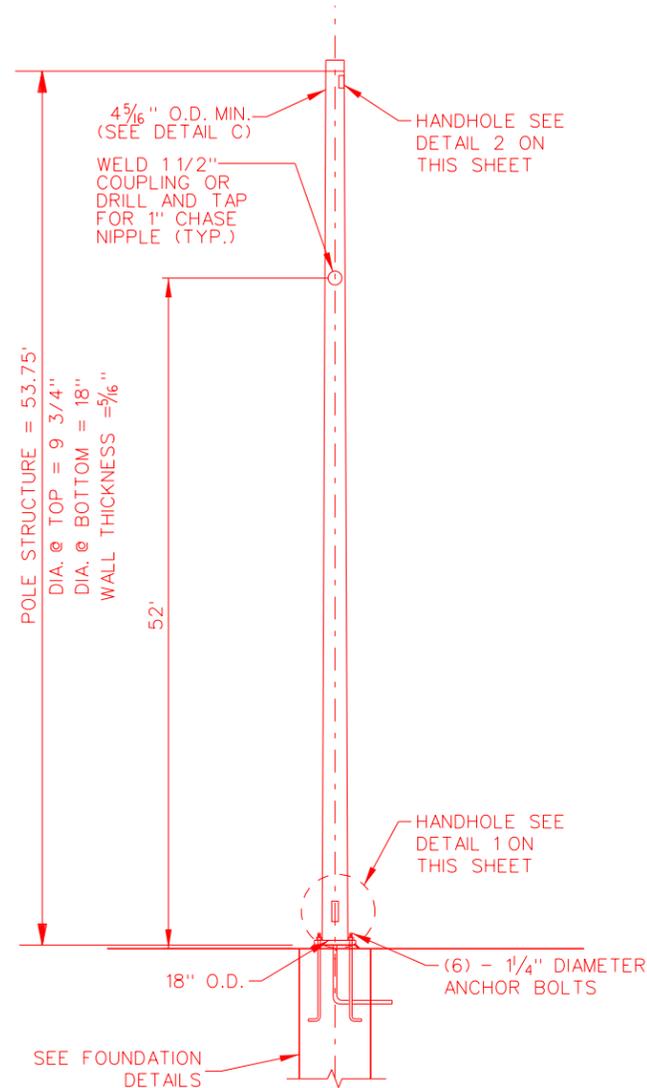
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

55 FOOT ITS POLE

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

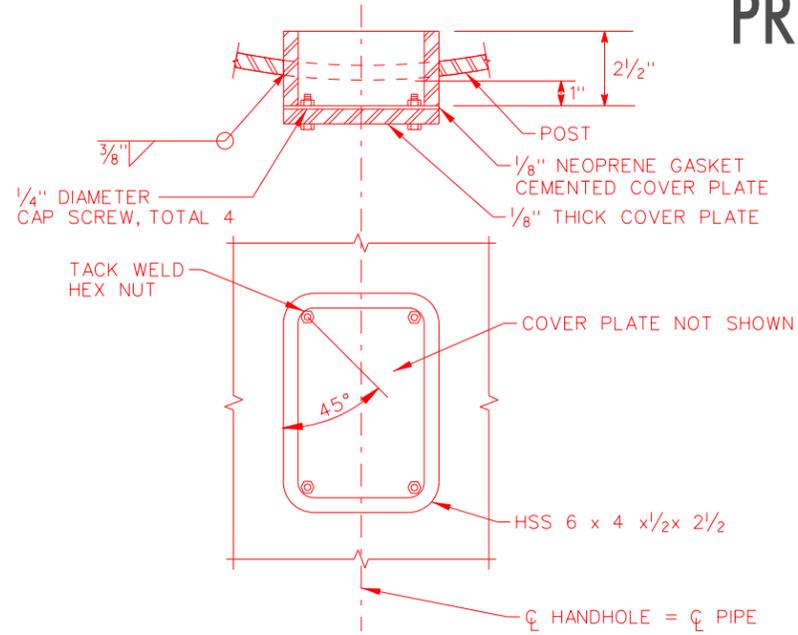
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:09:12 AM

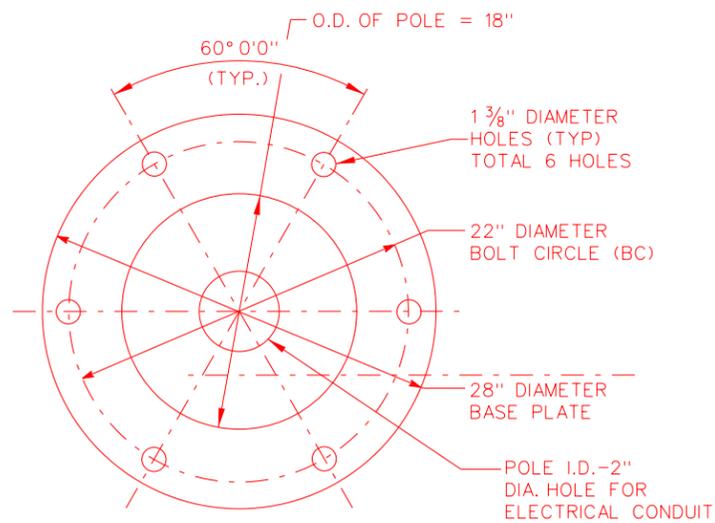


TYPICAL POLE ELEVATION

NTS
(ALL HEIGHTS ARE APPROXIMATE, ADJUST IN FIELD)

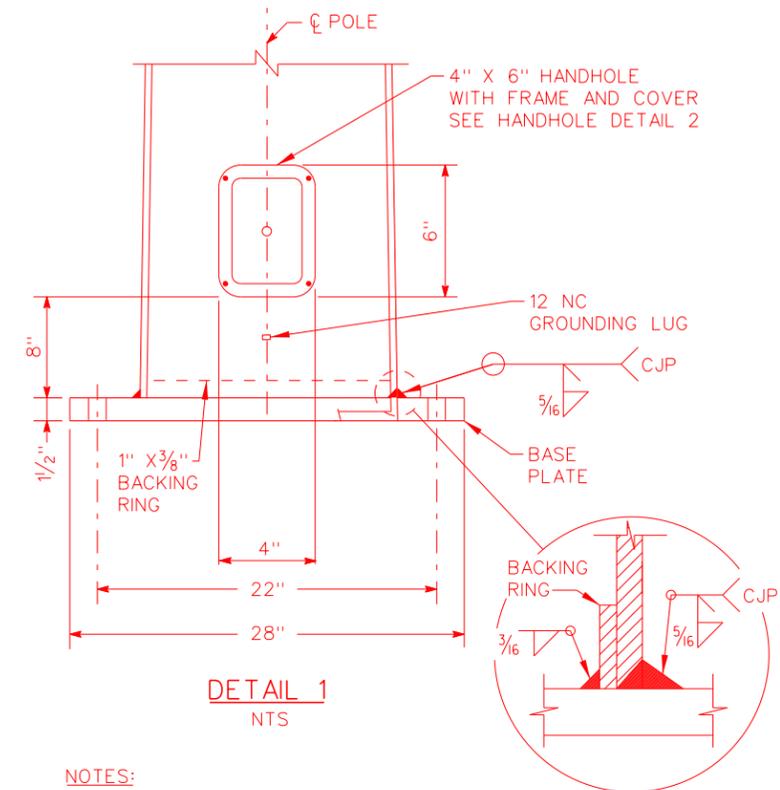


DETAIL 2
NTS



TYPICAL BASE PLATE PLAN

NTS



DETAIL 1
NTS

NOTES:

1. DEVICE MOUNT ASSEMBLIES TO BE INSTALLED AND MOUNTED PER MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.
2. SEE PLAN SHEETS AND NETWORK DIAGRAMS FOR INSTALLATION LOCATIONS AND EQUIPMENT TO BE INSTALLED.
3. INSTALL STEEL RAIN TIGHT REMOVABLE CAP ON TOP OF POLE IF POLE TOP DEVICE IS NOT SPECIFIED IN PLANS.
4. SWEEPS FOR CONDUIT SHALL NOT BE LESS THAN MINIMUM BENDING RADIUS OF FIBER.
5. IF VID IS NOT SPECIFIED IN PLANS, DO NOT INSTALL MAST ARM AND INSTALL STEEL RAIN TIGHT REMOVABLE PLATE OVER MAST ARM CONNECTION.

SHEET 2 OF 4

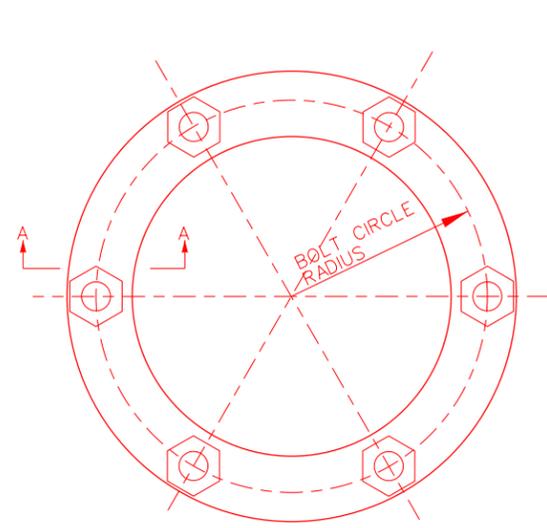
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

55 FOOT ITS POLE

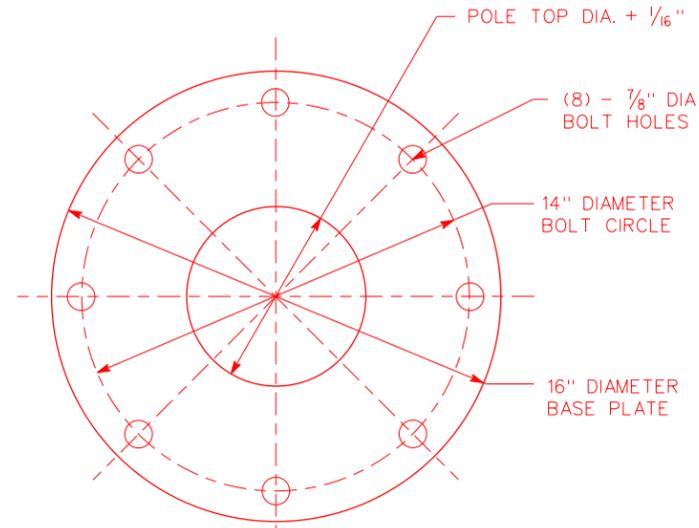
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:09:20 AM

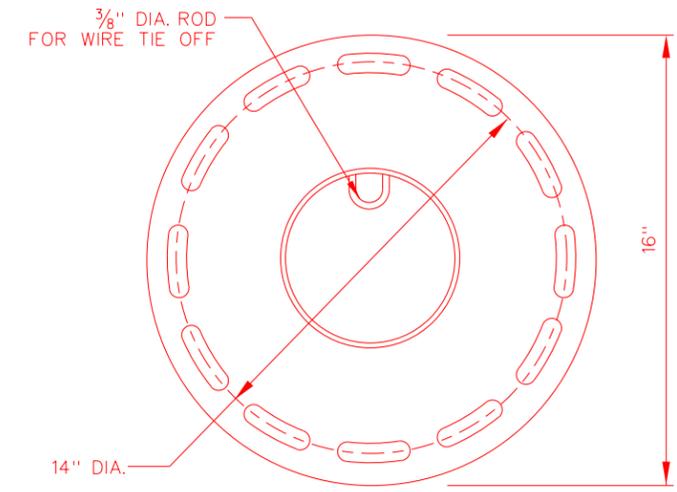
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



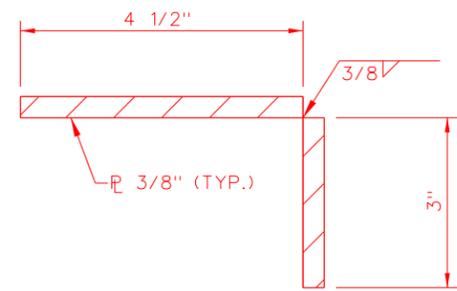
ANCHOR BOLT TEMPLATE



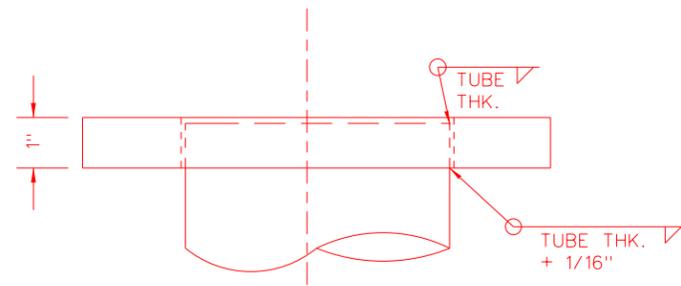
TOP VIEW



TOP VIEW

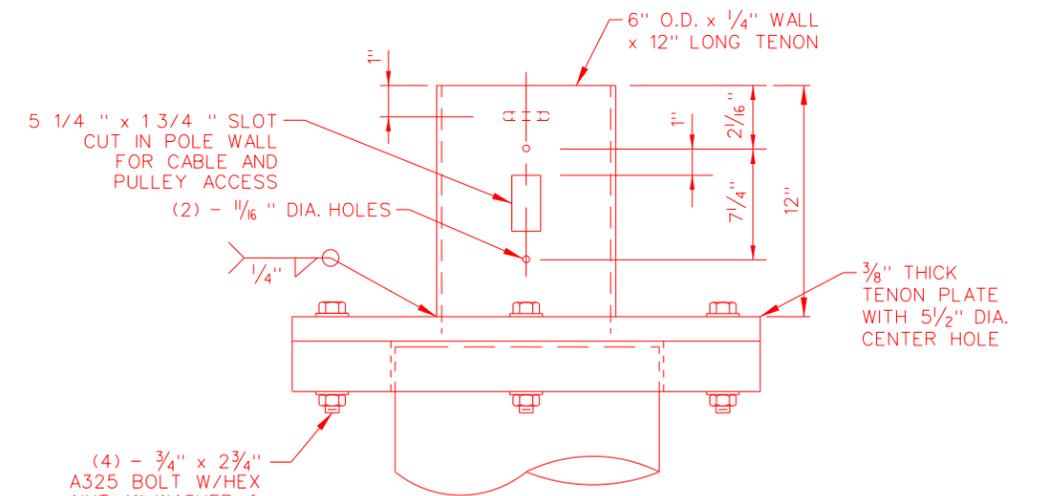


SECTION A-A



SIDE VIEW
TYPICAL CCTV POLE TOP MOUNT PLATE (FOR TENON MOUNT)
SEE DETAIL B

DETAIL A
NTS



SIDE VIEW
TYPICAL TENON DETAIL
(VARIES BY MANUFACTURER)

DETAIL B
NTS

SHEET 3 OF 4

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

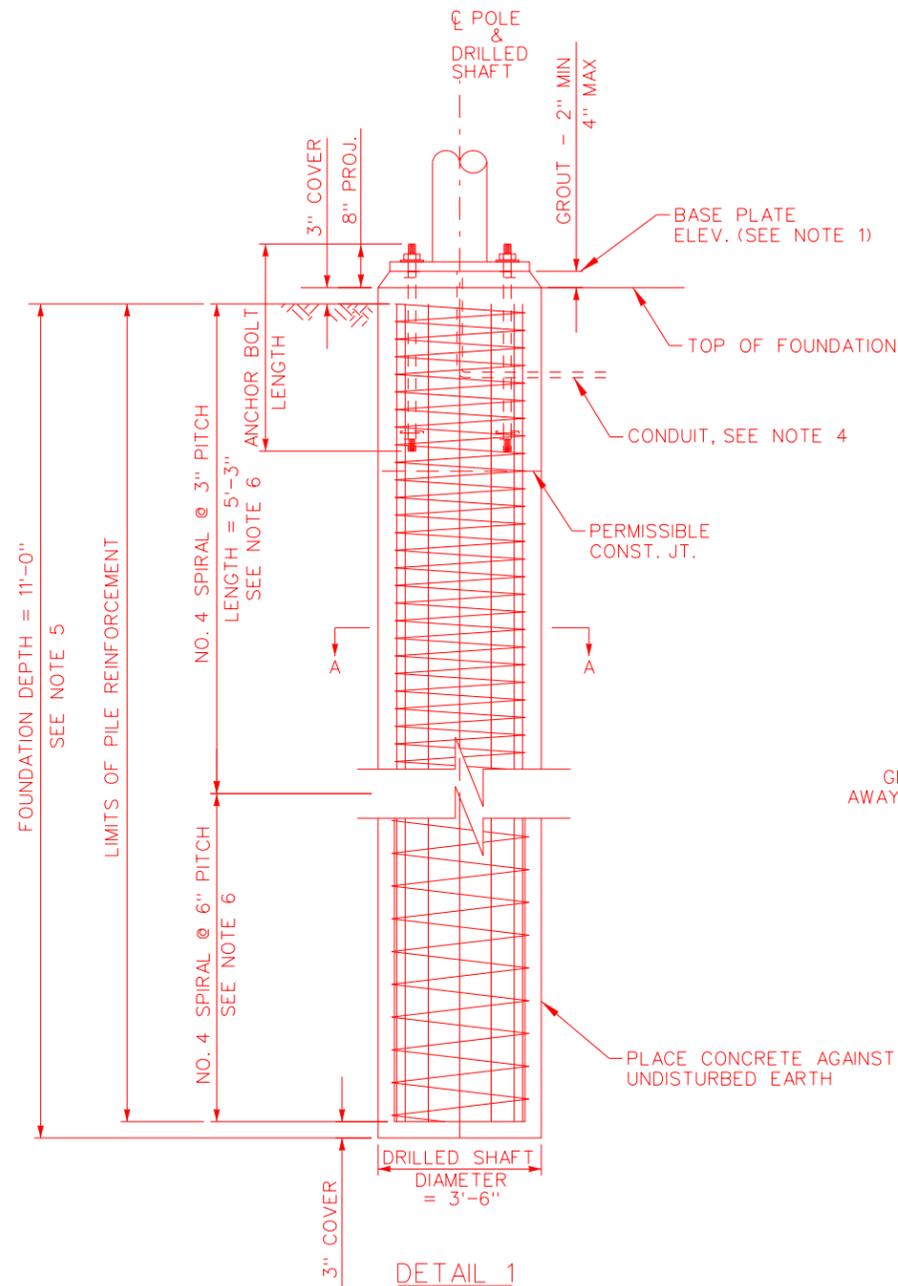
55 FOOT ITS POLE

NOTE:
CONTRACTOR SHALL COORDINATE WITH CCTV LOWERING DEVICE VENDOR FOR LOWERING DEVICE MOUNTING REQUIREMENTS BEFORE CCTV POLE FABRICATION

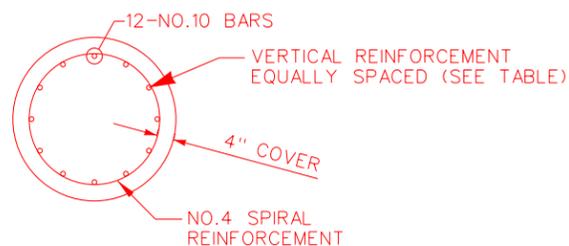
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:09:27 AM

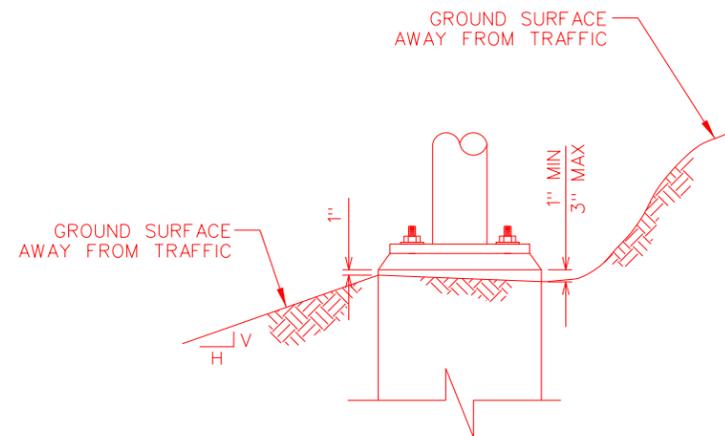
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



