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DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

SHANE M. MARSHALL, P.E.
Deputy Director of Engineering and Operations

TERIANNE S. NEWELL, P.E.
Deputy Director of Planning and Investment

December 4, 2018

Mr. Rick Torgerson, P.E.
Region Four Director
Utah Department of Transportation
210 West 800 South
Richfield, UT 84701

Subject: UDOT Project Number F-0191(152)126, US-191, North Moab to Colorado River Bridge, Grand County, Utah (PIN 15329)
Environmental Assessment Re-evaluation

Dear Mr. Torgerson:

A Final Environmental Assessment (EA) and Programmatic Section 4(f) Evaluation for the US-191 Colorado Bridge For Bridge/Roadway Reconstruction and Widening on US-191, from 400 North in Moab City to SR-279 (Potash Road), Grand County, was completed (2007) and approved through the issuance of a Finding of No Significant Impact (FONSI) (May 25, 2007) from the Federal Highway Administration (FHWA). Design modifications for the current phase between State Route 128 (SR-128) and 400 North in Moab, Grand County were not included in the 2007 EA and are the subject of this EA Re-evaluation. These improvements include a new stormwater collection system, three sedimentation basins, a vegetated water quality swale, a sedimentation dropout channel, and several new outfalls.

This letter summarizes the anticipated impacts that would occur to the subject segment as a result of final design modifications. The appendices include the supporting technical documentation and reports. FHWA and UDOT have executed an agreement (Memorandum of Understanding between the Federal Highway Administration and the Utah Department of Transportation Concerning the State of Utah's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 U.S.C. 327, executed January 17, 2017) through which FHWA has formally assigned its legal responsibilities for complying with the National Environmental Policy Act to UDOT. Therefore, this Re-evaluation is being processed in accordance with this agreement, and UDOT is the agency responsible for approving the Re-evaluation.

Need for Re-evaluation

The 2007 EA/Programmatic Section 4(f) Evaluation and FONSI evaluated the environmental impacts of roadway improvements required to meet the existing and projected travel demand through the design year 2030 and provide continuity between the four-lane sections north and south of the project limits.

The EA summarized the Preferred Alternative and elements of which would be considered under Phase 1 and Future Phases. Phase 1 included the Colorado River Bridge (completed). Future Phases included Roadway Widening between the US-191 Colorado River Bridge and Potash Road (completed), Courthouse Wash Structure Widening (completed), and Roadway Widening between 400 North to Colorado River Bridge (current).

This Re-evaluation focuses on the impacts of the final segment to be funded, Segment 4: Roadway Widening between 400 North to Colorado River Bridge. Specifically, the impacts resulting from this segment's final design, and changes that have occurred in the project area that would have an effect on the project or alter its previously identified impacts.

Currently, UDOT proposes to widen US-191 between 400 North and SR-128 in Grand County for a length of approximately 2.09 miles (MP 126.110 – MP 128.203). Figure 1 in Appendix A shows the project location of this segment. Figure 2 in Appendix A shows the project limits and environmental resources. Figure 3 in Appendix A shows the proposed improvements and areas of impact, and Figure 4 in Appendix A shows the existing and proposed typical sections. Figure 3 also identifies the areas of roadway improvements, multi-use path improvements, and other associated design features such as drainage features, improvements to cross streets, and side road modifications.

Following is a summary of the main components of the EA and any changes associated with each component due to final design modifications and the Re-evaluation of previously known and newly identified environmental resources in the project area.

Purpose and Need

As stated in the EA, the purpose of the US-191 Project is to meet the existing and projected travel demand and provide continuity with the existing four-lane sections at either end of the project limits, provide a bridge that accommodates US-191 traffic over the Colorado River and also meets current structural design standards, improve safety throughout the project corridor, and facilitate the movement of bicycle and pedestrian traffic along US-191. The proposed revisions included with the current segment do not change the original project concept or project purpose; therefore, the purpose of and need for the project remain valid.

Independent Utility

No additional transportation improvements are necessary for the proposed project to function as intended. The project would not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Changes from EA Preferred Alternative Incorporated with the Current Segment

The elements of the current segment of the US-191 project in Grand County between 400 North and SR-128 are listed below. Where the elements of this segment are different than those of the EA Preferred Alternative, these elements are described in more detail. Detailed figures of the current segment are provided in Appendix A. Figure 3 in Appendix A shows this segment's footprint and identifies the areas of new impact for this Re-evaluation.

- This segment of the project remains consistent with the 2007 EA and would include widening of the roadway to include four 12-foot-wide lanes with a 12-foot median in some locations, 6-foot shoulders, curb and gutter, and a sidewalk along the west side of the roadway (Appendix A). The proposed alignment would typically follow the centerline of the existing road. Specific design elements that differ from the 2007 EA are as follows:
    - Ø Stormwater facilities (described below).
    - Ø Emma Boulevard: provide access, curb returns, and sidewalk for future city roadway. This would also include a signalized pedestrian crossing.
    - Ø Re-alignment of 500 West: re-align intersection to better accommodate turning movements and improve signal functionality and traffic throughput.
    - Ø Avery driveway: The storm drain alignment from the sediment basins would require paving of a private driveway (675') and improvements to Cermak Street.
    - Ø Bicycle/Pedestrian facilities: The 2007 EA identified extending the multi-use trail to 600 North. The current US-191 design would extend the multi-use trail to the new Emma Boulevard intersection being constructed with this project. This would include an at-grade crossing using a HAWK (High-Intensity Activated crosswalk) signal.
- Final design would include stormwater facilities to comply with the latest versions of UDOT's Drainage Manual of Instruction (UDOT 2018) and the City of Moab Stormwater Master Plan (City 2017).
    - Ø Storm drainage impacts identified for the Preferred Alternative in the 2007 EA were based on conceptual level designs and included storm drainage improvements. The Water Resources section of the EA identified the need for detention basins and conveyance of runoff via future city/county systems but deferred further analysis until those systems were in place and/or the design had progressed.
    - Ø The 2017 City of Moab Storm Water Master Plan identified a need for storm drain improvements in the vicinity of US-191 including debris basins to the east, a conveyance network consisting of storm drain laterals, trunk lines, and pipe culverts generally discharging to the west to detention basins or to receiving waters, and various water quality BMPs. The final design would include debris basins, a water quality swale, and discharge culverts that are outside the 2007 EA study boundary and which are included in this EA re-evaluation. The majority of the storm water discharge would be to the Colorado River through an interconnected system of channels, wetlands, ponds, and overland flow through the Matheson Wetland Preserve. The Nature Conservancy and

the Utah Division of Wildlife Resources have joint ownership of the preserve and have been involved with the project and concur with the proposed stormwater discharges.

- Ø Sedimentation basins would be reconstructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. The three proposed sedimentation basins are existing basins that have filled in with sediment from the adjacent hillslope over time and will be cleaned out to restore their functionality.
  The storm drain alignment from the sediment basins would require paving of a private driveway (675') and improvements to Cermak Street. A main trunkline would be constructed in US-191 to collect and convey runoff to a central point near 500 West, and then away from the roadway corridor to the west through a 72" outfall culvert into a 500 foot long sedimentation dropout ditch and then through a 300 foot long vegetated water quality swale. After passing through the vegetated swale, stormwater would pass through two 52" 120-foot long culverts and then be conveyed into the Matheson Wetlands Preserve where it would pass through a series of ponds, channels and wetlands eventually outfalling to the Colorado River.

Changes in Impacts

The project team has reviewed the current segment and evaluated any changes from the design modifications and new information against the analysis in the Final EA. As part of the Re-evaluation process, UDOT reviewed and updated, where required, the original resources analyses. The following technical memos and reports were produced as part of the re-evaluation:

- US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey
- A Selective Reconnaissance-Level Historic Structures Assessment for the US-191 Moab to the Colorado River Bridge, Moab, Grand county, Utah
- Threatened and Endangered Riparian Bird Species Survey Memo
- Biological Assessment (BA) to address potential effects (both beneficial and adverse) of new project components on federally listed species and designated critical habitats
- Noise Technical Report
- Delineation of Wetlands & Waters of the US

Table 1 summarizes the environmental impacts. A detailed evaluation of the resource impacts that have changed is provided in the Environmental Analysis section of this Re-evaluation.