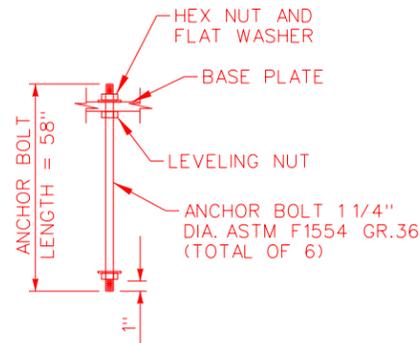
DETAIL 1



SECTION A-A



DETAIL 2



DETAIL 3

ANCHOR BOLT DETAIL
(SEE NOTE 8)

ITS POLE	ANCHOR BOLTS DIA.	ANCHOR BOLT LENGTH	VERTICAL REINFORCING STEEL	DRILLED SHAFT DIAMETER	FOUNDATION DEPTH
55'	1 1/4"	58"	12 - NO. 10	42"	11'

NOTES:

- CONFIRM BASE PLATE ELEVATION WITH ENGINEER PRIOR TO POURING OF FOUNDATION.
- DRILLED SHAFT SHALL BE CONSTRUCTED ACCORDING TO SECTION 509 OF THE STANDARD SPECIFICATIONS.
- PILE SHALL BE FORMED 6" MIN. BELOW GROUND SURFACE. REMAINDER TO BE PLACED AGAINST UNDISTURBED MATERIAL.
- FOR NUMBER AND SIZE OF CONDUIT IN FOUNDATION, SEE ELECTRICAL PLAN SHEETS, UNLESS NOTED OTHERWISE.
- DEPTH OF FOUNDATION (DRILLED SHAFT) WILL BE MEASURED FROM THE LOWEST POINT ON FINISHED GRADE AND LENGTH OF PILE WILL CHANGE ACCORDINGLY.
- TERMINATE NO. 4 SPIRAL REINFORCEMENT WITH 135 DEGREE HOOK AROUND MAIN VERTICAL REINFORCEMENT.
- ALL ANCHOR BOLTS AND NUTS SHALL CONFORM TO THE SPECIFICATIONS ASTM DESIGNATION F1554 GR.55 AND SHALL BE FURNISHED WITH COMMERCIAL QUALITY WASHERS.
- THREAD UPPER 8" OF ANCHOR BOLTS AND GALVANIZE ENTIRE BOLT IN ACCORDANCE WITH ASTM A153 (AASHTO M232).
- BEFORE PLACING THE FOUNDATION, CONTACT THE NDOT GEOTECHNICAL ENGINEERING SECTION FOR FURTHER INVESTIGATION WHEN THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED: (A) SOILS WITH HIGH ORGANIC CONTENT; (B) THE SITE CANNOT SUPPORT THE DRILL RIG; OR (C) FIRM BEDROCK IS ENCOUNTERED.
- BONDING AND GROUNDING SHALL MEET THE NATIONAL ELECTRIC CODE AND NDOT STANDARDS. SEE POLE GROUNDING DETAIL ON NDOT STANDARD PLAN T-30.1.16.
- STRUCTURAL BOLTS AND OTHER STEEL HARDWARE SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153 (AASHTO M232).

SHEET 4 OF 4

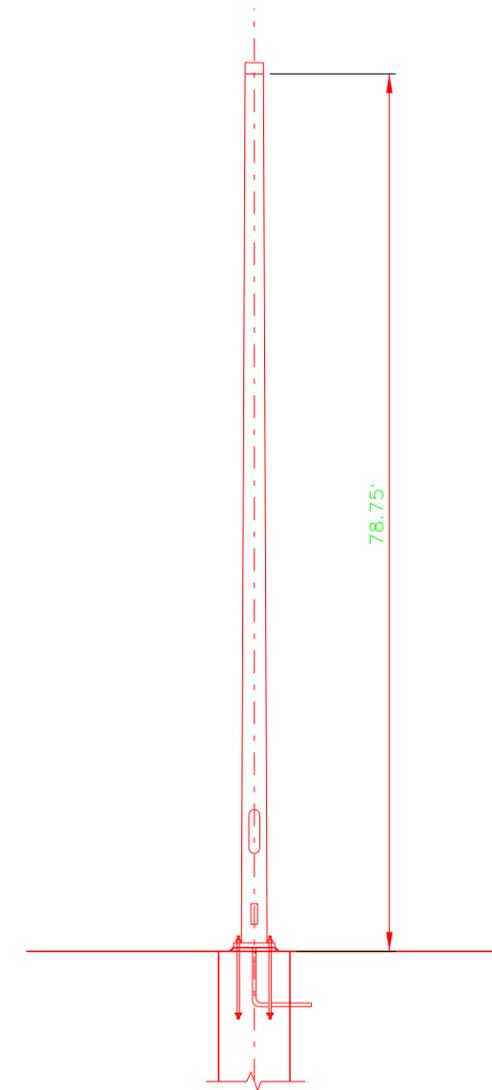
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

55 FOOT ITS POLE

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

GENERAL NOTES:

1. DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 5TH EDITION 2009 WITH 2010 INTERIM REVISIONS.
2. LOADING
 - A. IMPORTANCE FACTORS (If & Ir): 1.0
 - B. DRAG COEFFICIENT (C): 0.45 - 2.0 DEPENDING ON SHAPE OF MEMBER AND WIND VELOCITY
 - C. MAXIMUM WIND LOAD: 23.4 psf * Cd * I
 - D. NATURAL WIND GUSTS: 5.2 psf * Cd * I
 - E. WIND SPEED: 90 MPH
 - F. ICE LOAD: 3 psf
 - G. FATIGUE CATEGORY: I
3. SERVICEABILITY
MAXIMUM 1" DISPLACEMENT FOR 30MPH WIND SPEED.
4. STRUCTURAL STEEL
 - A. POLE MATERIAL IS ASTM A572 GRADE 50 STEEL.
 - B. STEEL TUBING SHALL CONFORM TO ASTM A500, GRADE C.
 - C. HOT DIP GALVANIZE STRUCTURAL STEEL AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.
 - D. HARDWARE SHALL BE GALVANIZED AS PER ASTM A153
5. MATERIAL REQUIREMENTS
 - A. STRUCTURAL STEEL: Fy = 50 ksi
 - B. DRILLED SHAFT: F'c= 4000 psi
 - C. REINFORCING STEEL: ASTM A615 GRADE 60
ALL BENDS AND HOOKS SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 5TH EDITION 2010 ARTICLE 5.10. ALL BEND DIMENSIONS FOR REINFORCING STEEL SHALL BE OUT-TO-OUT OF BARS. ALL PLACEMENT DIMENSIONS FOR REINFORCING STEEL SHALL BE TO CENTER OF BARS UNLESS NOTED OTHERWISE.
6. BOLTED CONNECTIONS.
 - A. ACCOMPLISH ALL STRUCTURAL HIGH STRENGTH BOLTING, EXCEPT ANCHOR BOLTS, USING AASHTO M164 BOLTS.
 - B. USE A HARDENED FLAT WASHER BETWEEN THE NUT AND THE CONNECTED PART.
 - C. USE HIGH STRENGTH BOLTS WITH DTI'S OR TENSION CONTROL INDICATORS INSTALLED PER SUBSECTION 506.03.07 OF THE STANDARD SPECIFICATIONS.
 - D. FABRICATE ANCHOR BOLTS FROM MATERIAL CONFORMING TO ASTM F1554 GRADE 55.
 - E. HOT-DIP GALVANIZE ALL STEEL PARTS IN ACCORDANCE WITH ASTM A153 (AASHTO M232), EXCEPT AS SPECIFIED FOR HIGH STRENGTH BOLTING.
 - F. HIGH STRENGTH BOLTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153, CLASS C, OR MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695, CLASS 50. WASHERS, NUTS, AND BOLTS IN ANY ASSEMBLY SHALL BE GALVANIZED BY THE SAME PROCESS. DTI SHALL BE MECHANICALLY GALVANIZED IN ACCORDANCE WITH ASTM B695. LUBRICATE THREADS WITH A DYED LUBRICANT.
7. WELDED CONNECTIONS
 - A. WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED ON THE PLANS.
 - B. WELD IN ACCORDANCE WITH SECTION 506 OF THE STANDARD SPECIFICATIONS.
 - C. USE ONLY WELDERS QUALIFIED ACCORDING TO ANSI/AASHTO/AWS D1.1-2000, SECTION 4 FOR THE TYPE OF JOINT, ELECTRODE, POSITION OF THE JOINT, AND THE MATERIAL THICKNESS.
 - D. USE ONLY PREQUALIFIED JOINTS.
 - E. TEST ALL FULL PENETRATION GROOVE WELDS ULTRASONICALLY IN ACCORDANCE WITH SECTION 6, PART F OF ANSI/AASHTO/AWS D1.1-2000. ACCEPT OR REJECT EACH WELD DISCONTINUITY ON THE BASIS OF ITS INDICATION RATING AND ITS LENGTH IN ACCORDANCE WITH SECTION 9.3.
 - F. HAVE ALL FILLET WELDS VISUALLY INSPECTED BY QUALIFIED PERSONNEL. ANY WELDS FOUND TO HAVE INCOMPLETE FUSION, OVERLAP OR CRACKS WILL BE REJECTED.
8. GROUTING
 - A. SHIM BASE PLATES TO FINISH ELEVATION AND COMPLETELY FILL PLATE AREA WITH A HIGH STRENGTH, NON-FERROUS, NON-SHRINK GROUT.
 - B. FORMULATE GROUT TO COMPLY WITH THE ASTM C1107.
 - C. TAPER ALL FINISHED SURFACES AT 45 DEGREE +/-.
9. FOUNDATION: DRILLED SHAFT.
10. GROUND ALL STRUCTURES IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES.
11. DIMENSIONS SHALL NOT BE SCALED FROM DRAWINGS.



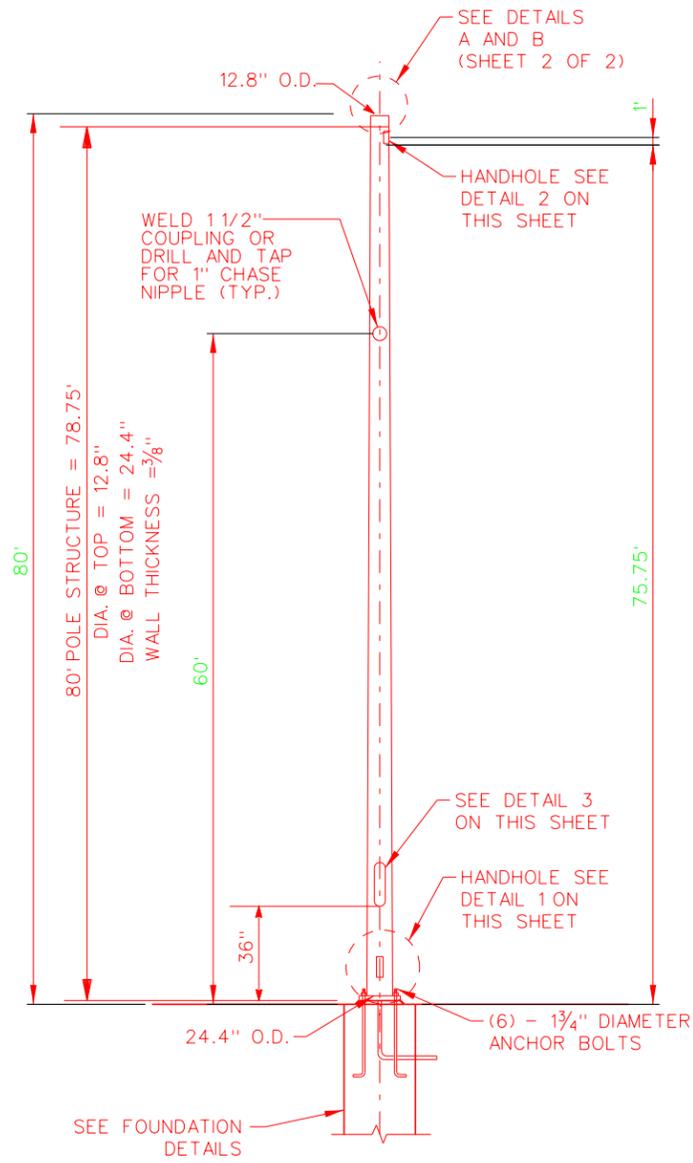
80 FOOT ITS POLE
NTS

SHEET 1 OF 4

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

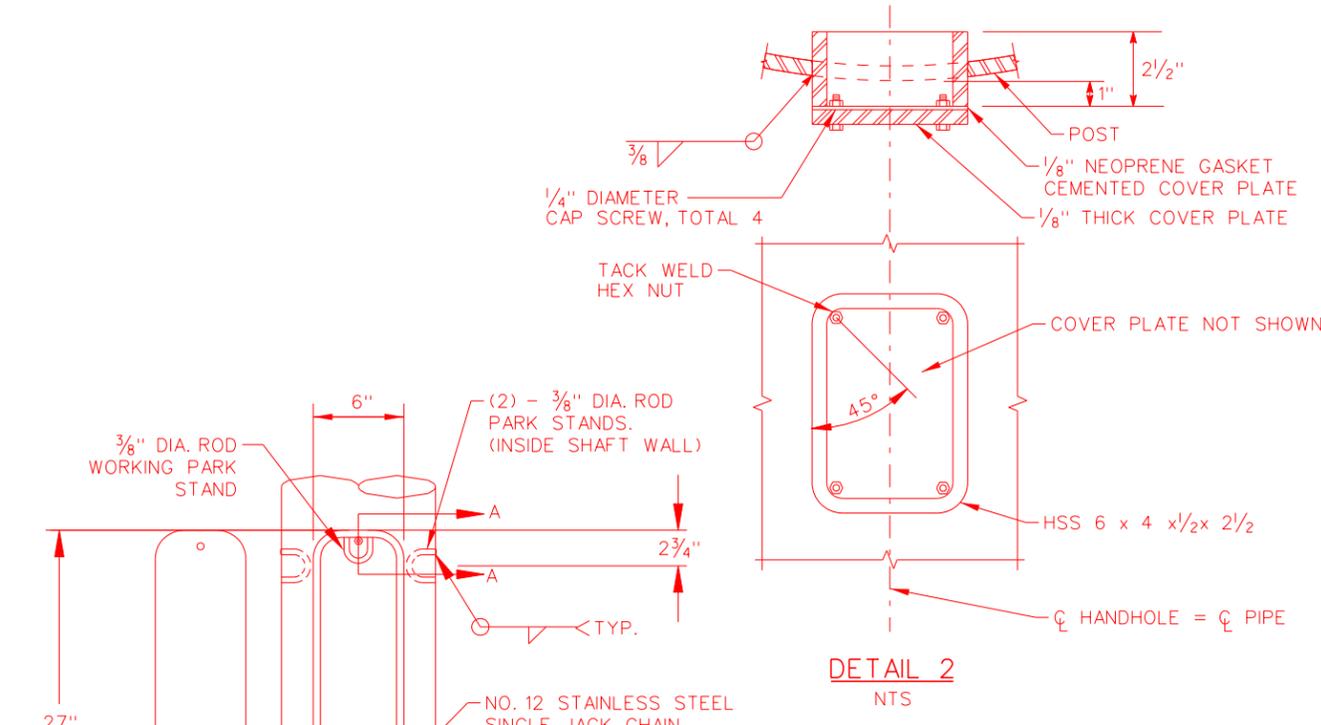
80 FOOT ITS POLE

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			

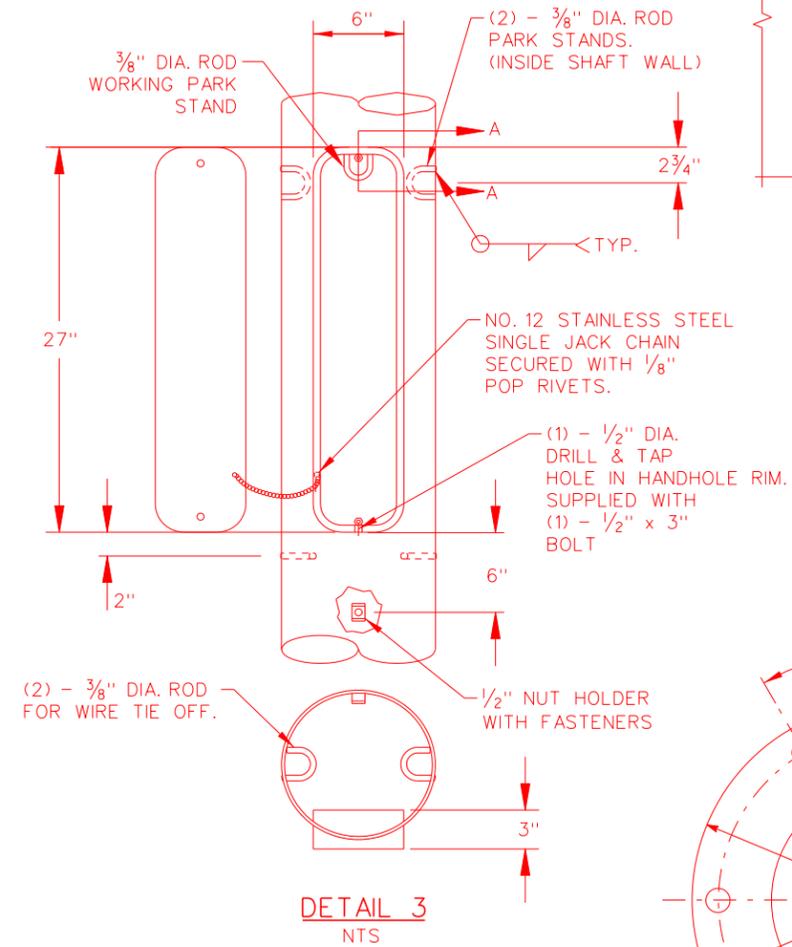


TYPICAL POLE ELEVATION
NTS

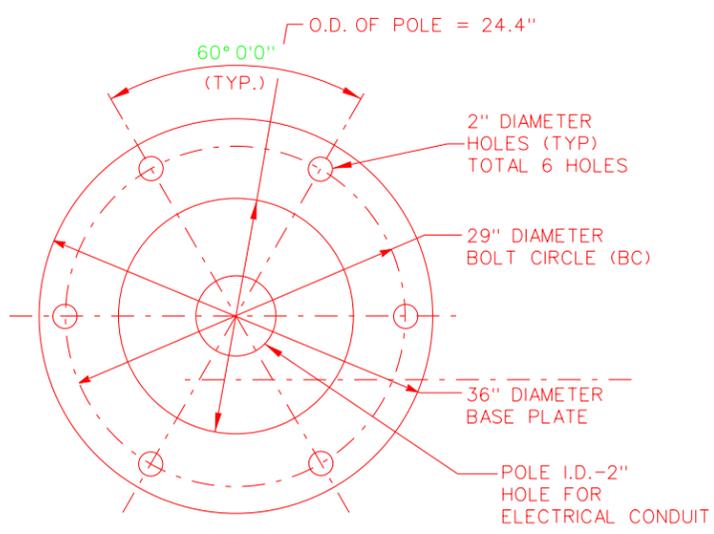
(ALL HEIGHTS ARE APPROXIMATE, ADJUST IN FIELD)