Table 1. Summary of Re-evaluation Analysis

Environmental Resource	Changed?		Comments
	Yes	No	
Land Use	X		The 2007 EA identified the additional need for 0.3 acres of ROW, 2.6 acres of permanent easement, and 3.6 acres of temporary easement. The current segment would convert an additional 1.62 acres of ROW to roadway use compared to the 2007 EA for a total of 1.92 acres. The current segment would also require 4.23 acres of permanent easement and 2.73 acres of temporary easement. These additional acreages are mainly to accommodate the proposed storm water system.
Farmlands		X	No changes identified.
Community Resources		X	No changes Identified. However, due to the expanded study area and increased need for property acquisition, there will be an increase in coordination with residences and businesses. All other conditions remain the same.
Economics		X	No changes identified.
Pedestrian and Bicyclist Considerations	X		The existing multi-use path would be extended to the south. This would include a new HAWK signal and at-grade crossing at Emma Blvd. These are considered beneficial changes in impacts.
Air Quality		X	No changes identified.
Noise		X	No changes identified.
Geology and Soils		X	No changes identified.
Water Quality	X		No additional impacts identified. Water quality improvement likely due to sediment detention basins and water quality swale.
Floodplains		X	No changes identified.
Wild and Scenic Rivers		X	No changes identified.
Wetlands and Other Waters of the U.S.	X		The 2007 EA identified 0.07 acres of impacts to wetlands. The current design for this segment would impact 0.29 acres of wetlands, 0.09 acres of other Waters of the U.S. (perennial channel), and 162 linear feet of perennial channel. Impacts to channels and dry washes are due to proposed storm drain improvements such as debris basins and the water quality swale. Specifically outfall structures (culverts) from the basins and swale to the storm drain system and receiving waters.
Vegetation and Wildlife		X	No changes identified.
Threatened, Endangered, and Other Sensitive Species	X		UDOT is currently in consultation with UFWS regarding potential impacts and has proposed the project may effect, but is not be likely to adversely affect, western yellow-billed cuckoo, southwest willow flycatcher, Colorado pikeminnow, razorback chub and bonytail.

Environmental Resource	Changed?		Comments
	Yes	No	
Invasive Species		X	No changes identified.
Paleontology, Archaeological, and Historic Resources	X		No change to impacts. An Intensive level Archaeologic Survey and a selective-reconnaissance level survey for architectural properties were conducted. The current segment would result in a finding of No Adverse Effect for 2 architectural properties and 2 Section 4(f) de minimis impacts, and a finding of No Historic Properties Affected for all remaining architectural properties and archaeological sites.
Hazardous Materials or Waste		X	No changes identified.
Visual Quality		X	No changes identified.
Cumulative Effects		X	No changes identified.
Section 4(f)	X		Four Section 4(f) resources have been identified in the current segment study area. Based on impacts, avoidance, minimization, and mitigation measures, UDOT has determined that the project would have no impact on one resource (Matheson Wetland Preserve), and the remaining three resources would not be adversely affected and therefore impacts to the three resources would be de minimis.

Public Involvement Efforts for the Re-evaluation

UDOT held public meetings/open houses on February 20, 2018 and June 27, 2018, at the Moab City Hall Council Chambers to receive input on the proposed design modifications. The meetings were advertised by email, hand delivered notices, Moab City's media, and local radio and newspaper. The focus of the open houses was to present UDOT's current roadway design for US-191 from 400 North to SR-128. Aerial maps showing the corridor were posted in two areas; these maps allowed residents and stakeholders to see their property and home in relation to the proposed alignment. Project team members explained the boards to the attendees and helped the attendees understand the proposed design changes. The boards highlighted the roadway and storm drain components of the design modifications.

At Open House 1 there were 32 stakeholders that signed the attendance sheet. At Open House 2 there were 28 stakeholders that signed the attendance sheet. At Open House 1 there were 4 written comments received and 14 online comments received - 18 total comments. At Open House 2 there were 3 written comments received and no additional online comments received.

Online comments for both open houses were received at https://arcg.is/4mSyP, the online comment form remains active as a way for the public to continue to make comments. The project advertised email

account at shenriksen@utah.gov also receives comments from the stakeholders. The project website remains active at udot.utah.gov/go/moabnorthmain

Most of the comments from the open houses concerned business disruption during construction and the loss of parking on Main Street.

The project team has met with and is continuing to meet with local government staff and officials and other stakeholders to address issues and concerns identified during the design process.

Environmental Analysis for the Re-evaluation

In 2018, UDOT evaluated the expected impacts to the natural and built environment from the current segment. The expected impacts of this segment include impacts from of US-191 between 400 North and SR-128. Table 1 above summarizes the changes to the environmental impacts. No substantial changes would occur to the natural or built environment as a result of this segment that would significantly affect the quality of the human and natural environment. The impacts of these changes are not individually or cumulatively significant or significantly different from those described in the 2007 Final EA and FONSI.

Land Use

The 2007 EA identified 0.3 acres of ROW impacts as part of the Preferred Alternative. The current segment would convert to a transportation corridor about 1.62 additional acres that were not identified as impacts as part of the EA Preferred Alternative, for a total of 1.92 acres.

The 2007 EA also identified the need for 2.6 acres and 3.6 acres for permanent and temporary easements, respectively. This segment would require a total of 4.23 acres and 2.73 acres for permanent and temporary easements. The additional land-use impacts are needed to accommodate the current segment's storm drain system, sedimentation basins, and water quality swale that were not included as part of the EA Preferred Alternative.

The land-use impacts of this segment would be similar to those analyzed in the Final EA for the EA Preferred Alternative, and the result of the analysis would not change.

Pedestrian and Bicyclist Issues

The 2007 EA identified a future Grand County non-motorized paved path along the east side of US-191 from 600 North to SR-128. This path has since been constructed from SR-128 to approximately 500 West. Construction of this segment would extend the path to the new Emma Boulevard intersection being constructed with this project. This would include an at-grade crossing using a HAWK (High-Intensity Activated crosswalk) signal. Moab City is planning a series of bike/ped facilities parallel to US-191 that would be accessible via this new crossing.

Noise

For this EA re-evaluation, a noise analysis was conducted according to the most recent UDOT Noise Abatement Policy updated June 2017. The original noise analysis conducted for the 2007 EA followed the March 8, 2004 UDOT Traffic Noise Abatement Policy. A copy of the Noise Technical Memo is attached as Appendix B.

The traffic noise level updates were modeled using the FHWA Traffic Noise Model, version 2.5. The model was used to predict traffic noise impacts from the current segment.

Four barriers to abate noise were modeled and analyzed, compared to two barriers in the 2007 EA. Similar to the 2007 EA, none of these barriers met the requirements for feasibility and reasonableness.

For undeveloped lands, the distances were calculated to the 71 dBA and 66 dBA noise impact distance as per the 2017 guidance, and are shown below. The 2007 EA approximated 65 dBA and 70 dBA contour distance. The 65 dBA distance within the re-evaluation area was 140 feet between 400 North and the Colorado River. The respective 70 dBA contour was 60 feet.

Table 2 – Distance to NAC Levels for Undeveloped Lands

Location	Distance to 71 dBA (ft)	Distance to 66 dBA (ft)
Between Moab Valley RV Resort & Campground and Archway Inn	40	160
Between Holiday Inn Express & Suites and Slickrock Campground	50	165
Between Rubicon Trail intersection and Motel 6	75	225
Between Super 8 and residential neighborhood	85	200
Between N Mi Vida Dr and residence (2 Rosalie Ct)	40	130
Residence (3 Rosalie Ct) and Ultimate UTV Adventures	50	150

Please see the Noise Technical Memo in Appendix B for a detailed discussion of the noise impacts and abatement analysis.

Water Quality

Impacts identified for the Preferred Alternative in the 2007 EA were based on conceptual level designs and included storm drainage improvements. The Water Resources section of the EA identified the need for detention basins and conveyance of runoff via future city/county systems but deferred further analysis until those systems were in place and/or the design had progressed. The 2017 City of Moab Storm Water Master Plan identified a need for storm drain improvements in the vicinity of US-191

including debris basins to the east, a conveyance network consisting of storm drain laterals, trunk lines, and pipe culverts generally discharging to the west to detention basins or to receiving waters, and various water quality BMPs.

The current US-191 design would include a new stormwater system, three sedimentation basins, a vegetated water quality swale, a sedimentation dropout channel, and several new outfalls outside the 2007 EA study boundary. The majority of the storm water discharge would be to the Colorado River through an interconnected system of channels, wetlands, ponds, and overland flow through the Matheson Wetland Preserve.

Copper, lead, and zinc are the dominant toxic pollutants in highway stormwater runoff. UDOT recently investigated the effectiveness of vegetated swales to remove total suspended solids and trace metals from stormwater runoff at the Mountain View Corridor (Salt Lake County) (UDOT unpublished data 2018). UDOT and the project team acknowledges that the MVC and US-191 settings differ in elevation and climate conditions but felt that the results were still relevant to the US-191 project. The pollutant removal results are compared with previous EPA and National Cooperative Highway Research Program (NCHRP) results in Table 3.

Table 3. Comparison of Pollutant Removal Effectiveness of Vegetated Swales.

Pollutant	Pollutant Removal of Vegetated Swales - %		
	EPA Stormwater Technology Fact Sheet – Vegetated Swales[1]	NCHRP Report 792 Long-Term Performance of Stormwater BMPs[2]	UDOT Wet Weather Sampling Results[3] 2017 & 2018
Total Suspended Solids (TSS)	81	75	65 to 77
Copper	51	64	38 to 71
Lead	67	67	44 to 72
Zinc	71	80	56 to 80

[1]USEPA 1999; [2]NASEM 2014; [3]UDOT unpublished data 2018

The UDOT results indicate that the Mountain View Corridor vegetated swale was effective in removing a high percentage of TSS and metal pollutants, and the swale effectiveness was generally consistent with previous findings from other studies. The lower range of pollutants removed was slightly lower than the EPA and NCHRP studies. However, after passing through the water quality swale, the stormwater would then be conveyed through an existing channel and ponds before entering the Matheson Preserve wetlands area. The improved water quality treatment system would provide cleaner water to the wetland than what is currently being delivered via roadway culverts and sheet flow.

Overall, the proposed project is considered a net benefit since it would improve water quality through sediment drop out and heavy metal removal in the swale and through the wetlands. Please see the

Threatened, endangered, and Other Sensitive Species discussion below and the Biological Assessment in Appendix D for a detailed discussion of water quality and evaluation of potential effects (both beneficial and adverse) of new project components on federally listed species and designated critical habitats.

Wetlands

The 2007 EA identified 0.07 acres of impacts to wetlands. The current design for this segment would impact 0.29 acres of wetlands, 0.09 acres of other Waters of the U.S. (perennial channel), and 162 linear feet of perennial channel. Impact avoidance and minimization efforts included shifting the alignment, steepening side slopes, and using retaining walls where feasible. A Section 404 Permit would be obtained prior to discharging dredged or fill material into waters of the United States, including wetlands. Mitigation measures and other conditions outlined in the Section 404 Permit would be complied with.

A copy of the Draft Delineation of Wetlands & Waters of the US report is attached as Appendix C.

Threatened, endangered, and Other Sensitive Species

UDOT is currently in consultation with UFWS regarding potential impacts associated with the proposed activities. In its Biological Assessment, UDOT has proposed that the project may effect, but is not be likely to adversely affect, western yellow-billed cuckoo, southwest willow flycatcher, Colorado pikeminnow, razorback chub and bonytail. No direct impacts to these species are anticipated. Indirect effects associated with the presence of suitable habitat near the project area would be mitigated and are anticipated to be insignificant and discountable. Additionally, there is potential for beneficial effects due to improvements in water quality. Details of the effects analysis are included in the Biological Assessment, attached as Appendix D.

Historic, Archaeological, and Paleontological Resources

As part of the Re-evaluation process, a supplemental cultural resource inventory was conducted in April 2018 for those areas that were not previously inventoried during the EA process. A cultural resources report was prepared and submitted to the Utah State Historic Preservation Officer (SHPO) during the National Historic Preservation Act Section 106 consultation process. The Utah SHPO concurred with the Determination of Eligibility and Finding of Effect. A copy of the Determination of Eligibility and Finding of Effect is provided in Appendix E.

The area of potential effects (APE) has been defined as the linear 200-foot-wide corridor along US-191 as well as the additional drainage areas, comprising approximately 103 acres. The APE for architecture extended to all parcels adjoining the APE.

The APE has been surveyed for archaeology by AECOM, under State Antiquities Project Number U18OM144, and the results are reported in US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey (Appendix E). An intensive level pedestrian survey was conducted using 15 meter transects to identify archaeological resources in undeveloped areas. Any previously documented sites were revisited. A selective-reconnaissance level

survey was conducted to record architectural properties, and the results are reported in A Selective Reconnaissance-Level Historic Structures Assessment for the US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah (Appendix E). This survey updated documentation on buildings that were recorded during the original EA, noted those that had since been demolished, and documented any building that had become historic since 2006.

The surveys have resulted in the identification of 9 archaeological sites and 16 architectural properties. All of the archaeological sites and nine of the architectural properties are previously documented. In total, 2 archaeological sites and 5 architectural properties are eligible to the National Register of Historic Places (NRHP). No known traditional cultural properties or paleontological resources are located in the APE. The Determinations of Eligibility and Findings of Effects (for both Section 106 and Section 4(f)) are provided in a copy of the Determination of Eligibility and Finding of Effect (DOEFOE) in Appendix E. Please see Appendix E for the attached notification letter regarding Section 4(f) de minimis impacts.

- Archaeological Resources - Description of Effect to Site 42GR5569 (Elk Mountain Mission Fort): All archaeological sites will be avoided by this project. The project is acquiring a 30 foot-wide perpetual storm drain easement for the construction and maintenance of the storm drain system. The location of the storm drain will be approximately 15 feet south of the fence and property line which forms the southern boundary of the Elk Mountain Mission Fort site. The drain will include a 72" wide pipe buried in a shallow trench until it reaches the detention basin outfall.

  The construction specifications will limit construction methods within this easement and will specifically reference *UDOT Standard Specification 01355 Part 3.8, Discovery of Historical Archaeological, or Paleontological Objects, Features, Sites or Human Remains*. Limitations for this construction will include stockpiling all materials south of the proposed storm drain alignment, which will limit the potential for accidental impacts to the Elk Mountain Mission Fort site. Vibrations will be minimized in this area by the use of flowable fill or other static compaction methods, and this method will be applied to 100 feet either side of the site boundary. Temporary environmental fencing will also be installed along the fence line for additional visibility, and an archaeological monitor will be present during all ground disturbing and compaction activities. Although historic activity south of the fort ruins is not clear, this area has a moderate likelihood of artifact or feature discovery during construction. The area has previously been disturbed by landowner activity.

- Architectural Properties - Description of Effects: All architectural properties eligible for the NRHP will be avoided during this project. Two properties (995 N. Main St. and 643 Stewart Canyon) will have perpetual easements and temporary construction easements to blend landscaping and property access with the new road alignment. These features do not impact any features that contribute to the significance of the properties and therefore the project will result in No Adverse Effect and a de minimis Section 4(f) impact.
- Consultation Efforts – Native American consultation of those tribes that expressed interest in this project during the 2007 EA. Notifications of the re-evaluation were sent to the Hopi Tribe

and the Paiute Indian Tribe of Utah, (sent March 27, 2018). The Hopi Tribe requested continued consultation on this project.

The current segment would result in a finding of No Adverse Effect for 2 archaeological sites and 2 Section 4(f) de minimis impacts, and a finding of No Historic Properties Affected for all remaining architectural properties and archaeological sites. Therefore, the Finding of Effect for the proposed UDOT Project No. F-0191(152)126; US-191, North Moab to Colorado River Bridge, Moab, Grand County, Utah, is No Adverse Effect.

Section 4(f)

The 2007 EA identified five Section 4(f) resources within the study area, four recreation sites and one wetland preserve. Of these five resources, only the Matheson Wetland Preserve is within the current segment study area.

In addition to the Matheson Wetland Preserve, three additional Section 4(f) resources have been identified in the current segment study area. These resources and their respective jurisdictional authorities include:

- Matheson Wetland Preserve – Utah Division of Wildlife Resources (DWR)
- Paved Multi-Use Trail east of US-191 – Grand County/Moab City
- 995 North Main Street – SHPO
- 643 Stewart Canyon – SHPO

UDOT has determined that the project would have no impact on the Matheson Wetland Preserve. The remaining three resources would not be adversely affected and therefore impacts to the three resources would be de minimis.

De Minimis Findings

UDOT can comply with Section 4(f) by finding that the program or project will have a de minimis impact on the area – i.e., there are no adverse effects of the project and the relevant SHPO or other official with jurisdiction over a property concurs.

De minimis impacts related to historic sites are defined as the determination of either "no adverse effect" or "no historic properties affected," in compliance with Section 106 of the National Historic Preservation Act.

De minimis impacts on publicly owned parks, recreation areas, and wildlife and waterfowl refuges are defined as those that do not "adversely affect the activities, features, and attributes" of the Section 4(f) resource, as noted in FHWA's guidance on applying the Section 4(f) de minimis impact criteria (FHWA, 2006b).