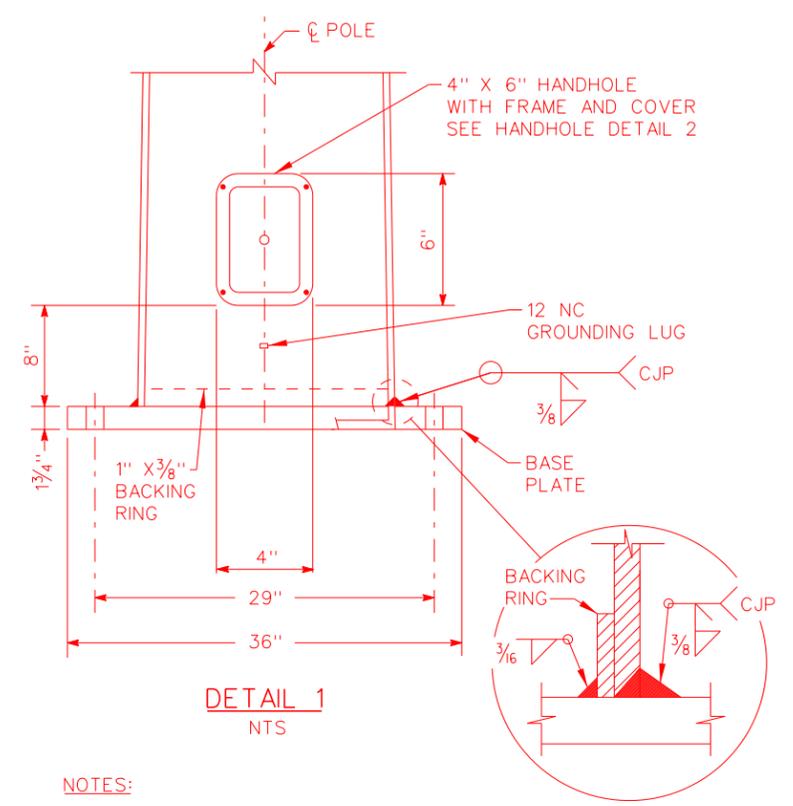
DETAIL 2
NTS



DETAIL 3
NTS



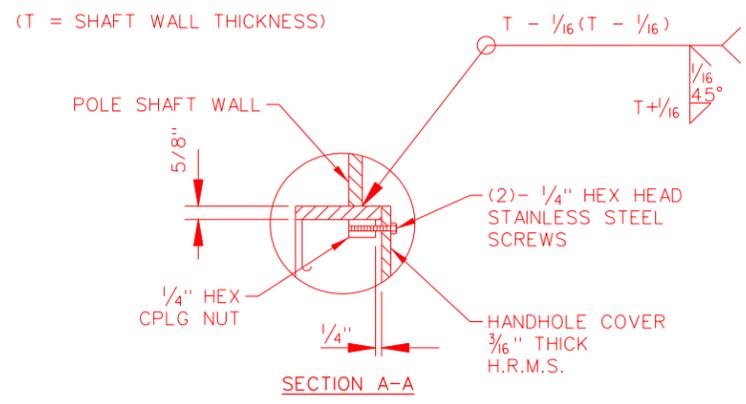
TYPICAL BASE PLATE PLAN
NTS



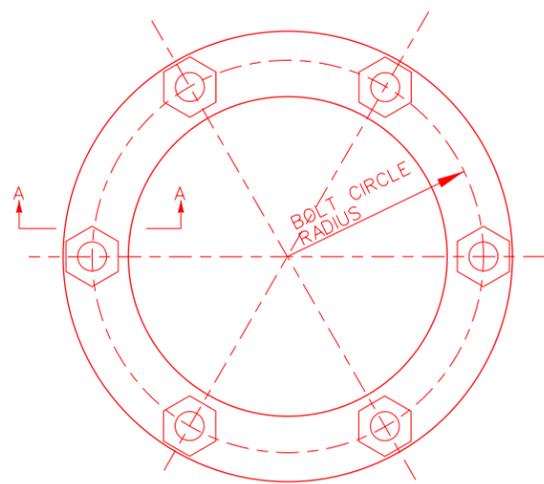
DETAIL 1
NTS

NOTES:

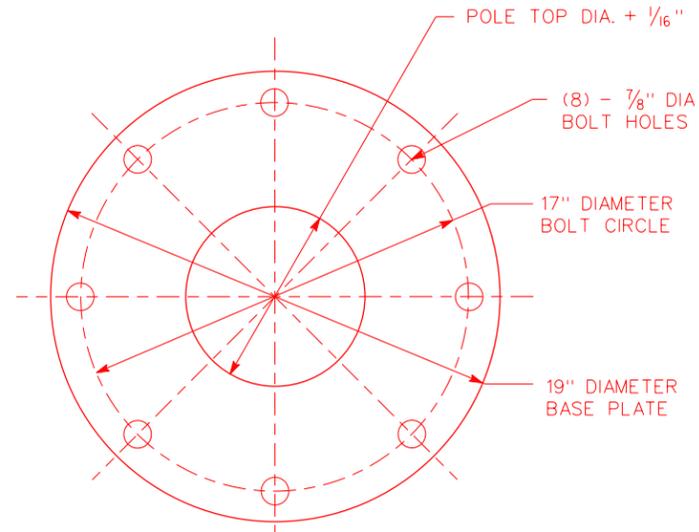
1. DEVICE MOUNT ASSEMBLIES TO BE INSTALLED AND MOUNTED PER MANUFACTURER'S SPECIFICATION AND RECOMMENDATIONS.
2. SEE PLAN SHEETS AND NETWORK DIAGRAMS FOR INSTALLATION LOCATIONS AND EQUIPMENT TO BE INSTALLED.
3. INSTALL STEEL RAIN TIGHT REMOVABLE CAP ON TOP OF POLE IF POLE TOP DEVICE IS NOT SPECIFIED IN PLANS.
4. SWEEPS FOR CONDUIT SHALL NOT BE LESS THAN MINIMUM BENDING RADIUS OF FIBER.



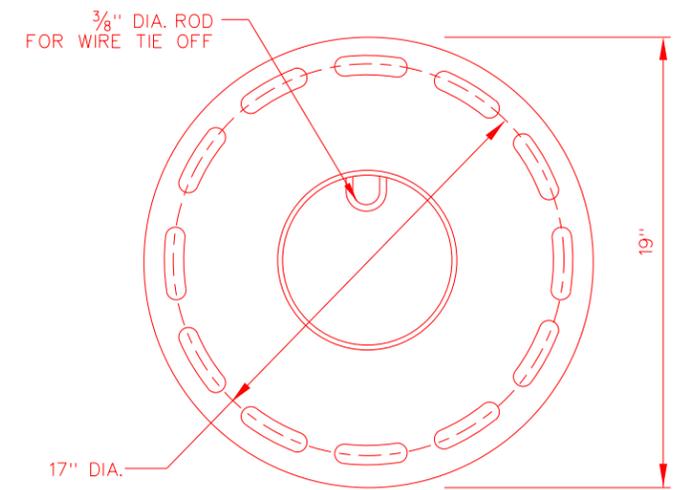
SECTION A-A



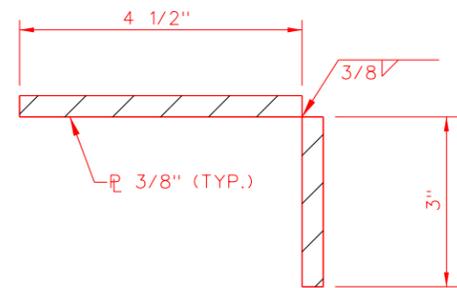
ANCHOR BOLT TEMPLATE



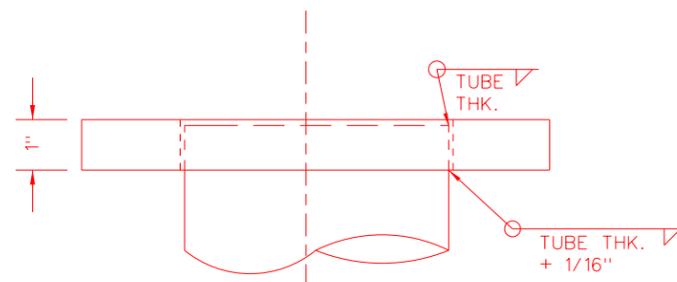
TOP VIEW



TOP VIEW

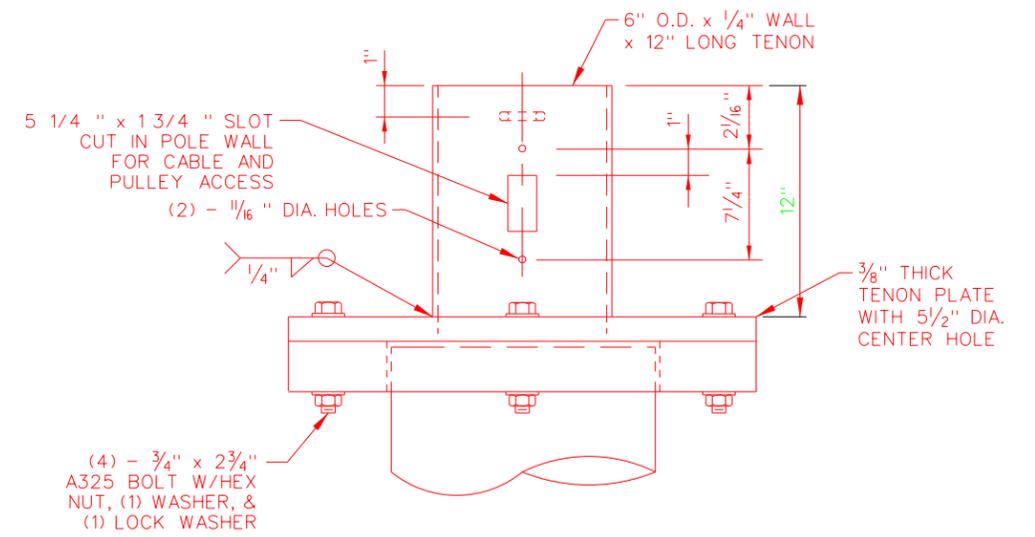


SECTION A-A



SIDE VIEW
TYPICAL CCTV POLE TOP MOUNT PLATE (FOR TENON MOUNT)
SEE DETAIL B

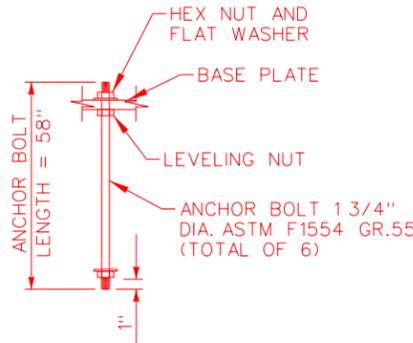
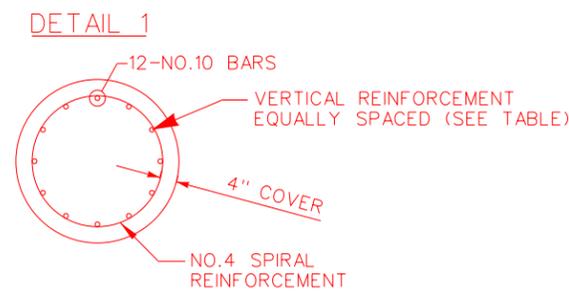
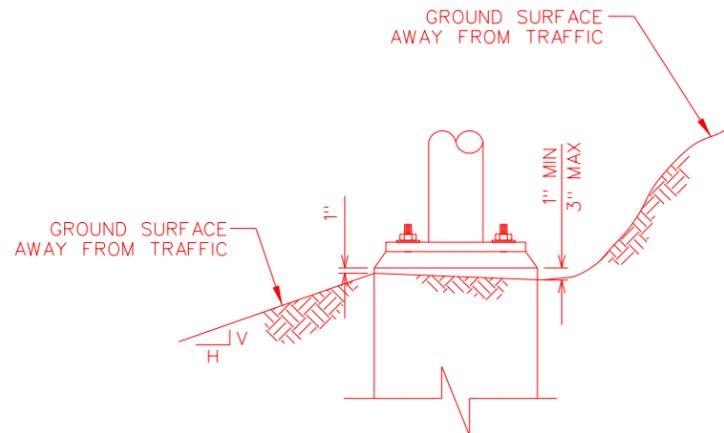
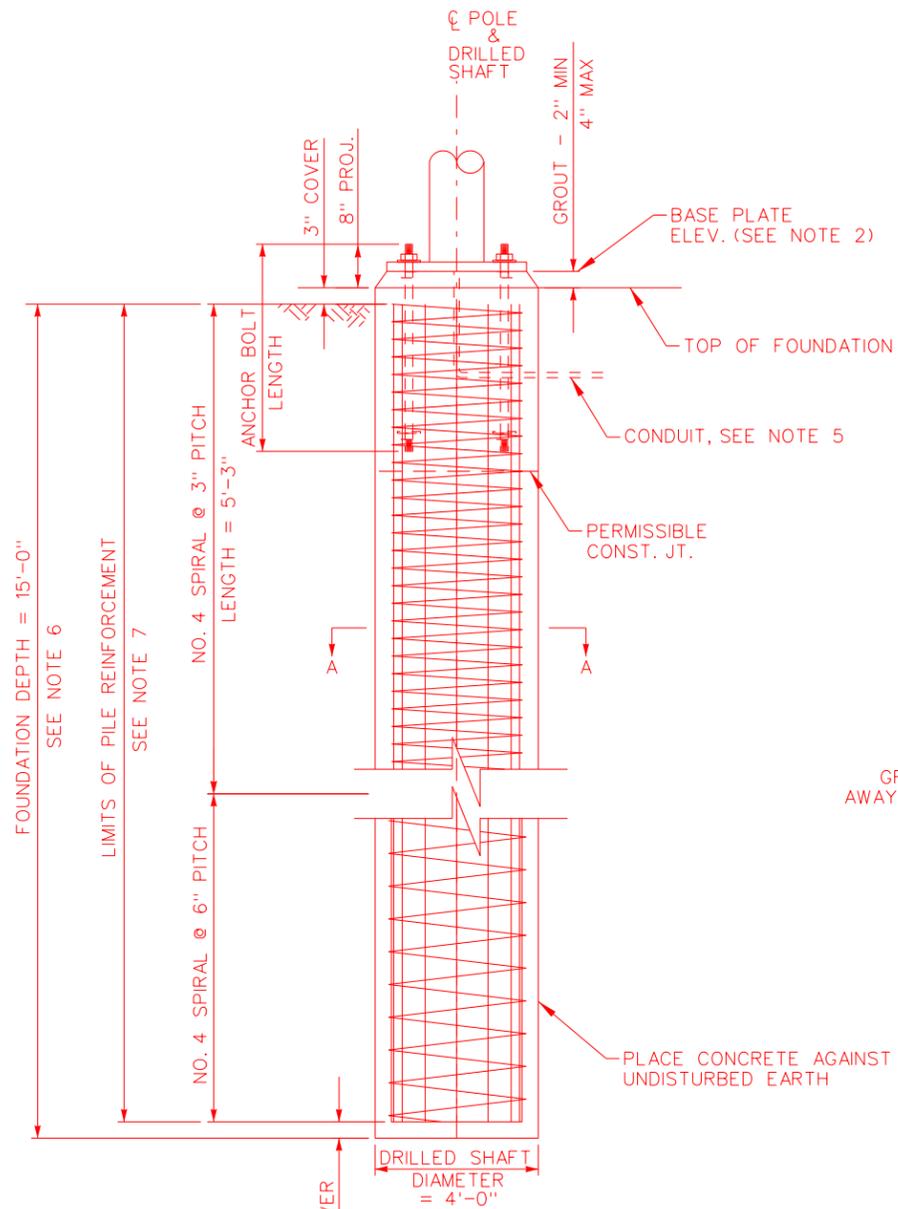
DETAIL A
NTS



SIDE VIEW
TYPICAL TENON DETAIL
(VARIES BY MANUFACTURER)

DETAIL B
NTS

NOTE:
CONTRACTOR SHALL COORDINATE WITH CCTV LOWERING DEVICE VENDOR FOR LOWERING DEVICE MOUNTING REQUIREMENTS BEFORE CCTV POLE FABRICATION



ITS POLE	ANCHOR BOLTS DIA.	ANCHOR BOLT LENGTH	VERTICAL REINFORCING STEEL	DRILLED SHAFT DIAMETER	FOUNDATION DEPTH
80'	1 3/4"	58"	12 - NO. 10	48"	16'

NOTES:

- FOR ANCHOR BOLT LAYOUT, REFER TO POLE MANUFACTURER'S SPECIFICATIONS.
- CONFIRM BASE PLATE ELEVATION WITH ENGINEER PRIOR TO POURING OF FOUNDATION.
- DRILLED SHAFT SHALL BE CONSTRUCTED ACCORDING TO SECTION 509 OF THE STANDARD SPECIFICATIONS.
- PILE SHALL BE FORMED 6" MIN. BELOW GROUND SURFACE. REMAINDER TO BE PLACED AGAINST UNDISTURBED MATERIAL.
- FOR NUMBER AND SIZE OF CONDUIT IN FOUNDATION, SEE ELECTRICAL PLAN SHEETS, UNLESS NOTED OTHERWISE.
- DEPTH OF FOUNDATION (DRILLED SHAFT) WILL BE MEASURED FROM THE LOWEST POINT ON FINISHED GRADE AND LENGTH OF PILE WILL CHANGE ACCORDINGLY.
- TERMINATE NO. 4 SPIRAL REINFORCEMENT WITH 135 DEGREE HOOK AROUND MAIN VERTICAL REINFORCEMENT.
- ALL ANCHOR BOLTS AND NUTS SHALL CONFORM TO THE SPECIFICATIONS ASTM DESIGNATION F1554 GR.55 AND SHALL BE FURNISHED WITH COMMERCIAL QUALITY WASHERS.
- THREAD UPPER 8" OF ANCHOR BOLTS AND GALVANIZE ENTIRE BOLT IN ACCORDANCE WITH ASTM A153 (AASHTO M232).
- BEFORE PLACING THE FOUNDATION, CONTACT THE NDOT GEOTECHNICAL ENGINEERING SECTION FOR FURTHER INVESTIGATION WHEN THE FOLLOWING SOIL CONDITIONS ARE ENCOUNTERED: (A) SOILS WITH HIGH ORGANIC CONTENT; (B) THE SITE CANNOT SUPPORT THE DRILL RIG; OR (C) FIRM BEDROCK IS ENCOUNTERED.
- BONDING AND GROUNDING SHALL MEET THE NATIONAL ELECTRIC CODE AND NDOT STANDARDS. SEE POLE GROUNDING DETAIL ON NDOT STANDARD PLAN T-30.1.16.
- STRUCTURAL BOLTS AND OTHER STEEL HARDWARE SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153 (AASHTO M232).

SHEET 4 OF 4

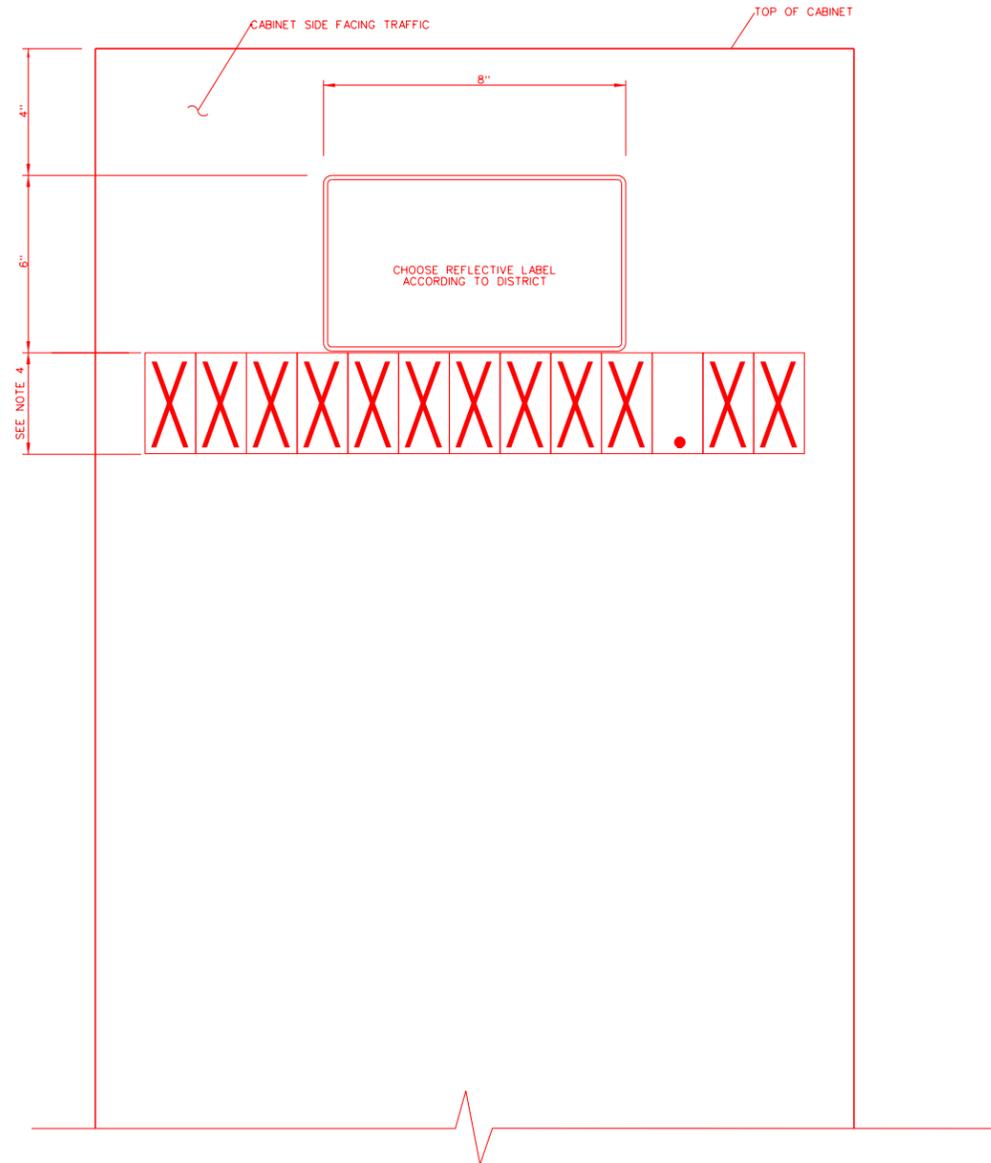
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

80 FOOT ITS POLE

PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:10:33 AM

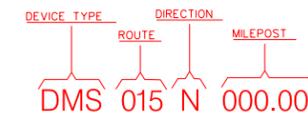
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



CABINET IDENTIFICATION CODE DETAIL
NTS

NOTES:

1. ALL CABINETS SHALL HAVE A THIRTEEN-DIGIT IDENTIFICATION CODE. IDENTIFICATION PLATE AND IDENTIFICATION PLATE INSTALLATION ARE INCIDENTAL TO CABINET INSTALLATION.
2. SEE PLAN SHEETS FOR CABINET IDENTIFICATION CODE. LETTERS AND NUMBERS SHALL BE PLACED IN SUCH A MANNER THAT THE ENTIRE IDENTIFICATION CODE IS CENTERED HORIZONTALLY ON THE SIDE OF THE CABINET FACING TRAFFIC.
3. INSTALL ADHESIVE BACKED NDOT OR FAST LABEL CENTERED HORIZONTALLY ABOVE CABINET IDENTIFICATION CODE. LABEL PROVIDED TO CONTRACTOR BY NDOT OR FAST.
4. ADHESIVE BACKED BLACK LETTERS WITH WHITE REFLECTIVE BACKGROUND FHWA SERIES C LETTERS CENTERED ON CABINET SIDE FACING TRAFFIC.
 - 2" LETTERS FOR DETECTORS, CCTV AND RAMP METER CABINETS
 - 1 1/2" LETTERS FOR POLE MOUNTED DMS AND TRAILBLAZER CABINETS



EXAMPLE:

POSSIBLE DEVICE TYPES

- DMS = Dynamic Message Sign
- CTV = Closed Circuit Television
- DET = Detector station (regardless of type of detection)
- HAR = Highway Advisory Radio
- CAB = Controller Cabinet (any type of Cabinet)
- RWS = Road Weather Information System
- RMP = Ramp Meter
- SVS = Service drop location (Metered Service)

- Possible Routes
- 015 = Interstate 15
 - 215 = Interstate 215
 - 515 = Interstate 515 (US 95 in some areas)
 - 095 = US 95 (in most areas, not in area with I-515 designation)
 - 587 = State Routes

- Possible Directions
- N = Northbound Roadway
 - S = Southbound Roadway
 - E = Eastbound Roadway
 - W = Westbound Roadway

- Possible Milepost
- Mileposts should be calculated to the nearest Hundreth of a mile. Use 5 digits with decimal point.
- Example
123.45 = milepost 123.45

Exception to the above address system

- 1) Use actual street address (RWS123FIRST) limited to 10 characters
- 2) Use intersection names (RWS123456) limited to 10 characters

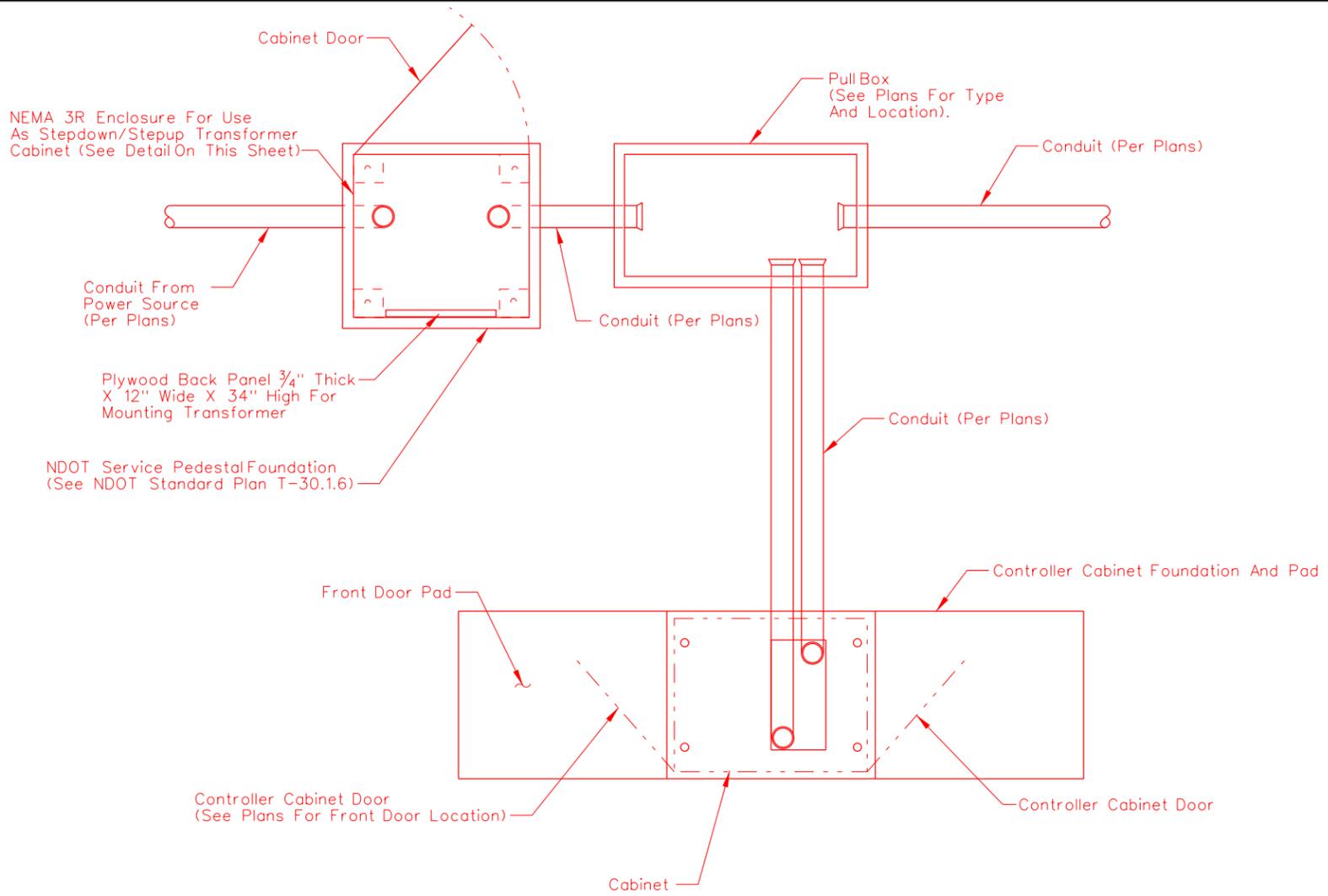
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

ITS CABINET LABELING

PRELIMINARY

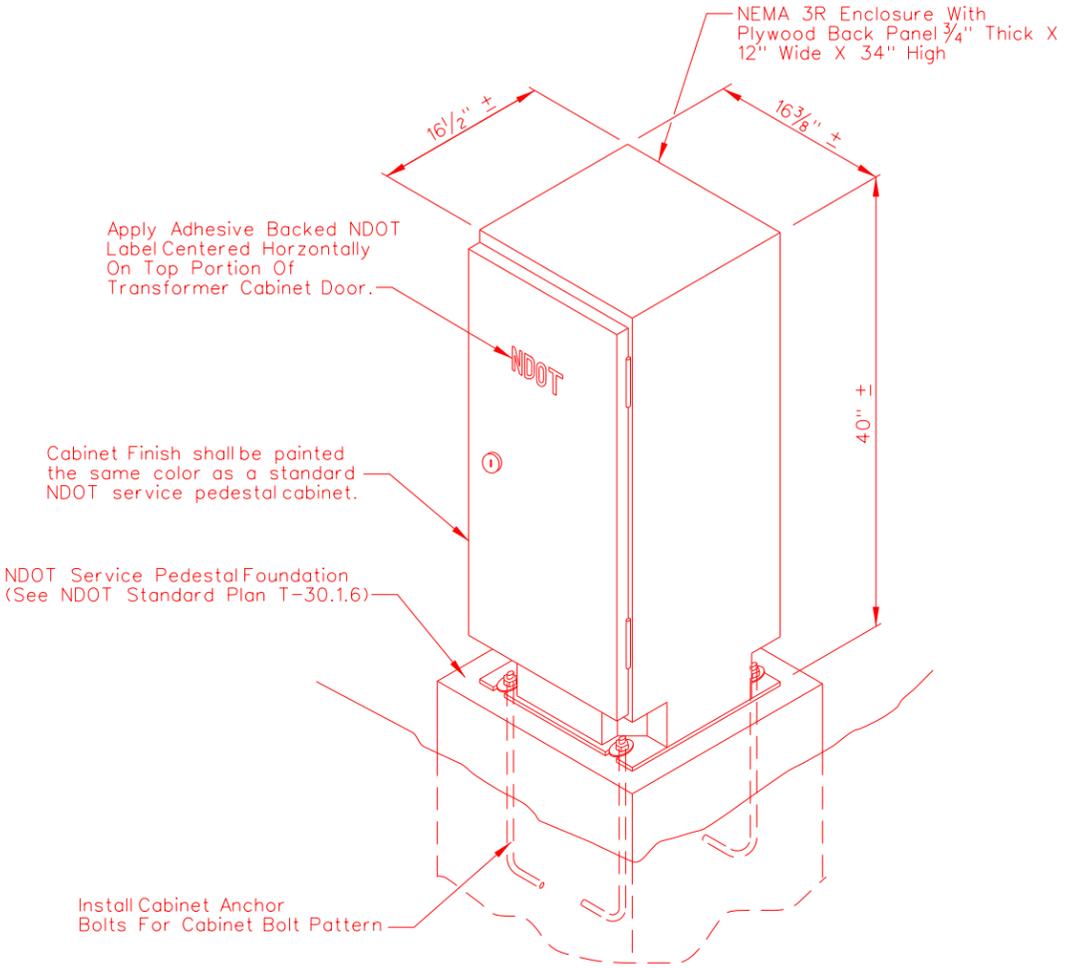
SUBJECT TO REVISION
2/3/2015 9:11:48 AM

STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



TYPICAL POWER CONDUIT CONFIGURATION DETAIL FOR TRANSFORMER CABINET INSTALLATION

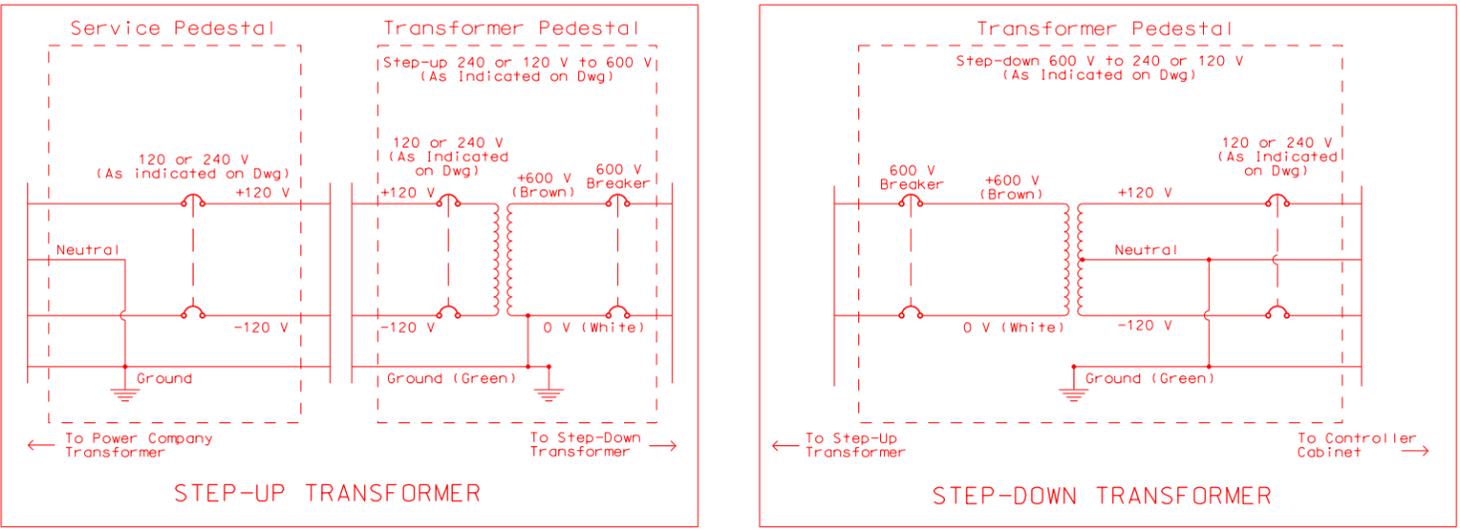
NTS



TYPICAL TRANSFORMER CABINET DETAIL ISOMETRIC VIEW

NTS

- NOTES:**
- SEE PLANS FOR ADDITIONAL CONDUITS NOT RELATED TO TRANSFORMER SYSTEM.



TRANSFORMER WIRING DETAILS

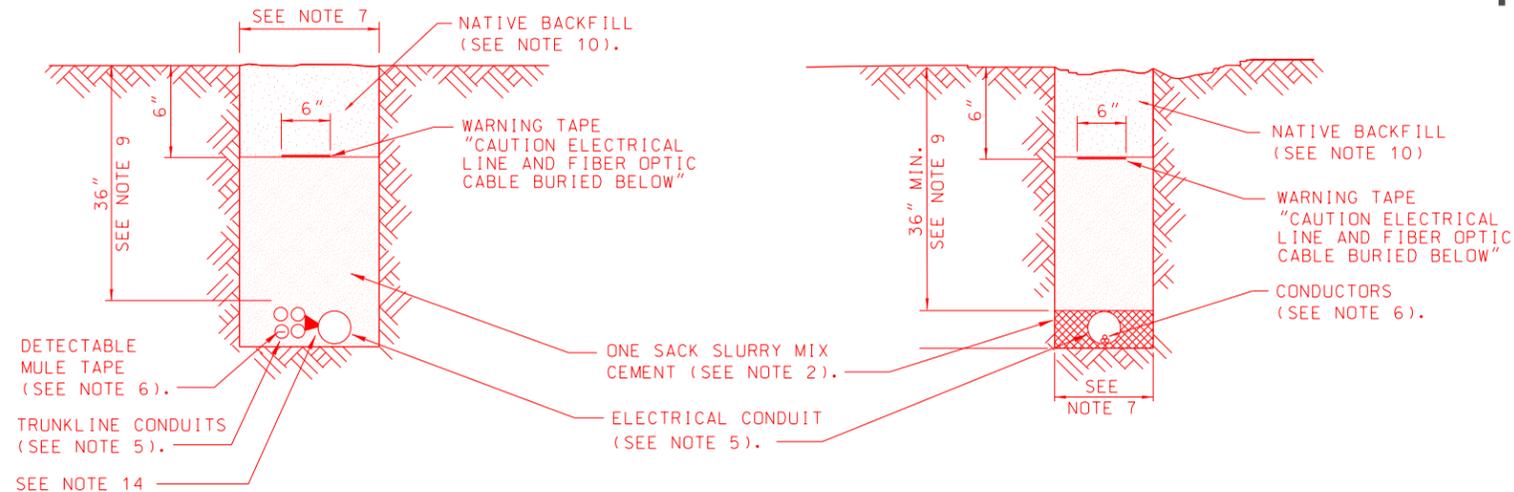
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

TYPICAL TRANSFORMER CABINET AND FOUNDATION

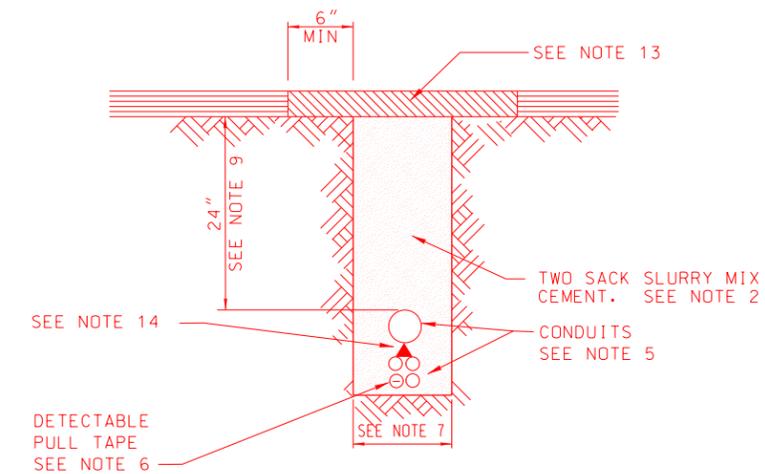
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:07:42 AM

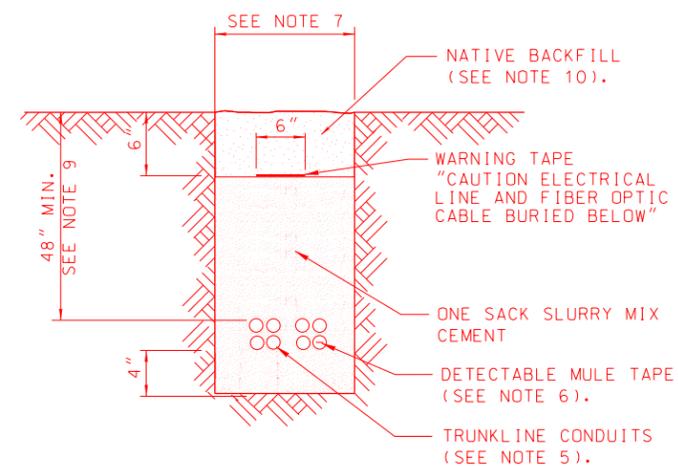
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



TYPICAL UNPAVED TRENCHES
NTS

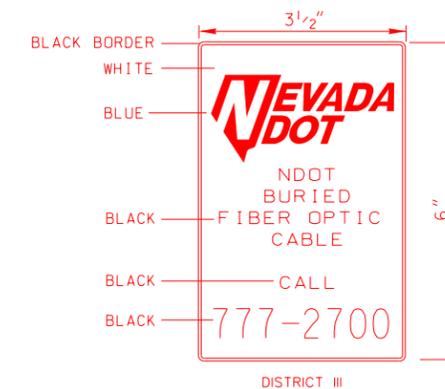
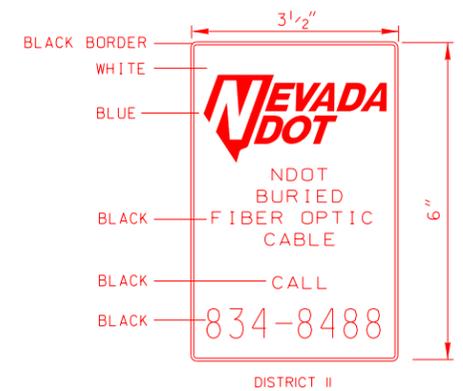
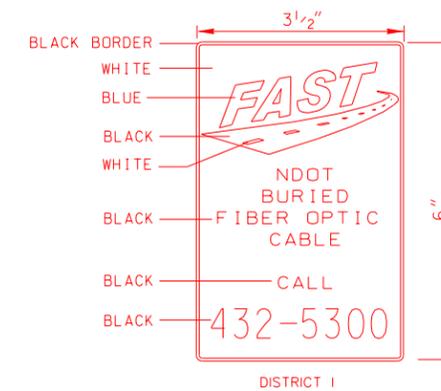


TYPICAL PAVED TRENCHES
SEE NDOT STANDARD T-30.1.2.1
NTS



TYPICAL UNPAVED FAST CONDUIT TRENCH
NTS

FIBER OPTIC CONDUIT MARKER STICKER
NTS



FIBER OPTIC CONDUIT MARKERS:

- NDOT APPROVED FIBER OPTIC MARKERS SHALL BE INSTALLED ALONG FIBER OPTIC CONDUIT RUNS AT:
- EACH SIDE OF ROAD CROSSINGS
 - CONDUIT TURN POINTS
 - AS NEEDED TO SEE FROM ONE MARKER TO ANOTHER OR AT 500 FEET SPACING
 - AT BURIED PULL BOX LOCATIONS

REFLECTIVE SHEETING FIBER OPTIC MARKER STICKERS SHALL BE INSTALLED ON FLEXIBLE GUIDE MARKERS. FLEXIBLE GUIDE MARKERS SHALL BE APPROXIMATELY 4in. WIDE AND 66in. IN HEIGHT, WITH A 18in. INSTALLATION DEPTH. EACH MARKER SHALL BE ORANGE IN COLOR AND HAVE 3in. X 12in. REFLECTIVE SHEETING AT THE TOP OF EACH SIDE OF THE MARKER. REFLECTIVE SHEETING SHALL MEET NDOT SECTION 716 REQUIREMENTS. EACH MARKER AND STICKER SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR SHALL CONTACT NDOT FOR THE PHONE NUMBER TO BE SHOWN ON STICKER. A LAYOUT OF THE STICKER SHALL BE PROVIDED TO NDOT FOR APPROVAL. STICKERS, MARKERS AND INSTALLATION SHALL BE INCLUDED IN THE UNIT PRICE FOR THE INSTALLATION OF CONDUIT.