The de minimis impact finding is based on the degree or level of impact including avoidance, minimization, and mitigation or enhancement measures that are included in the project to address the Section 4(f) use. In addition, the responsible official(s) with jurisdiction over the resource must agree in

writing that the impact is de minimis. For reasons explained in this section for each property, it is UDOT's opinion that the current segment of the US-191 project would not adversely affect the activities, features, and attributes of the Section 4(f) sites after taking into consideration mitigation and enhancement measures.

- Multi-use Trail – Area masterplans have long shown a continuous trail network along the project corridor and throughout the region. The 2007 EA identified a future meandering, paved path for non-motorized access from Moab City to the planned Colorado River Bridge. The EA further identified these non-motorized facilities as part of the cumulative effects of the US-191 project and anticipated they could be included in the project or proceed independent of the proposed project. The trail was built from 500 West to SR-128 as an independent project.

  The current US-191 design would extend the multi-use trail to the new Emma Boulevard intersection being constructed with this project. This would include an at-grade crossing using a HAWK (High-Intensity Activated crosswalk) signal.

  Existing trails would remain open for use during peak tourist season. Site specific locations may require temporary closures at other times when construction activities would make it unsafe for use by pedestrians and bicyclists. UDOT would coordinate with Moab City for trail closures and provide detours during construction. Proposed roadway shoulders, sidewalks, and crossings, as well as restoration of disturbed trails would improve the safety of bicyclists and pedestrians along US-191 and would also increase connectivity of non-motorized trails within the area. UDOT determined that the project's use of this trail would not adversely affect the activities, features, and attributes of the trail after taking into consideration mitigation and enhancement measures.

  Impacts, avoidance, minimization, and mitigation measures have been developed in consultation with the official(s) with jurisdiction. Coordination with representatives from Moab City and Grand County has been on-going since the initiation of the re-evaluation. A letter requesting concurrence with the above finding will be sent to Moab City and Grand County. If Moab City and Grand County concur with the above finding, consultation requirements of Section 4(f) will be satisfied.

- 995 North Main Street & 643 Stewart Canyon – A selective-reconnaissance level survey was conducted to record architectural properties for this segment of the US-191 Moab to the Colorado River Bridge Project. This survey updated documentation on buildings that were recorded during the original EA, noted those that had since been demolished, and documented any building that had become historic since 2006.

  The survey resulted in the identification of 16 architectural properties, nine of which were previously documented. Five architectural properties are eligible to the National Register of Historic Places (NRHP). All architectural properties eligible for the NRHP would be avoided

during this project. Two properties (995 N. Main St. and 643 Stewart Canyon) would have perpetual easements and temporary construction easements to blend landscaping and property access with the new road alignment. These easements do not impact any features that contribute to the significance of the properties and therefore the project will result in No Adverse Effect and a de minimis Section 4(f) impact.

See discussion in *Historic, Archaeological, and Paleontological Resources* and copy of the Determination of Eligibility and Finding of Effect (DOEFOE) (for both Section 106 and Section 4(f)) in Appendix E.

Conclusion

The Final EA and Section 4(f) Evaluation for the US-191 North Moab to the Colorado River Bridge has been re-evaluated as required by the FHWA regulations found in 23 CFR 771, FHWA Technical Advisory T6640.8A, and the National Environmental Policy Act. Per 23 CFR 771.130(b)(1). The impacts would not be individually or cumulatively significant, nor significantly different than those described in the EA and FONSI. Therefore, UDOT recommends that the decision documented in the FONSI remain valid and that approving this change is consistent with 23 CFR 771.130(b)(1). The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by UDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT. UDOT Environmental Services requests concurrence that the Re-evaluation has demonstrated that the FONSI remains valid and that the proposed resources, impacts, and methodology documented in this environmental Re-evaluation are valid in accordance with 23 CFR 771.129(b).

Sincerely,

Brandon D. Weston
UDOT Environmental Services Director

Enclosures

EA Re-evaluation Approval
UDOT Project Number F-0191(152)126, US-191; North Moab to Colorado River Bridge, Grand County, Utah (PIN 15329)

_____ _____

Rick Torgerson, P.E. Date
Region Four Director
Utah Department of Transportation

Appendices

Appendix A – Figures

Appendix B – Noise Technical Report

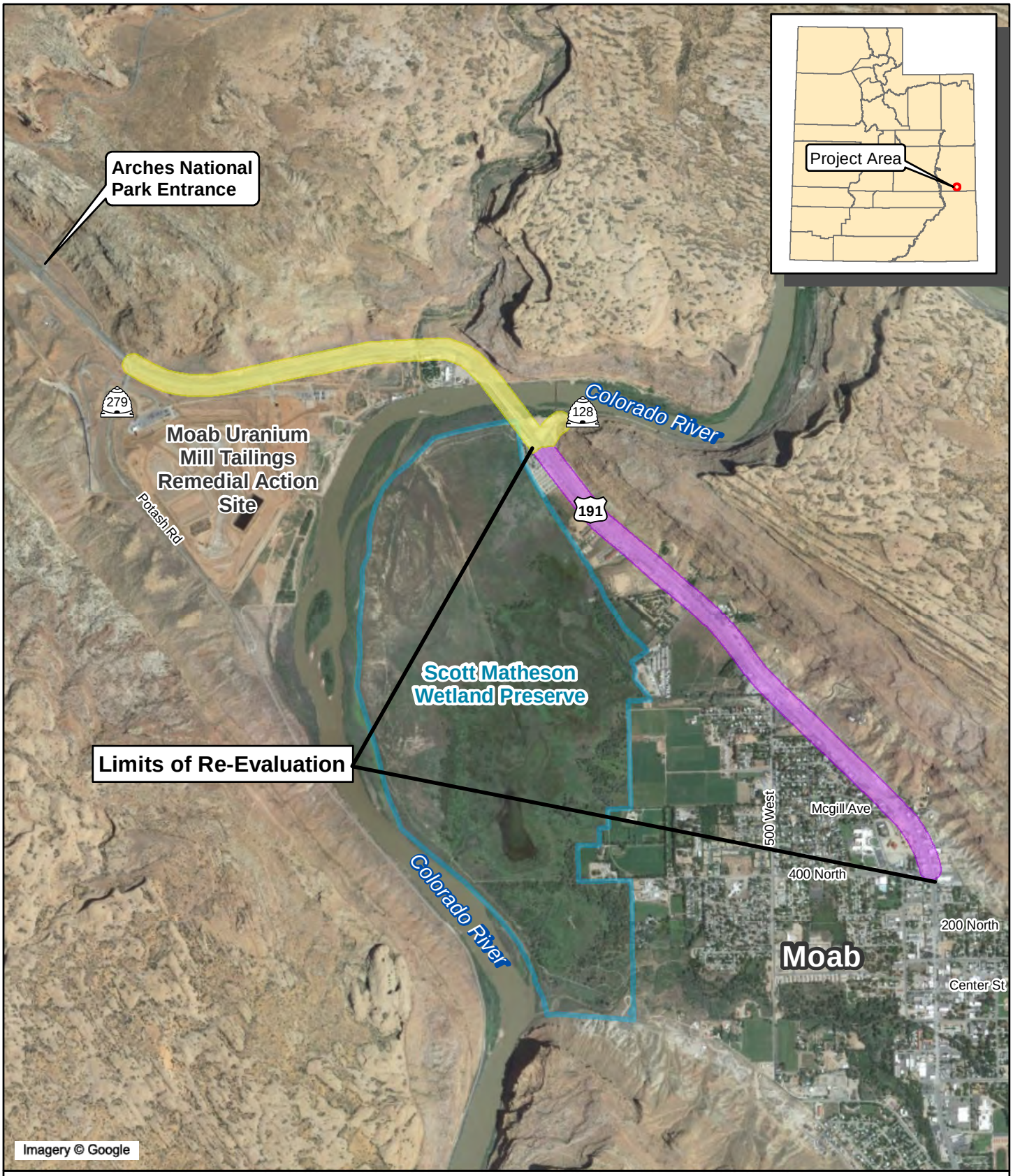
Appendix C – Draft Wetlands and Waters of the US report

Appendix D – Biological Assessment

Appendix E – Determination of Eligibility and Finding of Effect

Appendix A

Figures



Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Report\ProjectLocation.mxd

Existing Roadway (initial phase constructed)

EA Study Area (previously cleared Environmental Assessment)

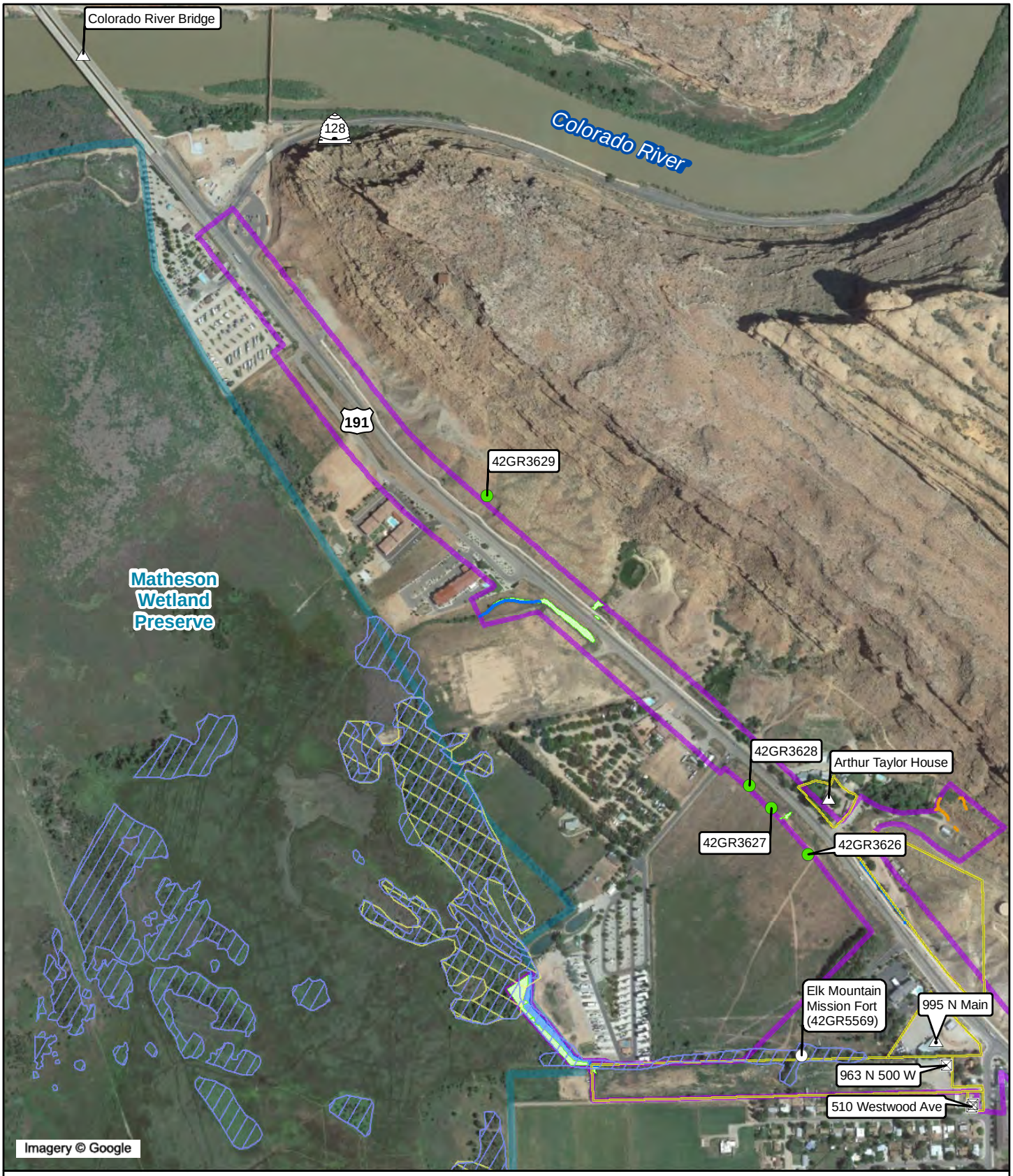
Matheson Wetland Preserve

N W E S

0 1,000 2,000 4,000 Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 1
Project Location and Limits of Re-Evaluation
EA Re-Evaluation
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018



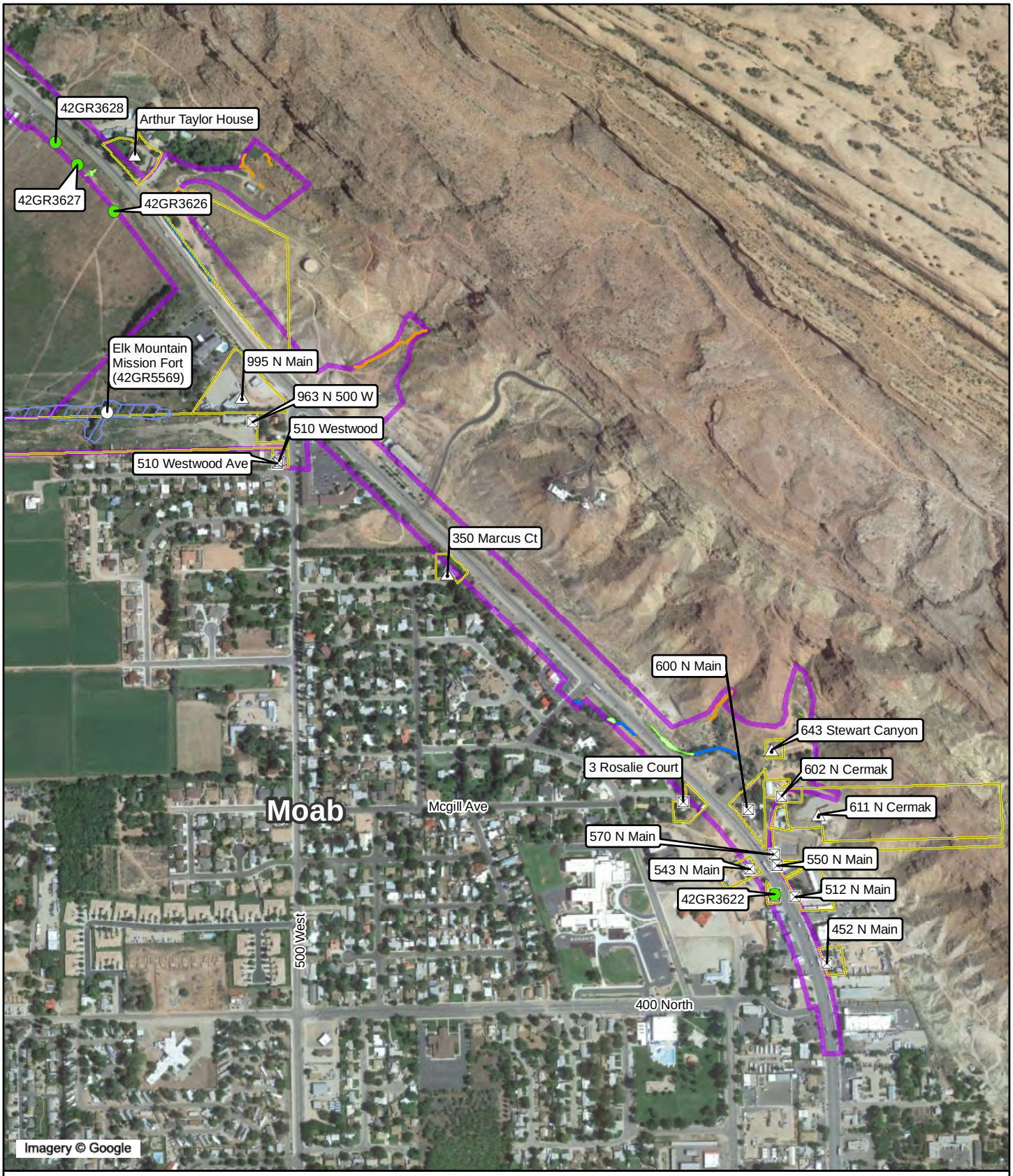
Archeological Site (listed)
Archeological Site (not eligible)
Potential SWFFL Habitat
Potential Yellow-billed Cuckoo Habitat
Perennial Channel
Dry Wash
Wetland
Open Water/Channel
Historic Site (listed)
Historic Site (eligible)
Historic Site (not eligible)
Historic Property

Data Sources: Utah AGRC, UDOT GIS

0 250 500 1,000 Feet

Figure 2
Re-Evaluation Project Area and Environmental Resources
Re-evaluation of EA
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Report\EnvironmentalResources_North.mxd



Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Report\EnvironmentalResources_South.mxd

- Archeological Site (listed)
- Archeological Site (not eligible)
- Potential SWFFL Habitat
- Perennial Channel
- Dry Wash
- Wetland
- Historic Site (listed)
- Historic Site (eligible)
- Historic Site (not eligible)
- Historic Property

0 250 500 1,000 Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 2A
Re-Evaluation Project Area and Environmental Resources
Re-evaluation of EA
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Report\ProposedImprovements.mxd