TYPICAL FIBER OPTIC CONDUIT MARKER DETAILS
NTS

NOTES:

1. THE TRENCH BOTTOM SHALL BE SMOOTH, FLAT AND WITHOUT SURFACE IRREGULARITIES; OTHERWISE, A SUFFICIENT AMOUNT OF BEDDING MATERIAL SHALL BE PLACED TO PROVIDE THE REQUIRED SURFACE.
2. SLURRY MIX CEMENT SHALL BE FLOWABLE.
3. ALL TRENCHES BETWEEN METER AND POWER SERVICES MUST BE APPROVED BY A UTILITY COMPANY CUSTOMER REPRESENTATIVE. ALL DIMENSIONS ARE MINIMUM. CONTRACTOR TO CONTACT NEVADA ENERGY OR CALL BEFORE YOU DIG AT 800-227-2600.
4. CONDUIT COUPLINGS SHALL BE STAGGERED.
5. CONDUIT SIZE AND NUMBER MAY VARY. MULTIPLE CONDUITS SHALL BE BANDED OR TAPED AT 10 FEET INTERVALS. SEE PLANS FOR NUMBER, SIZE AND TYPE OF CONDUITS.
6. DETECTABLE PULL TAPE SHALL BE INSTALLED INSIDE ALL CONDUITS.
7. TOTAL TRENCH WIDTH SHALL BE 6 inches WIDER THAN THE SUM OF OUTSIDE DIAMETERS OF CONDUIT(S) INSTALLED (3.0 inches EACH SIDE OF CONDUITS) UNLESS LESS WIDTH IS APPROVED BY ENGINEER. CONDUIT(S) SHALL BE CENTERED IN TRENCH. SEE PLANS FOR NUMBER AND SIZE.
8. COORDINATE WITH "CALL BEFORE YOU DIG" AND THE NDOT DISTRICT OFFICE TO LOCATE ALL EXISTING UTILITIES PRIOR TO DIGGING.
9. TRENCH DEPTHS AND CONDUIT COVER ARE TO BE MEASURED FROM FINAL GRADE.
10. NATIVE BACKFILL SHALL NOT CONTAIN ROCKS LARGER THAN 3in.
11. ALL SPOIL MATERIALS SHALL BE REMOVED OFFSITE BY THE CONTRACTOR ACCORDING TO NDOT STANDARD SPECIFICATION SECTION 107.14.
12. RETURN DISTURBED AREA TO MATCH EXISTING GRADE.
13. FOR PAVED TRENCHES, REMOVE AND REPLACE EXISTING SURFACE. NEW SURFACE MATERIAL SHALL MEET NDOT OR THE RESPECTIVE AGENCY REQUIREMENTS WHERE WORK IS BEING PERFORMED AND BE FROM AN APPROVED COMMERCIAL SOURCE. THIS WORK SHALL BE INCLUDED IN CONDUIT BID ITEM.
14. USE CONDUIT SPACERS TO SEPARATE POWER CONDUITS FROM COMMUNICATION CONDUITS IN TRENCH BY AT LEAST 1in. PLACE SPACERS AT INTERVALS OF A MAXIMUM 5 FEET.
15. INSTALL ALL CONDUIT PER JURISDICTION STANDARDS AND SPECIFICATIONS FOR CONSTRUCTION OUTSIDE FREEWAY RIGHT-OF-WAY.

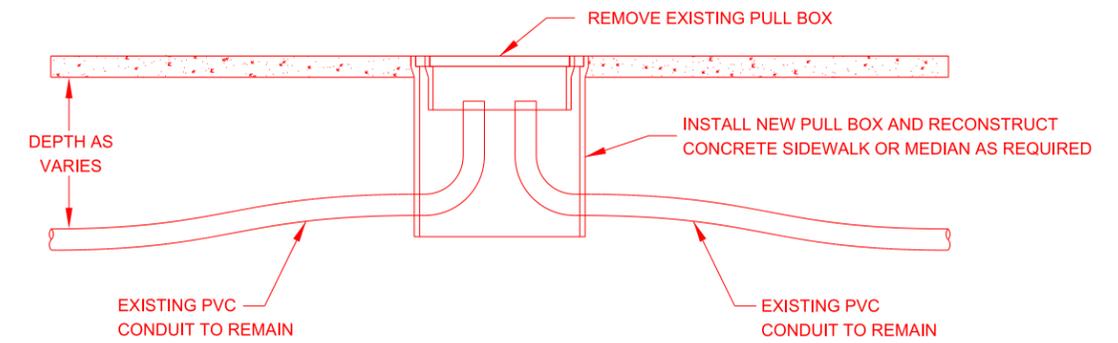
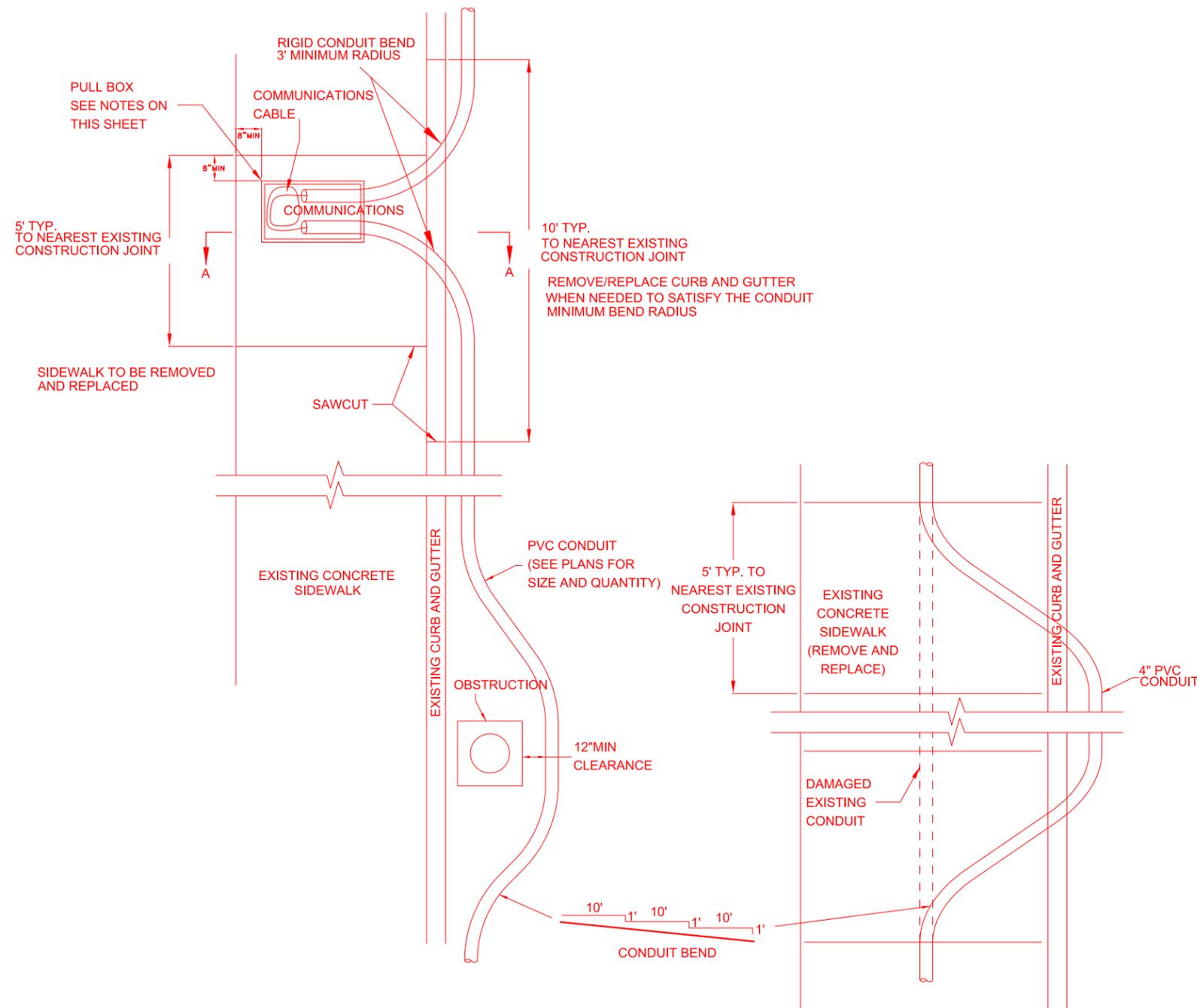
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CONDUIT TRENCH
PAVED AND UNPAVED
AREAS ITS DETAIL

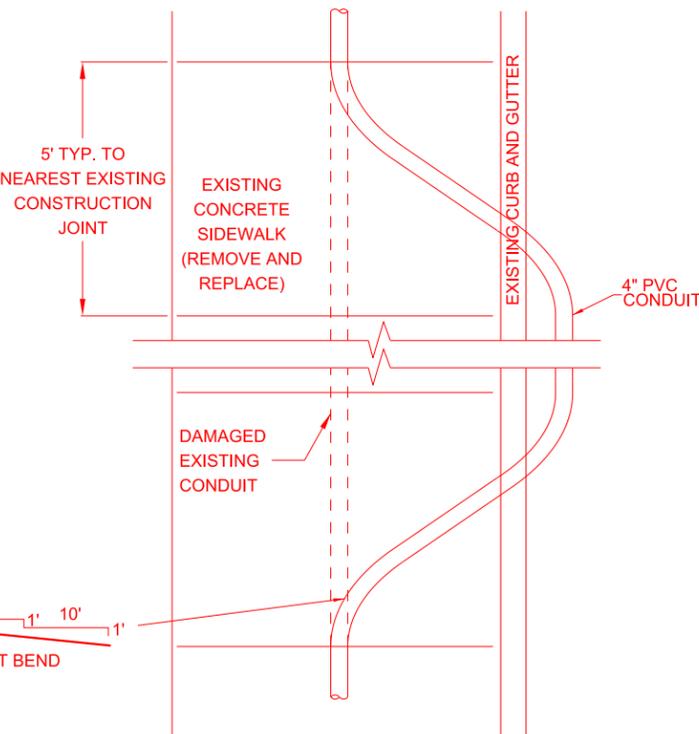
PRELIMINARY

SUBJECT TO REVISION
2/3/2015 9:07:29 AM

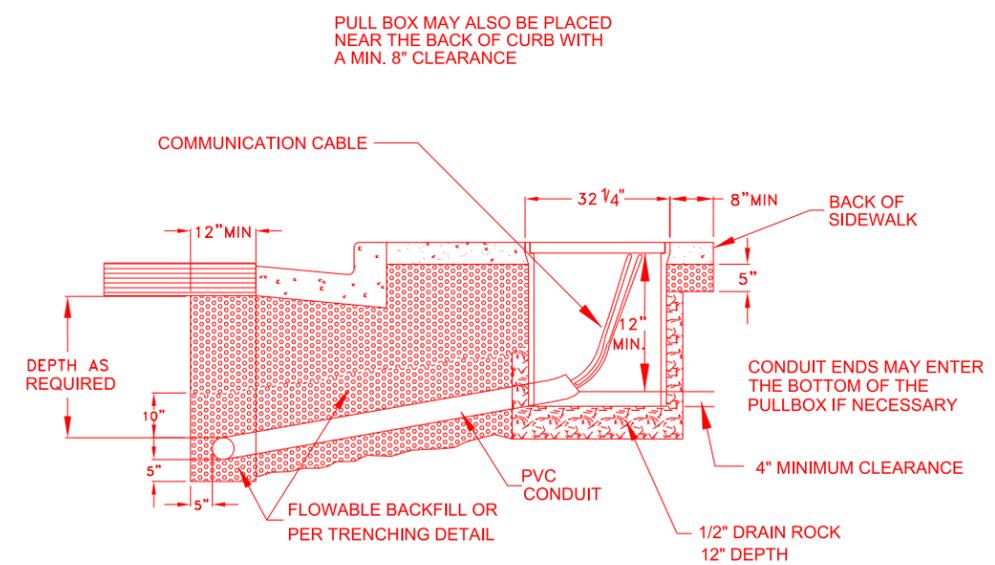
STATE	PROJECT NO.	COUNTY	SHEET NO.
NEVADA			



PULL BOX REPLACEMENT DETAIL



CONDUIT AND PULL BOX DETAIL (FOR EXISTING CURB & GUTTER)



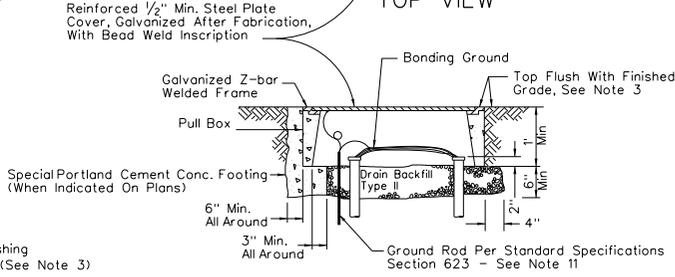
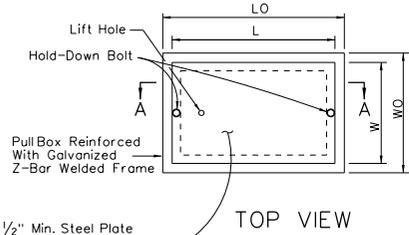
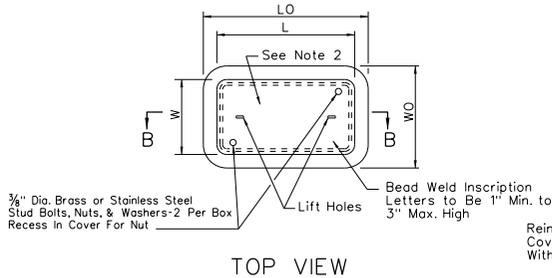
SECTION A-A

NOTES:

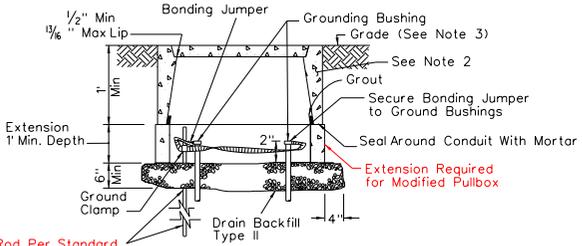
- 1 PULL BOX SHALL BE INSTALLED FOR THE COMMUNICATIONS PER APPLICABLE STANDARDS.
- 2 PULL BOX COVER SHALL BE INSCRIBED AS INDICATED ON PLANS.
- 3 APPROXIMATE LOCATIONS OF THE PROPOSED COMMUNICATION PULL BOXES ARE SHOWN ON THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MARKING THE LOCATIONS OF THE PROPOSED COMMUNICATION PULL BOXES IN THE FIELD PER STANDARD STANDARD SPECIFICATION INTERVALS AND THESE LOCATIONS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER BEFORE INSTALLATION.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

CONDUIT AND PULL BOX DETAIL (FOR EXISTING CURB & GUTTER)



SECTION A-A
PULL BOX
No. 3 1/2, No. 5, No. 7 & No. 9



SECTION B-B
MODIFIED PULL BOX
No. 3 1/2, No. 5, No. 7

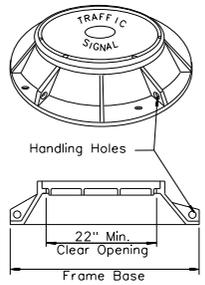
*FOR MODIFIED NO. 9, SEE SHEET M-1.13.1.

Pull Box	CONCRETE BOX		NON-PCC BOX		CONCRETE OR NON-PCC COVERS					
	Minimum Depth Box and Extension	LO	WO	Minimum ** Thickness	Minimum Depth Box and Extension	L**	W**	R	Edge Thickness	Edge Taper
No. 3/2	No Extension	20"	14"	5/8"	No Extension	15 1/2"	10 1/4"	1"	2"	1/8"
No. 5	22 1/4"	28"	18"	5/8"	20"	23 3/4"	13 3/4"	1"	2"	1/8"
No. 7	24"	36"	23"	3/8"	20"	30 3/4"	17 3/4"	1"	2"	1/8"

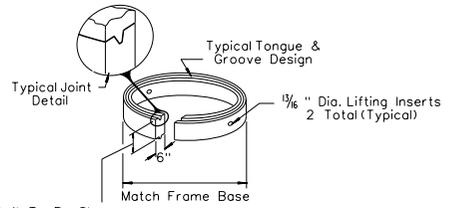
** Top dimension

Pull Box	CONCRETE BOX		STEEL COVER			EXTENSION
	LO	WO	Height	L**	W**	
No. 3/2	19"+	12"+	12"+	14 1/2"+	8 3/4"+	None
No. 5	25"+	15"+	12"+	20 1/2"+	10 1/2"+	None
No. 7	35"+	22"+	12"+	30"+	17"+	None
No. 9	52"+	35"+	14"+	47 3/4"+	30"+	None

** Top Dimension
*** Top of Box



ELECTRICAL MANHOLE
FRAME & COVER



COLLAR RISER

3/4", 6", 1", To Be Shown On Plans or Per Engineer

NOTES FOR ELECTRICAL MANHOLE:

1. A COMPACTED BASE AND A CONCRETE FOOTING SUPPORT SHALL BE CONSTRUCTED PRIOR TO PLACEMENT OF THE CAST IRON FRAME AS DIRECTED BY THE ENGINEER.
2. ADJUSTMENTS TO ELEVATIONS SHALL BE MADE WITH COLLAR/RISERS AS REQUIRED. MINIMUM DEPTH 18".
3. REFER TO STANDARD PLAN R-4.7.3 FOR CONCRETE COLLAR DETAILS.

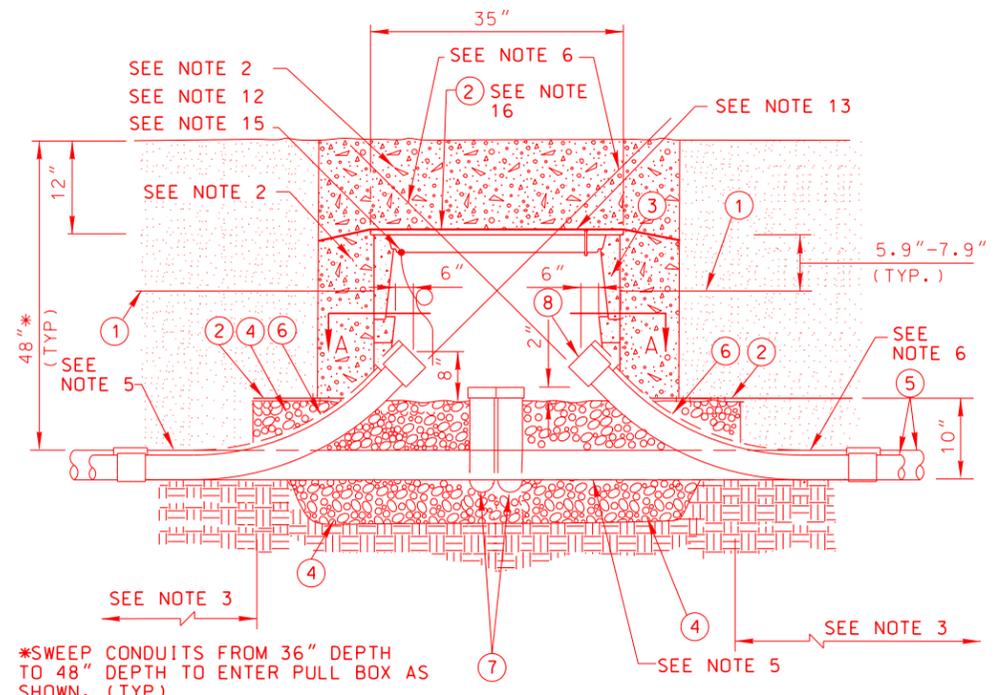
NOTES FOR PULL BOXES:

1. STEEL COVER SHALL HAVE EMBOSSED NON-SKID PATTERN.
2. STEEL REINFORCING SHALL BE PER MANUFACTURERS REQUIREMENTS.
3. TOP OF PULL BOXES SHALL BE FLUSH WITH SURROUNDING GRADE OR TOP OF ADJACENT CURB, EXCEPT THAT IN UNPAVED AREAS WHERE PULL BOX IS NOT IMMEDIATELY ADJACENT TO AND PROTECTED BY A CONCRETE FOUNDATION, POLE OR OTHER CONSTRUCTION, THE BOX SHALL BE PLACED WITH ITS TOP 1" ABOVE SURROUNDING GRADE. WHERE PRACTICABLE, PULL BOXES SHOWN IN THE VICINITY OF CURBS SHALL BE PLACED ADJACENT TO THE BACK OF CURB, AND PULL BOXES SHOWN ADJACENT TO STANDARDS SHALL BE PLACED ON SIDE OF FOUNDATION FACING AWAY FROM TRAFFIC, UNLESS OTHERWISE NOTED. WHEN PULL BOX IS INSTALLED IN SIDEWALK AREA, THE DEPTH OF THE PULL BOX SHALL BE ADJUSTED SO THAT THE TOP OF THE PULL BOX IS FLUSH WITH THE TOP OF SIDEWALK.
4. THE NOMINAL DIMENSIONS OF THE OPENING IN WHICH THE COVER SETS SHALL BE THE SAME AS THE COVER DIMENSIONS EXCEPT THE LENGTH AND WIDTH DIMENSIONS SHALL BE 1/8" GREATER.
5. ALL COVERS AND BOXES SHALL BE INTERCHANGEABLE WITH NEVADA STANDARD MALE AND FEMALE GAGES. WHEN INTERCHANGED WITH A STANDARD MALE OR FEMALE GAGE, THE TOP SURFACES SHALL BE FLUSH WITHIN 1/8". TOP OUTSIDE EDGE OF ALL CONCRETE COVERS AND PULL BOXES SHALL HAVE A 1/4" MINIMUM RADIUS.
6. PULL BOX SHALL NOT BE INSTALLED WITHIN THE BOUNDARIES OF NEW OR EXISTING CURB RAMPS.
7. PULL BOXES FOR ELECTROLIERS AND SIGNAL STANDARDS SHALL BE LOCATED AT THE SAME STATION (+5') AS THE ADJACENT ELECTROLIER OR SIGNAL STANDARD. PULL BOXES SHALL BE PLACED ADJACENT TO BACK OF CURB OR EDGE OF SHOULDER EXCEPT WHERE THIS IS IMPRACTICAL, A BOX MAY BE PLACED IN ANOTHER SUITABLE PROTECTED AND ACCESSIBLE LOCATION.
8. IN AREAS WHERE THE POSSIBILITY OF MATERIAL ERODING FROM AROUND THE PULL BOX EXISTS, THE PULL BOX SHALL BE PLACED IN DRAIN BACKFILL TYPE II (12" DEPTH ON EACH SIDE AND 1" DEPTH), AS DIRECTED BY THE ENGINEER.
9. USE MODIFIED PULL BOXES ONLY WHEN INDICATED ON THE PLANS.
10. INSTALL CONDUIT PLUG ON EACH UNUSED CONDUIT OR INNERDUCT.
11. ALL METAL PULL BOX LIDS SHALL BE GROUNDED. INSTALL A STRANDED #4 (GREEN, 7-STRAND) THW WIRE, 4 FEET IN LENGTH, FROM THE LID TO THE BONDING GROUND. FASTEN THE #4 CONDUCTOR TO THE LID BY CAD WELDING.
12. ALL CONDUITS SHALL HAVE A MINIMUM OF 6" CLEARANCE FROM THE TOP OF THE CONDUIT TO THE COVER. SEAL ALL CONDUIT ENDS WITH A DUCT SEALING COMPOUND.

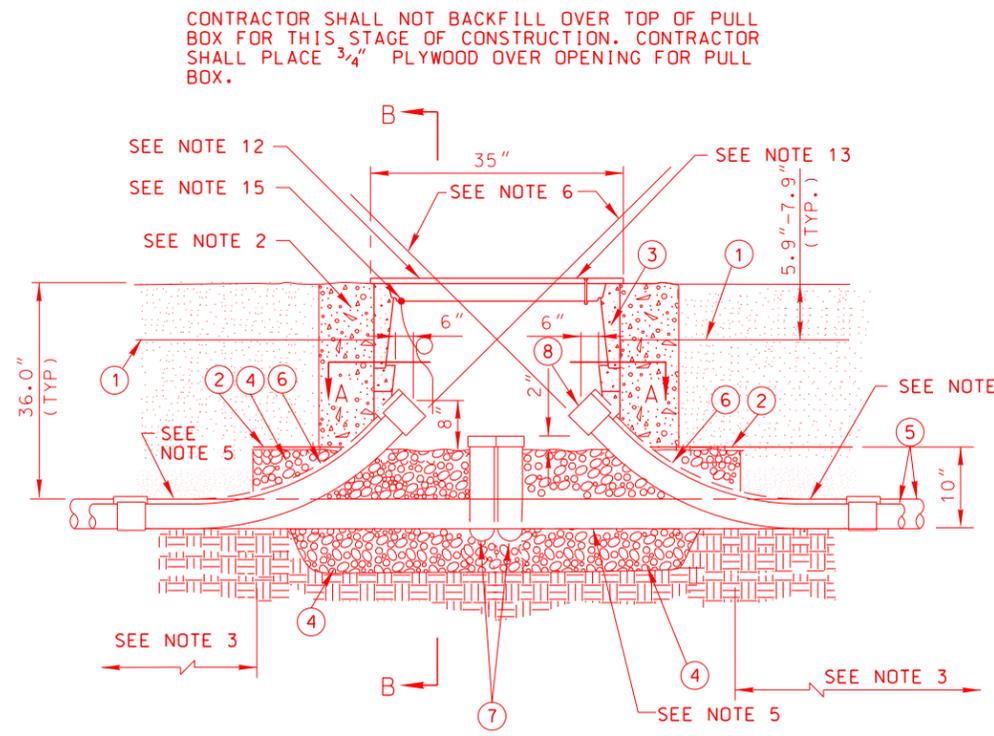
STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

PULL BOXES/
ELECTRICAL MANHOLE
FRAME & COVER

DET. *	(000)	Signed Original On File
ADOPTED	REVISD	CHIEF SAFETY/TRAFFIC ENGR.

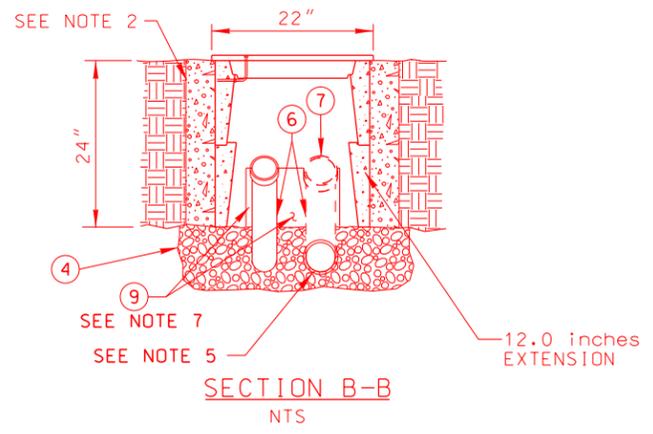
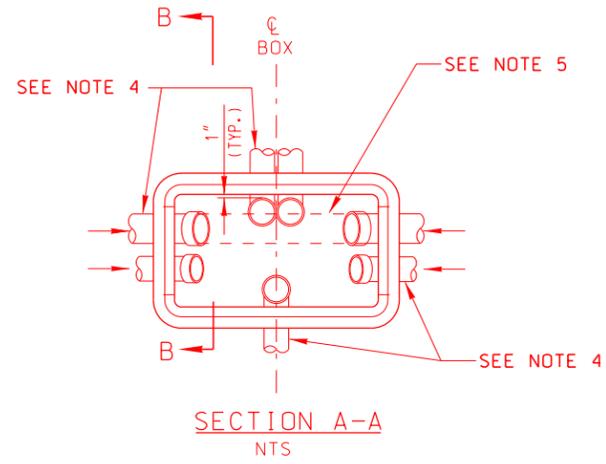


BELOW GRADE
INSTALLATION DETAIL
NTS



INSTALLATION DETAIL
NTS

TABLE	
ITEM	DESCRIPTION
①	WARNING TAPE
②	30 lbs. FELT PAPER
③	NO. 7 PULL BOX WITH EXTENSION WITH EXCEPTIONS AS DRAWN
④	BEDDING MATERIAL PER NDOT STANDARD PLAN T-30.1.18
⑤	SCH. 40 PVC OR HDPE CONDUIT (S) (SEE PLANS FOR SIZE AND QUANTITY)
⑥	45 DEGREE PVC ELBOW, OR HDPE BEND 36in. RADIUS
⑦	90 DEGREE PVC ELBOW, OR HDPE BEND 15in. RADIUS
⑧	CONDUIT BELL END (TYPICAL)
⑨	KNOCK OUT 8 inches x 12.0 inches



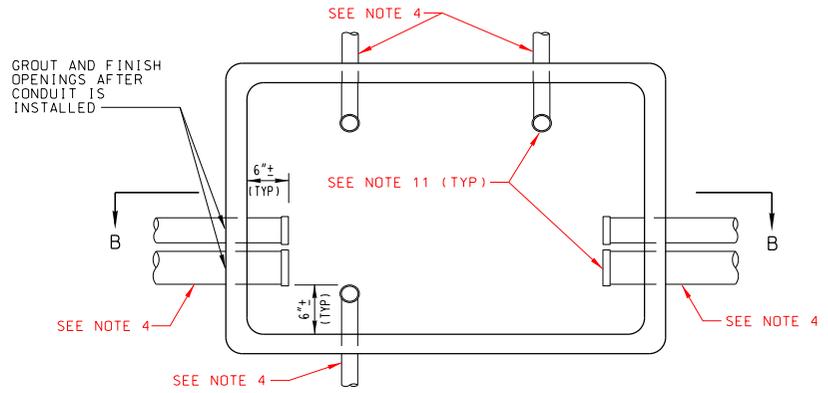
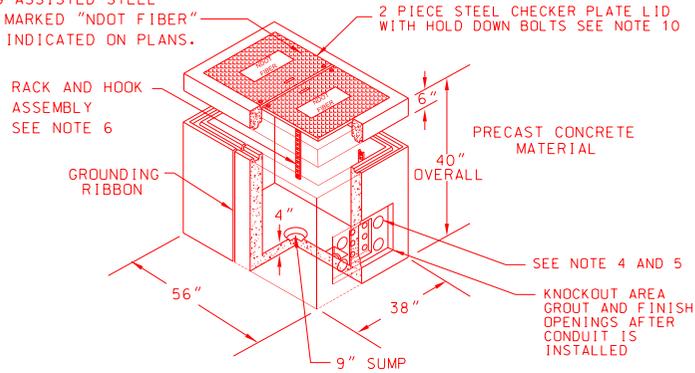
- NOTES:
- NUMBERS IN CIRCLES REFER TO ITEMS IN TABLE.
 - BACK FILL ACCORDING TO NDOT STANDARD PLANS AND SPECIFICATIONS.
 - TRUNK LINE CONDUIT FROM THE TYPICAL TRENCH SECTION SHALL NOT DEFLECT BY MORE THAN ONE FOOT PER 10 FEET FROM THE ALIGNMENT PRECEDING OR FOLLOWING THE PULL BOX.
 - SEE PLAN SHEETS FOR NUMBER AND SIZE OF CONDUIT(S).
 - NEW TRUNK LINE FIBER OPTIC CONDUIT(S) SHALL PASS UNDER NO. 7 PULL BOXES. AT CONDUIT TRANSITION LOCATIONS (BRIDGE STRUCTURES, METAL CONDUIT TO HDPE OR PVC, ETC.) ALL CONDUITS SHALL ENTER PULL BOX. AT LOCATIONS WHERE POWER CONDUCTORS, DETECTOR CABLES, LOOP LEAD-IN CABLES, DETECTOR CABLE, RAMP METER SIGNAL CABLES OR BRANCH FIBER OPTIC CABLES ENTER OR PASS THROUGH, ALL OTHER CONDUITS SHALL ENTER THE PULL BOX.
 - BOTTOM OF CONDUIT CENTERLINE SHALL BE ALIGNED TO EXIT TOP OF PULL BOX TO FACILITATE CABLE PULLING. PER SECTION 623.01.03 OF THE STANDARD SPECIFICATIONS.
 - USE FELT PAPER TO BLOCK OPENING BETWEEN CONDUITS.
 - INSTALL CONDUIT PLUG ON EACH EMPTY CONDUIT ENTERING PULL BOX.
 - SEAL ENDS OF ALL CONDUITS WITH CABLES OR CONDUCTORS WITH NDOT APPROVED MATERIAL.
 - A PULL BOX EXTENSION CAN BE ELIMINATED IF THE PULL BOX IS SUPPLIED WITH A DEPTH OF 24in. OR GREATER.
 - PULL BOX HEIGHT ABOVE FINISHED GRADE SHALL PERMIT 4in. OF SURFACE LANDSCAPING, IF APPLICABLE, TO MATCH EXISTING CONDITIONS.
 - THIS PULL BOX SHALL BE DESIGNED FOR TRAFFIC AREAS. STEEL COVERS SHALL BE USED. COVER AND BOX SHALL SUPPORT AASHTO H20-44 TRUCK LOADING.
 - "NDOT" SHALL BE THE TITLE ENGRAVED IN THE LID UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS. BOND AND GROUND LID PER SECTION 623.02.17 OF THE STANDARD SPECIFICATIONS.
 - GROUND CONDUCTOR(S) SHALL BE BONDED AND GROUNDED PER STANDARD SPECIFICATIONS (AS REQUIRED).
 - PULL BOX LID BONDING/GROUND CONDUCTOR SHALL BE 4 ft. OF #4 GREEN STRANDED GROUND WIRE, CAD WELDED TO THE LID PER NDOT REQUIREMENTS. GROUND WIRE SHALL BE COILED FOR FUTURE BONDING AND GROUNDING. IF PULL BOX INSTALLATION IS REPLACING AN EXISTING PULL BOX, THEN THE CONDUCTOR SHALL BE BONDED/GROUNDED TO THE EXISTING GROUNDING SYSTEM.
 - COVER TOP OF PULL BOX WITH 30 LB. FELT PAPER TO HELP PROTECT METAL LID.
 - CONTRACTOR TO GPS LOCATE AND BURY ALL PULL BOXES PER NDOT GUIDE "SPECIAL INSTRUCTIONS FOR SURVEY, MAPPING OR GIS CONSULTANTS," CURRENT EDITION.

NOTE:
PULL BOX LAYOUT AND CONFIGURATION IS PROVIDED AS REFERENCE DESIGN. SUBSTITUTE PULL BOX CONFIGURATIONS MEETING PROJECT SPECIFICATIONS CONFIGURATION MAY BE USED IF APPROVED BY NDOT.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

**NO. 7 PULL BOX
MODIFIED TYPICAL
INSTALLATION**

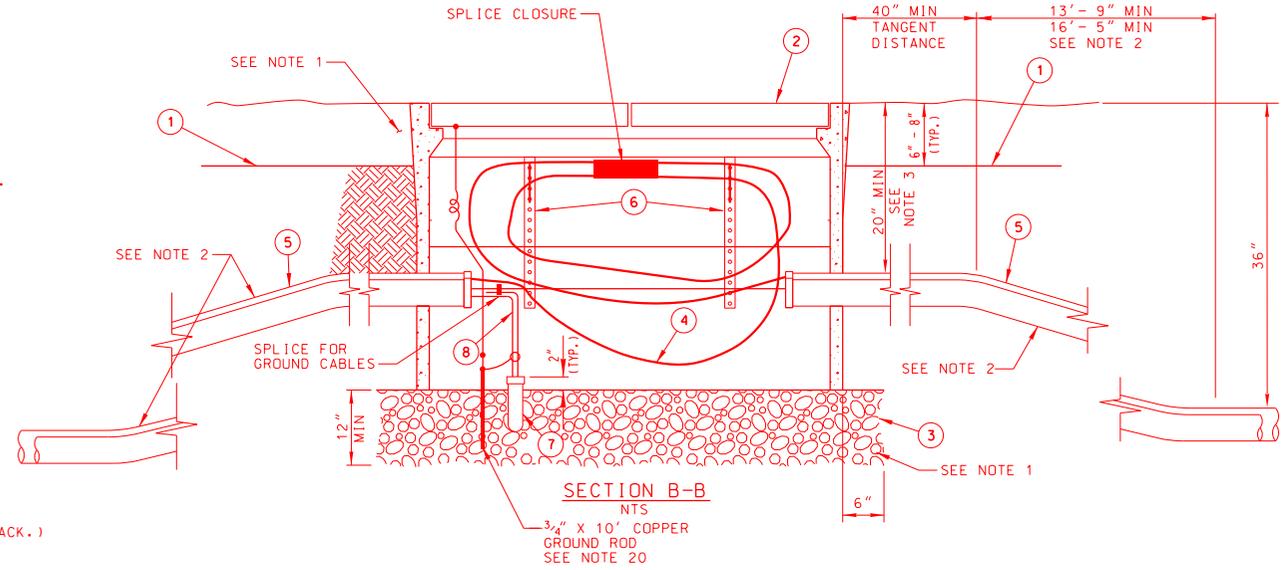
ADJUSTABLE TORSION
 SPRING ASSISTED STEEL
 COVER MARKED "NDOT FIBER"
 OR AS INDICATED ON PLANS.