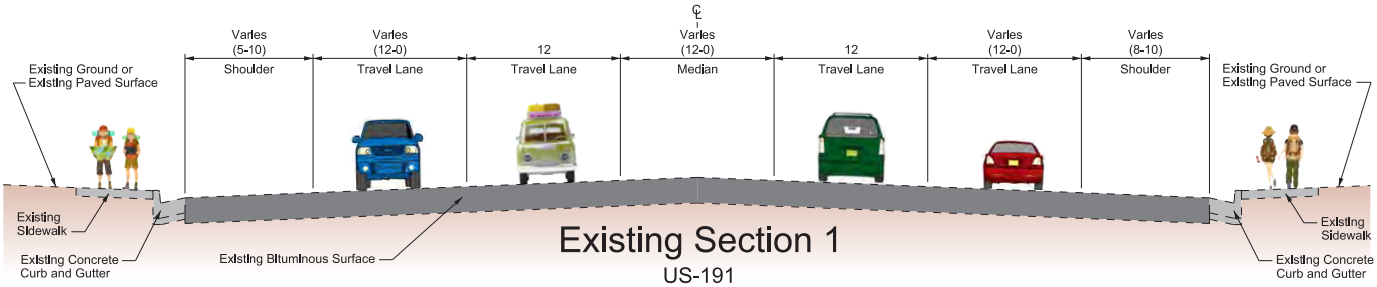
- Project Area
- Proposed Water Quality Swale
- Matheson Wetland Preserve

N
W E
S

0 500 1,000 2,000 Feet

Figure 3
Proposed Improvements and Areas of Impact for Re-Evaluation
Re-evaluation of EA
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018

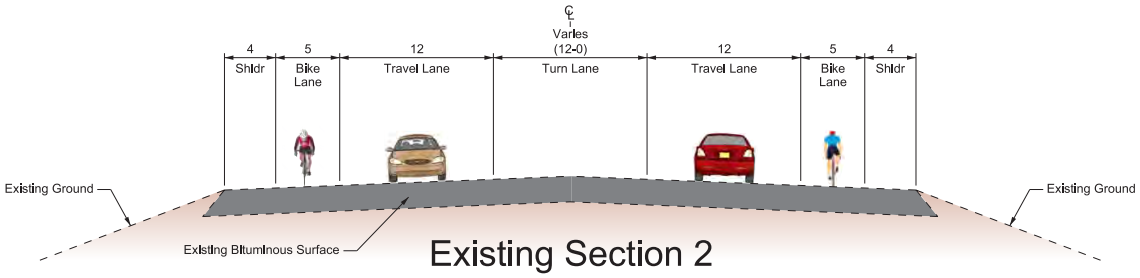
Data Sources: Utah AGRC, UDOT GIS



Existing Section 1

US-191

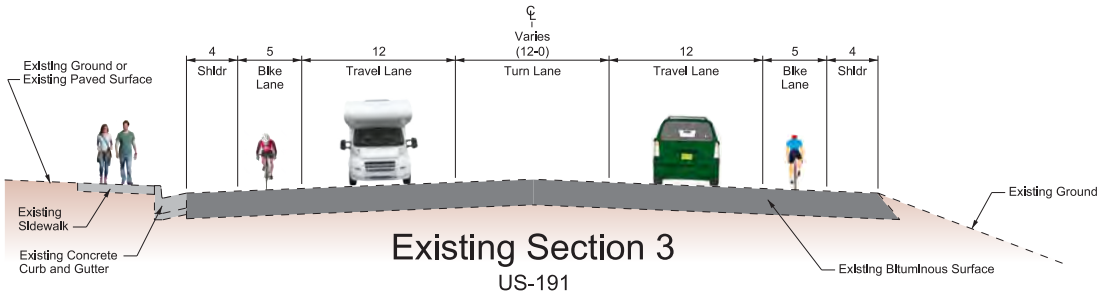
508+44.00 TO 516+78.00



Existing Section 2

US-191

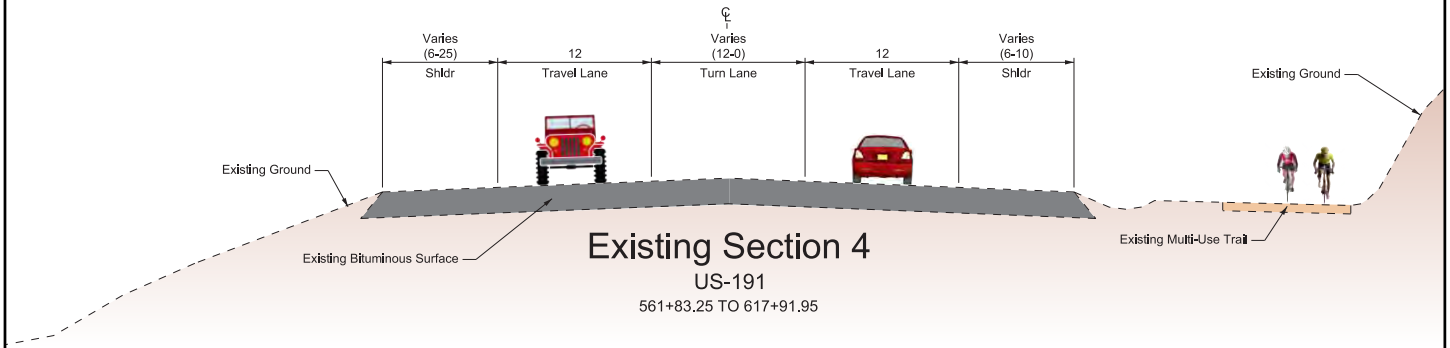
516+78.00 TO 531+33.68
534+77.44 TO 539+76.67



Existing Section 3

US-191

531+33.68 TO 534+77.44
539+76.67 TO 561+83.25

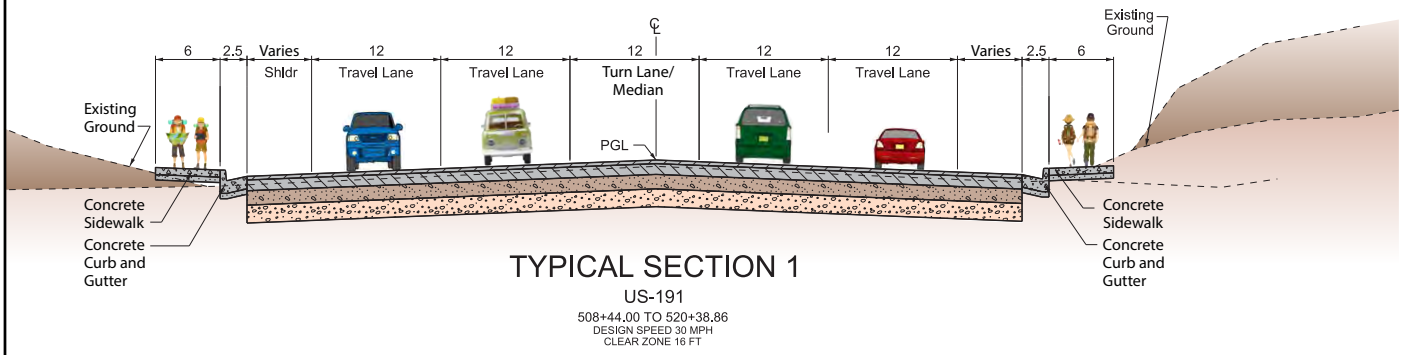


Existing Section 4

US-191

561+83.25 TO 617+91.95

Figure 4
Cross Sections
EA Re-Evaluation
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018