PLAN VIEW
 NTS

NOTES:

1. BACKFILL ACCORDING TO NDOT STANDARD PLANS AND SPECS.
2. TRUNKLINE CONDUIT(S) FROM THE TYPICAL TRENCH SECTION SHALL NOT DEFLECT BY MORE THAN ONE FOOT PER 10 FEET FROM THE ALIGNMENT PRECEDING OR FOLLOWING PULL BOX ENTRANCE/EXIT.
3. TOP OF TRUNKLINE CONDUITS ENTERING THROUGH SIDE OF PULL BOX SHALL BE LOCATED AT LEAST 20" BELOW EXISTING FINISHED GRADE.
4. SEE PLAN SHEETS FOR NUMBER AND SIZE OF CONDUIT.
5. IF MORE THAN 3 CONDUITS ARE REQUIRED, KNOCKOUT SHALL BE WIDENED 3/8" MORE THAN THE ADDITIONAL CONDUIT WIDTH.
6. ALL PULL BOXES SHALL BE FURNISHED WITH TWO RACKS & HOOKS INSTALLED ON EACH OF THE TWO LONG SIDES.
7. TRUNKLINE CONDUITS SHALL ENTER THROUGH KNOCKOUTS.
8. PULL BOX AND STEEL COVER SHALL SUPPORT AASHTO H20-44 TRUCK LOADING.
9. LOCKING MECHANISM SHALL BE PROVIDED FOR COVER, FOUR 3/4" PENTA HEAD BOLTS AT 90° SHALL BE USED. ONE 3/4" PENTA HEAD SOCKET AND RATCHET SHALL BE PROVIDED TO NDOT FOR EVERY 10 PULL BOXES.
10. "NDOT FIBER" SHALL BE THE TITLE ENGRAVED IN THE LID OR AS INDICATED ON PLANS.
11. ALL CONDUITS SHALL HAVE BELL ENDS.
12. ALL POWER CONDUCTORS INSIDE PULL BOX SHALL BE TAGGED "POWER".
13. NUMBERS IN CIRCLES REFER TO ITEMS IN TABLE.
14. SECURE UNDERGROUND SPLICE CLOSURES IN PULL BOXES USING THE RACKS AND HOOKS. ORIENT THE UNDERGROUND SPLICE CLOSURE SO THE END CAP IS AT LEAST 6" BELOW THE OPPOSITE END.
15. PULL BOX HEIGHT SHALL MATCH EXISTING FINISHED GRADE.
16. EACH NUMBER 9 PULL BOX SHALL BE EQUIPPED WITH 100 FEET OF SLACK TRUNKLINE AND BRANCH FIBER OPTIC CABLE FOR EACH CABLE ENTERING THE PULL BOX. (I.E., TRUNKLINE TYPICALLY WILL HAVE 200 FEET OF SLACK.)
17. INSTALL CONDUIT PLUGS ON EACH CONDUIT OR INNERDUCT ENTERING THE PULL BOX.
18. ALL METAL PULL BOX LIDS SHALL BE GROUNDED. INSTALL A STRANDED #4 (GREEN, 7-STRAND) THW WIRE, 4 FEET IN LENGTH, FROM THE LID TO THE BONDING GROUND. FASTEN THE #4 CONDUCTOR TO THE LID BY CAD WELDING. ALL CONDUITS SHALL HAVE A MINIMUM OF 6" CLEARANCE FROM THE TOP OF THE CONDUIT TO THE LID, AT NO DIRECT PAYMENT.
19. SEAL ALL CONDUIT ENDS WITH A DUCT SEALING COMPOUND. USE NSI INDUSTRIES DUCT SEALING COMPOUND OR AN APPROVED EQUAL (NO DIRECT PAYMENT).
20. GROUND CONDUCTOR(S) SHALL BE BONDED AND GROUNDED PRE STANDARD SPECIFICATION(S) AS REQUIRED.
21. DESIGN LOAD: H-20 WHEEL LOADINGS
22. SUITABLE FOR USE IN OFF STREET LOCATIONS WHERE NOT SUBJECT TO HIGH DENSITY TRAFFIC. IT SHALL NOT BE USED IN TRAVEL OR PARKING LANES.
23. INSIDE DIMENSIONS - 30"x45"x36"
24. FOR USE AT FIBER OPTIC SPLICE POINTS.



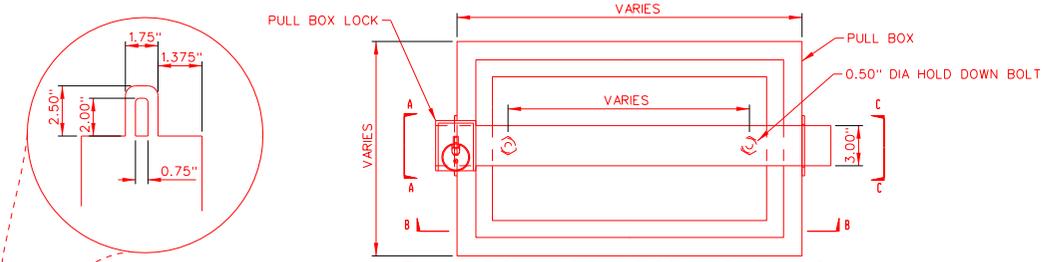
SECTION B-B
 NTS

TABLE	
ITEM	DESCRIPTION
①	WARNING TAPE
②	NO. 9 PULL BOX WITH LID & EXTENSIONS
③	BEDDING MATERIAL PER NDOT STANDARD PLAN T-30.1.18
④	FIBER OPTIC CABLE, AS REQUIRED
⑤	CONDUIT (SEE PLANS FOR SIZE AND QUANTITY)
⑥	RACK & HOOK ASSEMBLY (SEE NOTE 6)
⑦	90 DEGREE ELBOW, 15" RADIUS
⑧	POWER CONDUCTORS (SEE NOTE 12)

STATE OF NEVADA
 DEPARTMENT OF TRANSPORTATION

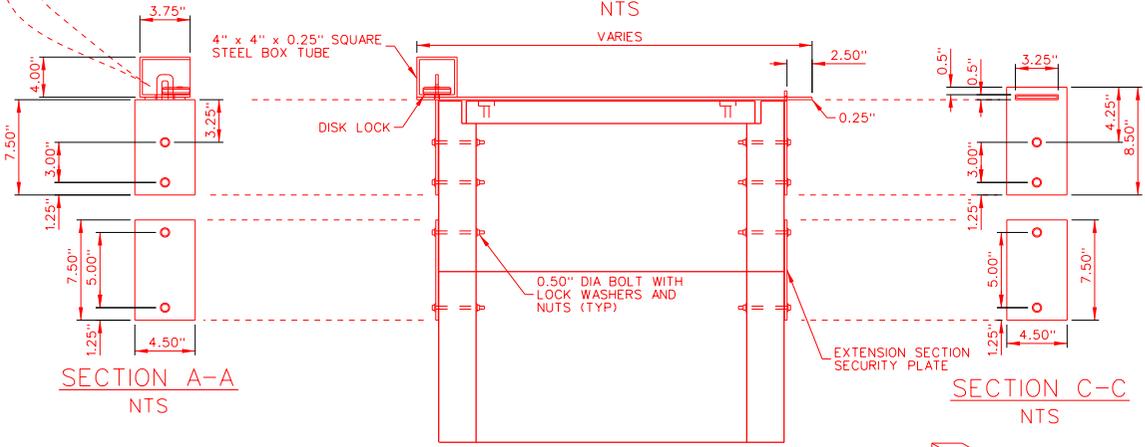
**NO. 9 (MODIFIED)
 PULL BOX AND CONDUIT
 DETAIL**

DET. • (000)	Signed Original On File
ADOPTED •/••	REVISD •/•• CHIEF SAFETY/TRAFFIC ENGR.



PULL BOX LOCK FOR NO. 3 1/2, 5, & 7 TRAFFIC RATED PULL BOXES

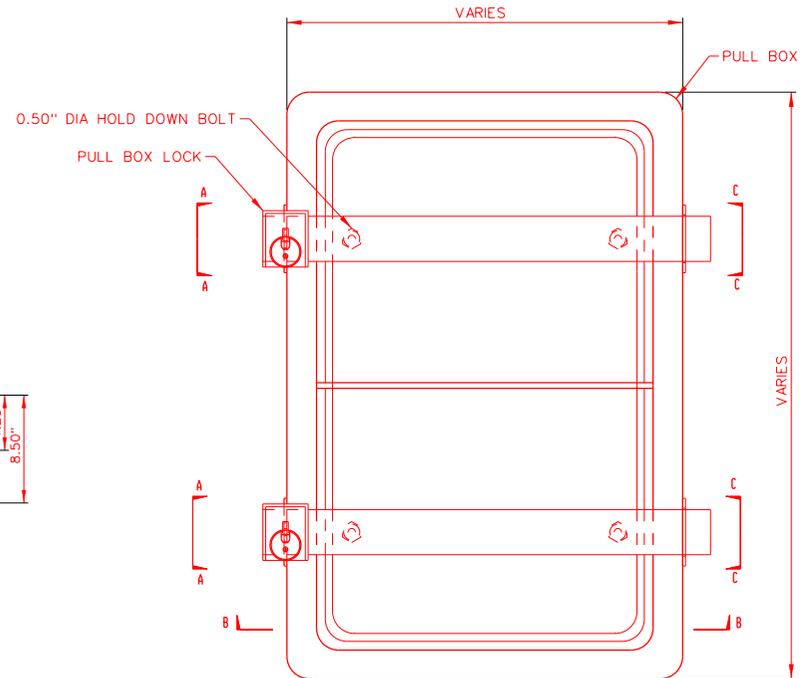
TOP VIEW
NTS



SECTION A-A
NTS

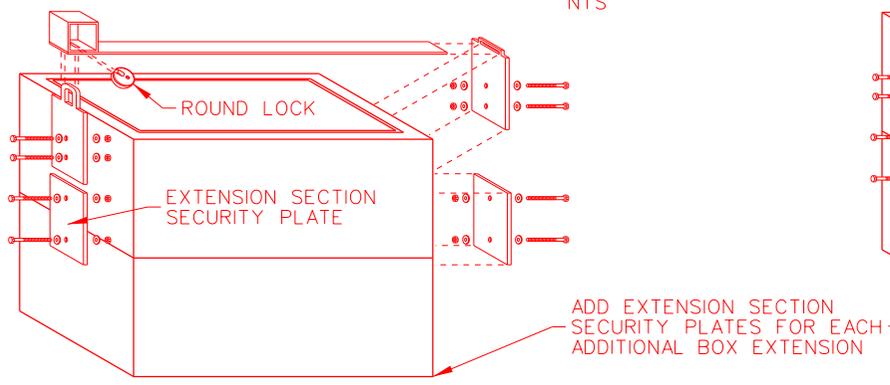
SECTION C-C
NTS

SECTION B-B
NTS



NO. 9 PULL BOX (TYP)

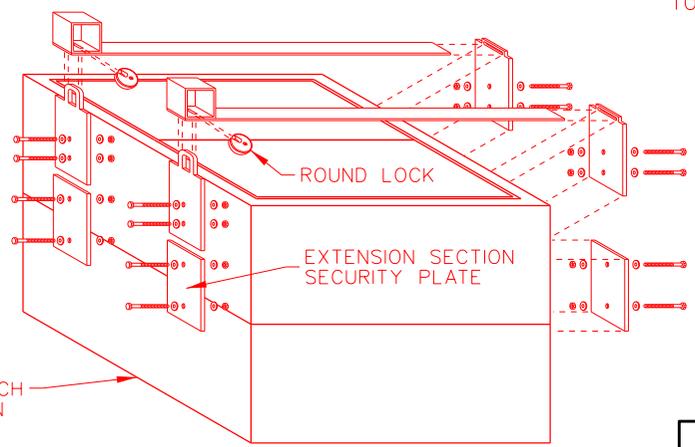
TOP VIEW
NTS



NO. 3 1/2, 5, & 7 PULL BOX LOCK ASSEMBLY

TOP VIEW
NTS

*LOCKING MECHANISM MUST COVER HOLD DOWN BOLTS

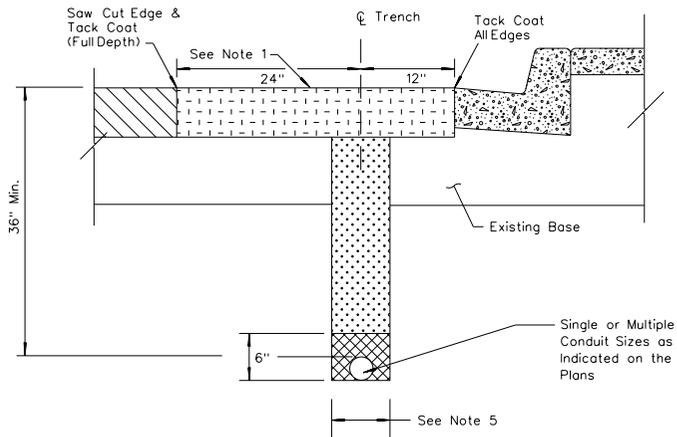


NO. 9 PULL BOX LOCK ASSEMBLY

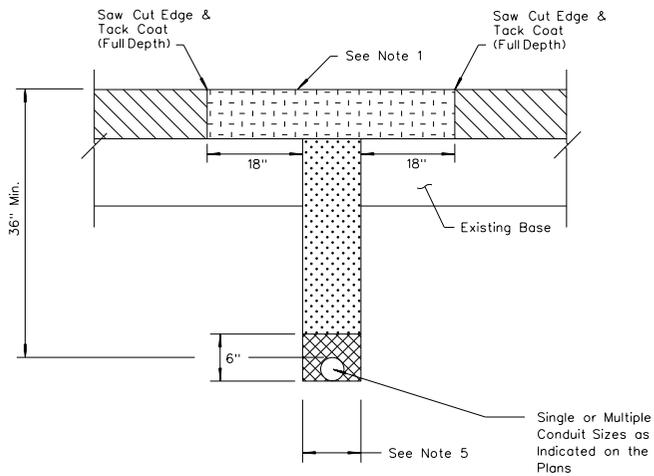
TOP VIEW
NTS

*LOCKING MECHANISM MUST COVER HOLD DOWN BOLTS

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION		
PULL BOX LOCKING DETAIL		
DET. •	(000)	Signed Original On File
ADOPTED	REVISD	CHIEF SAFETY/TRAFFIC ENGR.



LONGITUDINAL

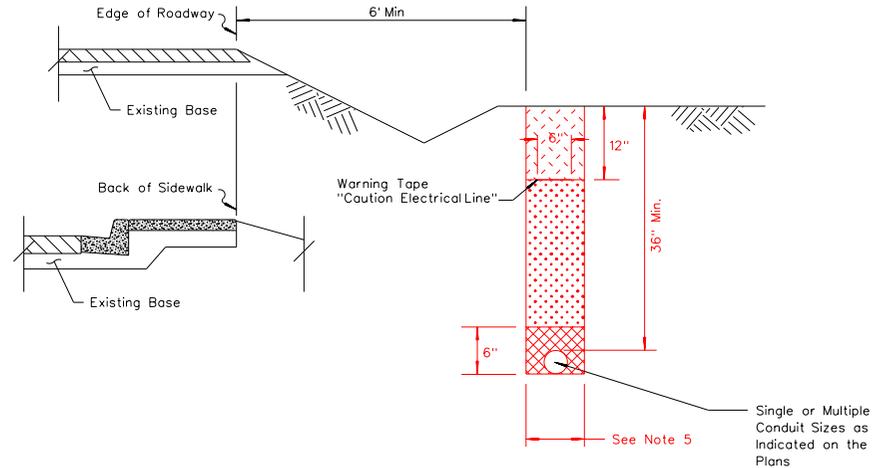


TRANSVERSE

TRENCHING IN PAVEMENT

LEGEND:

- Existing Pavement
- Limits of Removal & Repair of Pavement
- Sand Bedding (See Note 14)
- Class A Slurry Cement Backfill
- Backfill



TRENCHING IN NATIVE SOIL (CLASS A SLURRY)

NOTES:

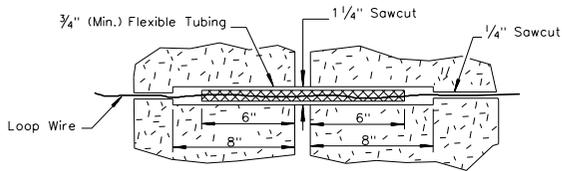
1. REMOVE EXISTING PAVEMENT AND REPLACE WITH NEW APPROVED MATERIAL OF SAME TYPE. MATCH EXISTING PAVEMENT DEPTH BUT NOT LESS THAN 6", AND SEAL NEW SURFACE AS DIRECTED BY THE ENGINEER.
2. RECOMPACT EXISTING BASE MATERIAL AROUND TRENCH TO MEET COMPACTION REQUIREMENTS FOR THAT MATERIAL TYPE AND LOCATION.
3. NEW ASPHALT AND CONCRETE PAVEMENT MATERIAL MUST BE APPROVED BY THE ENGINEER AND OBTAINED FROM AN APPROVED SOURCE.
4. UNLESS OTHERWISE PROVIDED FOR IN THE BASE AND SURFACE SUMMARIES NEW PAVEMENT MATERIAL AND TRENCHING SHALL NOT BE PAID FOR DIRECTLY BUT INCLUDED IN THE PRICE FOR THE CONDUIT.
5. TOTAL TRENCH WIDTH SHALL BE 6" WIDER THAN THE OUTSIDE EDGES OF CONDUIT(S) INSTALLED. USE CONDUIT SPACERS TO SEPARATE MULTIPLE CONDUITS IN TRENCH BY AT LEAST 1". PLACE SPACERS AT INTERVALS OF 5' MAXIMUM. CONDUITS SHALL BE CENTERED IN TRENCH.
6. FOR TRENCHING IN A NON-NDOT-OWNED FACILITY USE THE OWNER'S STANDARDS FOR TRENCHING, COMPACTION, AND PATCHING.
7. LONGITUDINAL TRENCHING IN SHOULDER: IF SHOULDER IS 4' WIDE OR LESS, REMOVE ALL SURFACE MATERIAL FROM EDGE OF OIL TO SHOULDER STRIPE AND REPLACE.
8. ENGINEER MAY FOR GOOD CAUSE, REQUIRE WIDER PATCH SECTIONS OR OTHERWISE ALTER THE REQUIREMENTS.
9. IF SAW CUT IS WITHIN 2' OF AN EXISTING PAVEMENT EDGE OR EXISTING PAVEMENT PATCH, REMOVE EXISTING PAVEMENT TO THAT EDGE AND REPLACE ENTIRE SECTION
10. IF SAWCUT EDGES FOR TRENCH FALL WITHIN A WHEEL PATH, SAWCUT SHALL BE EXTENDED TO, AND REMOVAL MADE TO EDGE OF THE TRAVEL LANE. OPTIONALLY THE ENTIRE TRAVEL LANE CAN BE ROTOMILLED TO A DEPTH OF 2" AND OVERLAYED WITH 2" OF BITUMINOUS PLANTMIX AS DIRECTED BY THE ENGINEER.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF LOOP DETECTORS, ADJUSTMENTS OF UTILITIES AND SURVEY MONUMENTS TO GRADE AND INSTALLATION OF TEMPORARY PAVEMENT MARKINGS.
12. PERMANENT RESURFACING SHALL NOT BE PLACED ON TRENCHES BACKFILLED WITH CONCRETE SLURRY FOR A MINIMUM OF 7 DAYS AFTER PLACEMENT OF THE CONCRETE SLURRY OR SIMILAR MATERIAL. PROVIDE TEMPORARY COVER OR BACKFILL AS DIRECTED BY THE ENGINEER.
13. USE OF ROCK WHEEL TRENCHING MACHINES OR SIMILAR EQUIPMENT MAY BE PERMITTED WITHIN PAVED AREAS OR WITHIN 1' OF THE EDGE OF PAVING, AS DIRECTED BY THE ENGINEER.
14. SAND BEDDING SHALL CONFORM TO GRADATION REQUIREMENTS IN SUBSECTION 706.03.03 FINE AGGREGATES.
15. IF INSTALLING UNDERGROUND ELECTRICAL FACILITIES OR SUPPLIES REFER TO NAC 408.447 AND 408.453.
16. BACKFILL IN ACCORDANCE WITH SECTION 207 IF WITHIN THE ROADSIDE SLOPE OR DITCHES. OTHERWISE THE BACKFILL MAY BE ACCOMPLISHED WITH NATIVE MATERIAL COMPACTED TO 90% OR AS DIRECTED BY THE ENGINEER.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

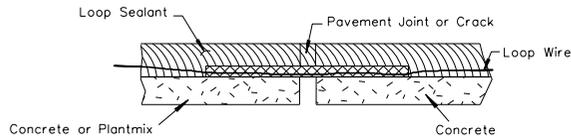
TRAFFIC CONDUIT
TRENCHING DETAIL

DET. •	(000)	Signed Original On File
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.