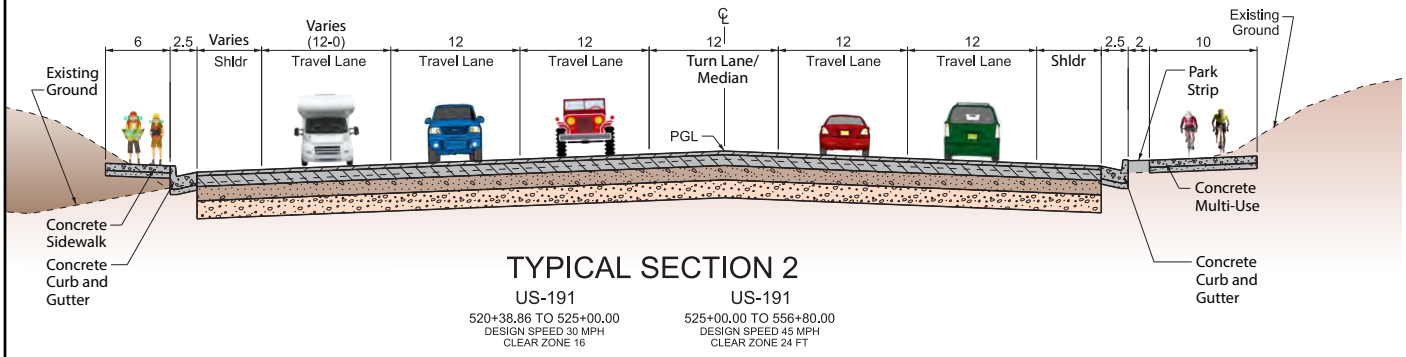
TYPICAL SECTION 1

US-191

508+44.00 TO 520+38.86

DESIGN SPEED 30 MPH

CLEAR ZONE 16 FT



TYPICAL SECTION 2

US-191

520+38.86 TO 525+00.00

DESIGN SPEED 30 MPH

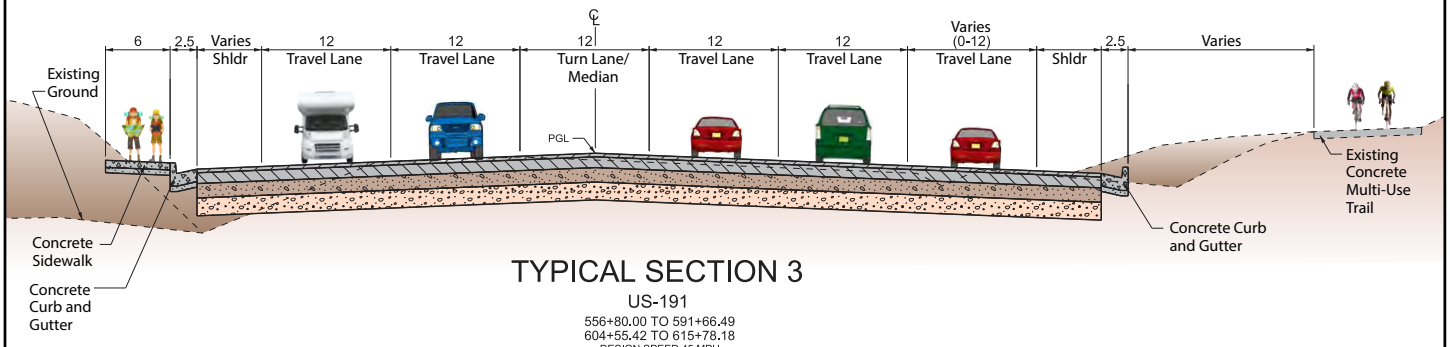
CLEAR ZONE 16

US-191

525+00.00 TO 556+80.00

DESIGN SPEED 45 MPH

CLEAR ZONE 24 FT



TYPICAL SECTION 3

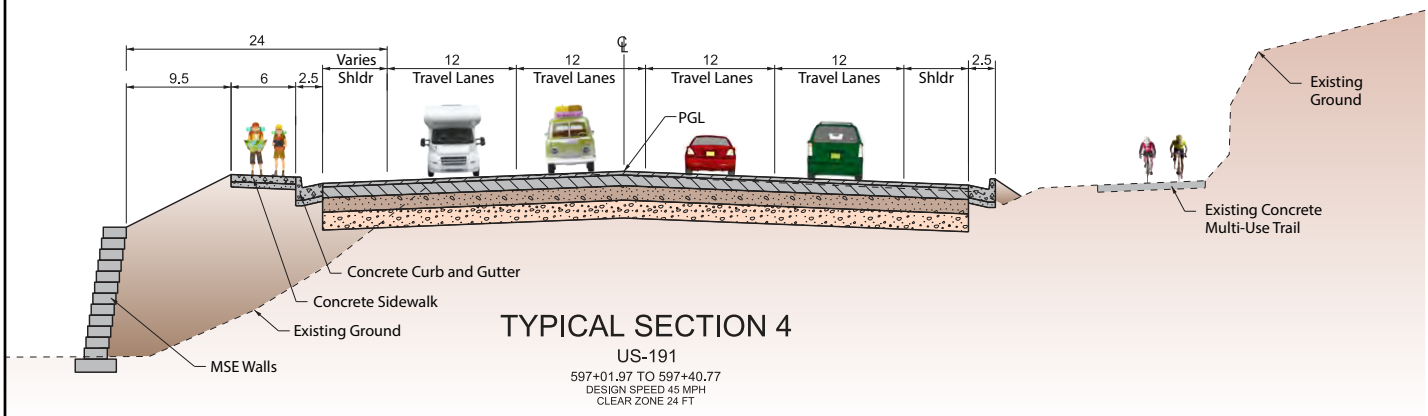
US-191

556+80.00 TO 591+66.49

604+55.42 TO 615+78.18

DESIGN SPEED 45 MPH

CLEAR ZONE 24 FT



TYPICAL SECTION 4

US-191

597+01.97 TO 597+40.77

DESIGN SPEED 45 MPH

CLEAR ZONE 24 FT

Figure 4A
Cross Sections
EA Re-Evaluation
US-191 MP 126.1 to 128.2
UDOT PIN 15329
December, 2018

Appendix B

Noise Technical Report

Utah Department of Transportation
Noise Technical Report

US-191 North Moab to Colorado River Bridge

US-191 – 400 North to SR-128

Grand County, Utah

Project No. F-0191(152)126

PIN 15329

September, 2018

The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being or have been carried-out by UDOT pursuant to 23 USC 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

Prepared by:

AECOM

756 East Winchester Street, Suite 400

Salt Lake City, UT 84107

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Appendices

List of Acronyms and Abbreviations

ANSI	American National Standards Institute
CFR	Code of Federal Regulations
dB	Decibel (measure of sound pressure level on a logarithmic scale)
dBA	A-weighted decibel (sound pressure level)
EA	Environmental Assessment
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
Leq(h)	A-weighted, energy average sound level during a 1-hour period
Lmax	Maximum measured noise level
Lmin	Minimum measured noise level
LOS	Level-of-Service
NAC	Noise Abatement Criteria
NSA	Noise Study Area
ROW	Right-of-Way
SLM	Sound Level Meter
TNM	Traffic Noise Model
UDOT	Utah Department of Transportation
USC	United States Code

Executive Summary

This noise study is a re-evaluation of potential noise impacts related to proposed improvements to US-191 in Grand County. Noise impacts were previously studied in conjunction with the Environmental Assessment (EA; Utah Department of Transportation [UDOT], 2007). Proposed improvements include adding a travel lane in each direction from 400 North in Moab to SR-128 near the Colorado River bridge. Work will be mostly within the existing roadway footprint, and all within existing UDOT right-of-way (ROW).

Analysis was conducted according to the most recent UDOT Noise Abatement Policy updated June, 2017 (UDOT, 2017). This is a Type 1 project according to UDOT Noise Abatement Policy and Federal Highway Administration (FHWA) regulations because it includes the addition of through traffic lanes.

The noise analysis included a total of five short-term measurements and 72 noise-sensitive land uses in the study area. In order to simplify the reporting and analysis of noise impacts and mitigation, these receptors were organized into 14 Noise Study Areas (NSAs) as summarized in Table 2 and shown in Figure 2.

Existing and future noise levels were predicted using FHWA approved Traffic Noise Model (TNM) version 2.5 software.

Noise impacts were predicted for 24 of the identified noise-sensitive receptors. Abatement in the form of noise walls was considered and modeled in TNM according to the UDOT Noise Policy. However, no walls were determined to meet the requirements for inclusion in the project.

For undeveloped lands, the distances were calculated to the 71 dBA and 66 dBA noise impact distance (see Table 16).

The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being or have been carried-out by UDOT pursuant to 23 USC 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

1.0 Project Description

In 2007, the Utah Department of Transportation (UDOT), in cooperation with the Federal Highway Administration (FHWA), completed an environmental assessment (EA) for the US-191 Colorado River Bridge project [Project No.: BHF-0191(27)129E]. The project involved the replacement of the US-191 bridge over the Colorado River and widening of the roadway within a 3.7-mile-long segment of US-191 from 400 North in Moab, UT to State Route (SR) 279 (Potash Road). FHWA signed the Finding of No Significant Impact (FONSI) for the project in May 2007, and UDOT subsequently completed Phase 1 of the project, which included the construction of the bridge and roadway improvements within an approximately 1.7-mile-long segment of US-191 from SR-279 to SR-128 (north of Moab).