T-30.1.2.1

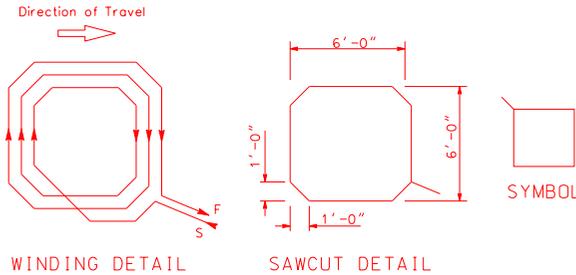


PLAN

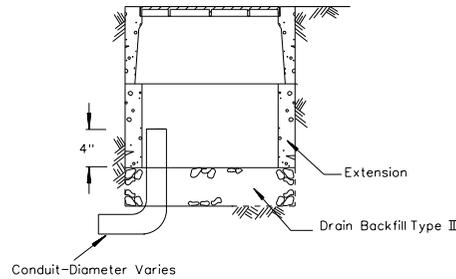


ELEVATION

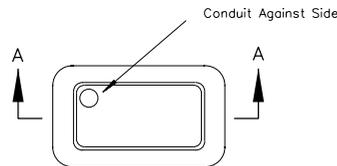
PAVEMENT JOINT CROSSING DETAILS
No Direct Payment



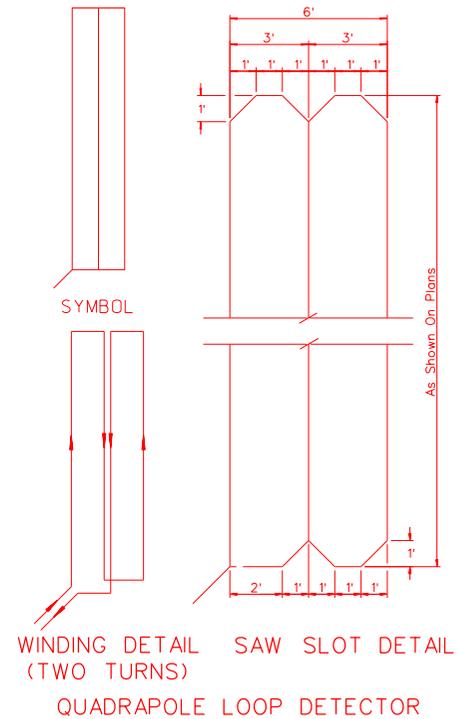
WINDING DETAIL SAWCUT DETAIL
ALTERNATE LOOP DETECTOR CONFIGURATION
*Use only as directed on plans or by engineer.



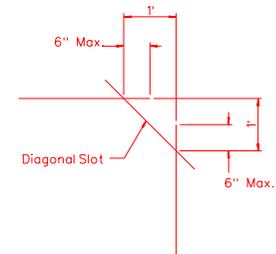
SECTION A-A



NO.5 PULL BOX (MODIFIED)
For Conduit Location
See Notes 1 & 2



WINDING DETAIL (TWO TURNS) SAW SLOT DETAIL
QUADRAPOLE LOOP DETECTOR



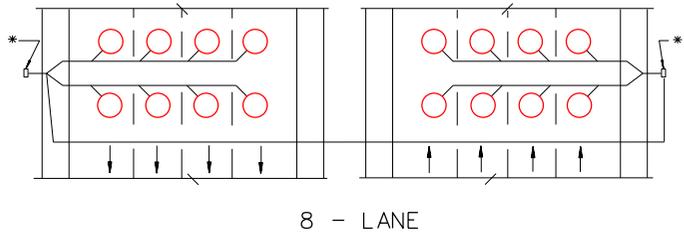
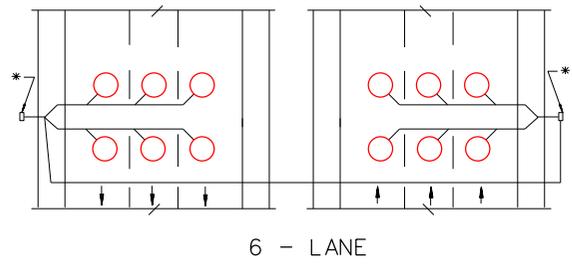
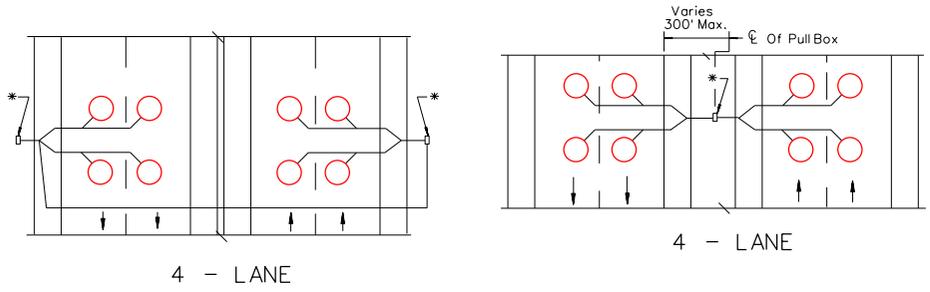
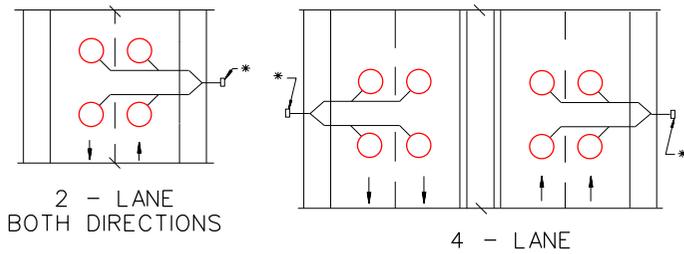
PLAN VIEW OF DIAGONAL
SLOT AT CORNERS

NOTES:

- ALL PULL BOXES SHALL BE NO. 5 (MODIFIED). SEE SHEET T-30.1.18 FOR DETAILS NOT SHOWN.
- PAYMENT SHALL BE MADE UNDER THE FOLLOWING ITEMS:
CONDUIT - DIAMETER VARIES
NO. 5 PULL BOX (MODIFIED)
6 FOOT x 6 FOOT DETECTOR LOOPS
- ALTERNATE LOOP DETECTOR CONFIGURATION SHALL BE 6' X 6' SQUARE WITH 3 TURNS OF WIRE.

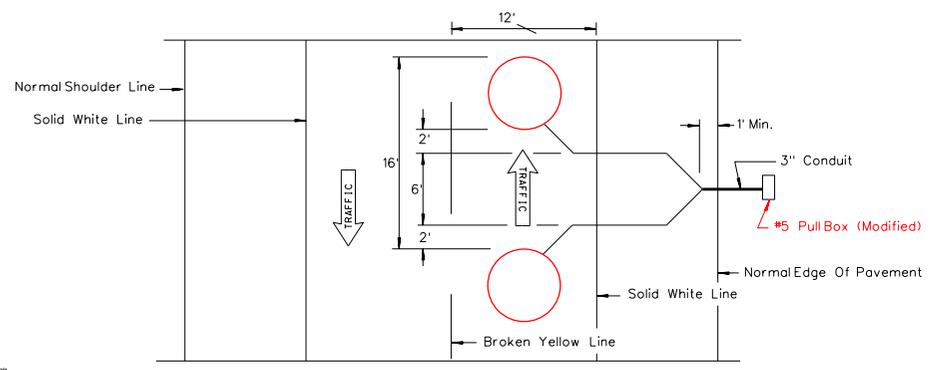
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION	
No. 5 (MODIFIED) PULL BOX & PAVEMENT JOINT LOOP CROSSING AND OTHER DETAILS	
DET. • (000)	Signed Original On File
ADOPTED •/••	REVISD •/•• CHIEF SAFETY/TRAFFIC ENGR.

66 LHS



NOTES:

1. ALL LOOPS SHALL BE 6" DIAMETER ROUND LOOPS WITH 4 TURNS OF WIRE.
2. LOOP WIRE PAIRS FROM LOOP PROPER TO NO. 5 PULL BOX (MODIFIED) SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT.
3. LOOP WIRE PAIRS SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT FOR THE ENTIRE HOME RUN.
4. LOOP CUTS SHALL BE 3/8" WIDE x 2 1/2"-3" MAXIMUM DEPTH.
5. LOOPS SHALL BE CENTERED IN ALL TRAVEL AND TURN LANES.
6. LOOP WIRE SHALL BE AWG 14 STRANDED IMA-51-1.
7. EACH INDIVIDUAL CONDUCTOR SHALL BE A CONTINUOUS RUN WITH NO SPLICES AND SHALL BE LABELED AT EACH END WITH THE LANE ASSIGNMENT.
8. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO ASCERTAIN THAT THE LOOP PLACEMENT IS NOT IN CONFLICT WITH OTHER ITEMS OF WORK.
9. FIVE WORKING DAYS PRIOR TO PLACEMENT OF LOOP DETECTORS, THE RESIDENT ENGINEER SHALL NOTIFY THE TRAFFIC SECTION OF THE PLANNING DIVISION (888-7155) FOR ASSISTANCE IN ESTABLISHING THE EXACT LOCATION.
10. DETECTORS SHALL BE INSTALLED AFTER DENSE GRADE PAVING OR PROFILE GRADE IS ESTABLISHED.
11. LOOP LOCATION SHALL BE MARKED ON THE EDGE OF THE PAVEMENT BY PAINTING THE WORD "LOOP" IN WHITE.
12. SEE STANDARD SHEET T-30-1.4.1 FOR PAVEMENT JOINT DETAILS.
13. PAYMENT WILL BE MADE UNDER THE FOLLOWING ITEMS:
 NO. 5 PULL BOX (MODIFIED) (EACH)
 6" DIA. LOOPS (EACH)
 3" DIA. CONDUIT (LINF.T)



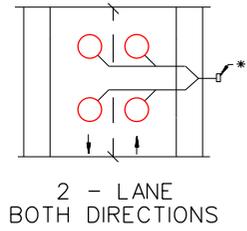
SPEED DETECTOR LOOP PLACEMENT DETAIL
(OPPOSITE LANE LOOPS NOT SHOWN FOR CLARITY)

LEGEND:

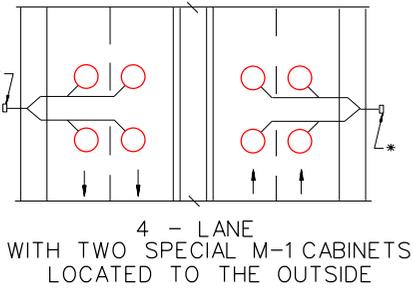
* -No. 5 Pull Box (Modified)

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION	
SPEED DETECTOR LOOP CONFIGURATION AND NOTES	
DET. • (000)	Signed Original On File
ADOPTED •/••	REVISIED •/•• CHIEF SAFETY/TRAFFIC ENGR.

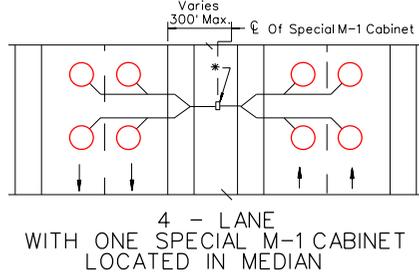
66 LHS



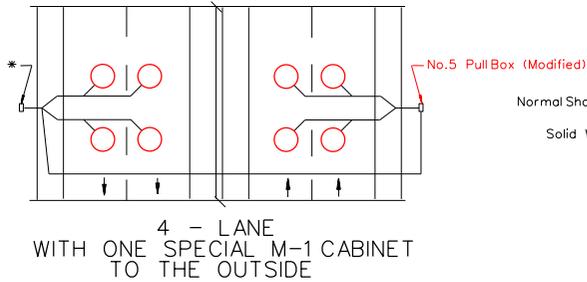
2 - LANE
BOTH DIRECTIONS



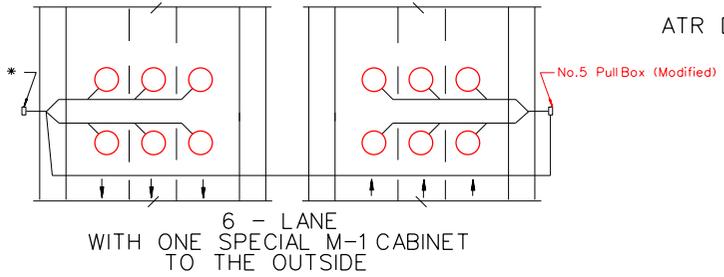
4 - LANE
WITH TWO SPECIAL M-1 CABINETS
LOCATED TO THE OUTSIDE



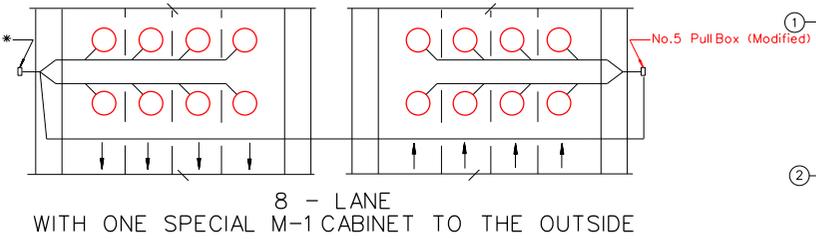
4 - LANE
WITH ONE SPECIAL M-1 CABINET
LOCATED IN MEDIAN



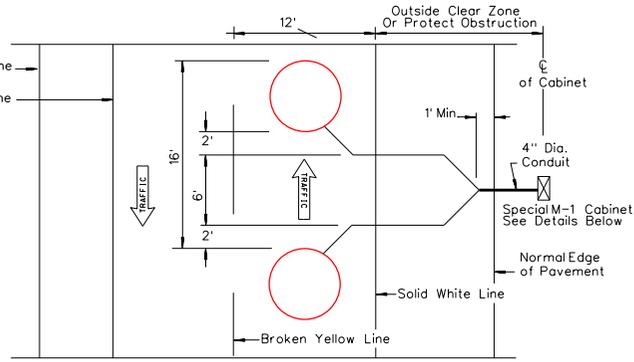
4 - LANE
WITH ONE SPECIAL M-1 CABINET
TO THE OUTSIDE



6 - LANE
WITH ONE SPECIAL M-1 CABINET
TO THE OUTSIDE

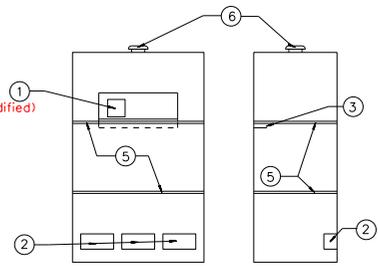


8 - LANE
WITH ONE SPECIAL M-1 CABINET TO THE OUTSIDE



ATR DETECTOR LOOP PLACEMENT DETAIL
OPPOSITE LANE LOOPS NOT SHOWN FOR CLARITY

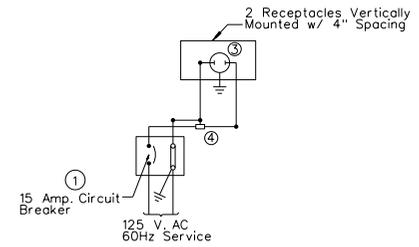
- LEGEND:**
- * Special M-1 Cabinet
 - ① Main Switch
 - ② Field Wire Terminal Blocks
 - ③ N.E.M.A. Standard Plug Receptacle With Grounding Contact
 - ④ Radio Interference Suppressor
 - ⑤ Shelf
 - ⑥ Thermostat-Controlled Fan With T-Vent



SPECIAL M-1 CABINET
SEE SHEET T-30.1.5 FOR ADDITIONAL DETAILS

NOTES:

1. ALL LOOPS SHALL BE 6" DIAMETER ROUND LOOPS WITH 4 TURNS OF WIRE.
2. LOOP WIRE PAIRS FROM LOOP PROPER TO NO. 5 PULL BOX (MODIFIED) OR SPECIAL M-1 CABINET SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT.
3. LOOP WIRE PAIRS SHALL BE TWISTED NO LESS THAN FOUR TIMES PER FOOT FOR THE ENTIRE HOME RUN.
4. LOOP CUTS SHALL BE 3/8" WIDE x 2 1/2"-3" MAXIMUM DEPTH.
5. LOOPS SHALL BE CENTERED IN ALL TRAVEL AND TURN LANES.
6. LOOP WIRE SHALL BE AWG 14 STRANDED IMA-51-1.
7. EACH INDIVIDUAL CONDUCTOR SHALL BE A CONTINUOUS RUN WITH NO SPLICES AND SHALL BE LABELED AT EACH END WITH THE LANE ASSIGNMENT.
8. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO ASCERTAIN THAT THE LOOP PLACEMENT IS NOT IN CONFLICT WITH OTHER ITEMS OF WORK.
9. FIVE WORKING DAYS PRIOR TO PLACEMENT OF LOOP DETECTORS, THE RESIDENT ENGINEER SHALL NOTIFY THE TRAFFIC SECTION OF THE PLANNING DIVISION (888-7155) FOR ASSISTANCE IN ESTABLISHING THE EXACT LOCATION.
10. DETECTORS SHALL BE INSTALLED AFTER DENSE GRADE PAVING OR PROFILE GRADE IS ESTABLISHED.
11. LOOP LOCATION SHALL BE MARKED ON THE EDGE OF THE PAVEMENT BY PAINTING THE WORD "LOOP" IN WHITE.
12. FOR SPECIAL M-1 CABINET ONLY - IN CONFORMANCE WITH NATIONAL ELECTRIC CODE 250-56, WHEN THE GROUNDING PLATE DOES NOT HAVE A RESISTANCE TO GROUND OF 25 OHMS OR LESS, IT SHALL BE AUGMENTED BY ONE ADDITIONAL ELECTRODE PREFERABLY A 1/2" X 96" COPPER GROUND ROD.
13. IF GUARDRAIL/BARRIER RAIL IS PROVIDED, THE CABINET SHALL BE PLACED A MINIMUM OF 24" BEHIND RAIL.
14. SEE STANDARD SHEET T-30-1.4.1 FOR PAVEMENT JOINT DETAILS.
15. PAYMENT WILL BE MADE UNDER THE FOLLOWING ITEMS:
SPECIAL CABINET (EACH)
SPECIAL M-1 CABINET (EACH)
NO. 5 PULL BOX (MODIFIED) (EACH)
4" DIA. CONDUIT (LINFIT)
6" DIA. LOOPS (EACH)



CABINET WIRING

STATE OF NEVADA DEPARTMENT OF TRANSPORTATION			
ATR DETECTOR LOOP CONFIGURATION AND NOTES			
DET. *	(000)	Signed Original On File	
ADOPTED	REVISED	CHIEF SAFETY/TRAFFIC ENGR.	