UDOT is now planning to complete the last two miles of the project south of the Colorado River from SR-128 to 400 North in Moab. Proposed improvements to US-191 in this section include expanding the roadway to a 5-lane cross-section, including a center turn lane. Other improvements include drainage and pedestrian improvements. Specifically, the project may include the widening of the roadway to include four 12-foot-wide lanes with a 12-foot median and 6-foot shoulders. Curb and Gutter and sidewalks would be included throughout as well as extending the existing multiuse path all the way to the south. The proposed alignment would typically follow the centerline of the existing road. Sedimentation basins would be constructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. A detention basin with associated pipes and ditches would be constructed on the west side of the roadway north of Westwood Avenue.

This project is a Type 1 project according to the UDOT Noise Abatement Policy and FHWA regulations because it includes the addition of traffic lanes, and therefore requires a noise analysis.

2.0 Noise Analysis Overview

2.1 Regulatory Overview

Noise analysis for this project was conducted in conformance with FHWA guidelines for traffic noise analysis published in 23 CFR 772 and with the Utah Department of Transportation (UDOT) Noise Abatement Policy, updated June, 2017. This project is Type I because it includes the addition of through traffic lanes. According to FHWA and UDOT policy, noise impacts must be analyzed and assessed for all Type I Projects.

The environmental review, consultation and other actions required by applicable Federal environmental laws for this project are being or have been carried-out by UDOT pursuant to 23 USC 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

Noise is often characterized as unwanted sound. The magnitude, or loudness, of sound is related to fluctuation in ambient air pressure and is measured in decibels. Because the human ear is more sensitive to some frequencies than others, sound in the human environment is measured on an A-weighted scale in Decibels (dBA). Because the level of sound fluctuates over a given period of time, noise levels over time can be summarized in multiple ways. The FHWA policy and guidelines are based

on the one-hour equivalent continuous sound level (Leq(h)) for the loudest hour of the day, which represents the level in decibels which would produce the same sound energy over an hour of time.

The UDOT Noise Abatement Criteria (NAC) establishes the different land use categories for consideration of noise impacts as presented in Table 1. According to the UDOT Noise Abatement Policy, a noise impact is considered to occur when either:

- the future worst-case Leq(h) is equal to or greater than the UDOT NAC for each corresponding land use category; or
- the future worst-case Leq(h) is greater than or equal to an increase of 10 dBA over the existing noise level.

If a noise impact occurs, abatement measures must be considered.

Table 1 – UDOT Noise Abatement Criteria

Activity Category	FHWA Criteria (Leq(h)	UDOT Criteria Leq(h)[1]	Evaluation Location	Activity Description
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	66	Exterior	Residential
C	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and televisions studios.
E	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	-	-	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	-	-	Undeveloped lands that are not permitted.

1. *Hourly A-weighted sound level in decibels reflecting a 1 dBA "approach" value below 23 CFR 772 values*

Source: UDOT Noise Policy (June, 2017)

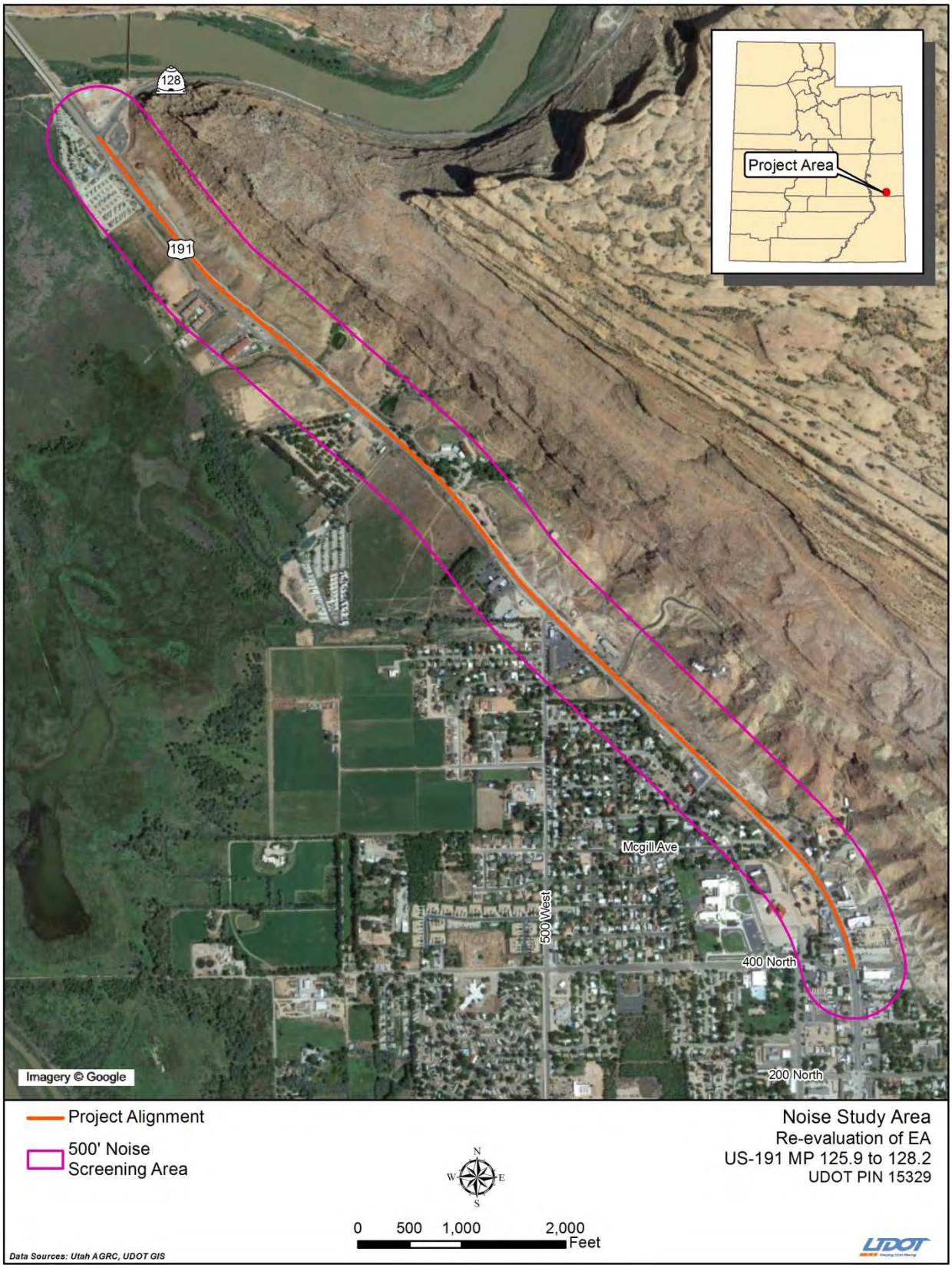


Figure 1 – Study Area

2.2 Noise Measurement Procedures

Short-term measurements were conducted in the analysis area for the purpose of validating the noise model. These were conducted using a noise meter rated by the American National Standards Institute (ANSI) as Type 1. Measurements were conducted between 15 and 20 minutes at five representative locations where frequent human use occurs. The noise meter was subjected to a field calibration check before and after each measurement, and was within one year of a certified laboratory calibration (see Appendix B for certification). All field data was recorded on field data sheets, including the time and location of the measurement, instrumentation data, concurrent traffic counts, meteorological data, as well as observed noise events during the measurement that might influence the results. See Appendix B for field data sheets and measurement site photos.

2.3 Selection of Noise Sensitive Receptors

In general, noise-sensitive receptors are selected to represent potentially impacted land uses in the Study Area within a 500-foot screening distance of the roadway. The vicinity of the proposed Project was reviewed and 72 noise-sensitive receptors were identified. Noise-sensitive land use areas identified within the project area include: residences (single- and multi-family), places of worship, hotels, restaurants with outdoor seating, the bicycle/pedestrian trail along US-191, and campgrounds.

All receptor locations (short-term measurement locations and all modeled locations) are located to represent an area of frequent exterior human use.

2.3.1 Noise Study Areas

In order to better categorize the potential noise impacts and evaluate noise abatement for the various project alternatives, all of the potentially impacted, noise-sensitive receptors have been organized into Noise Study Areas (NSAs). An NSA is generally defined as a geographical area that includes a variety of individual noise-sensitive receptor units (individual homes, apartment units, institution properties, etc.) which have a similar land use and noise environment, and if impacted, would likely be protected by a single noise abatement element, such as a noise wall. Descriptions of delineated NSAs, including location, primary land use and type of noise-sensitive receptors are listed in Table 2. See Figure 2 for an overview of the Study area with the defined NSAs as well as the modeled noise-sensitive receptors.

Table 2 – Noise Study Areas

NSA	Description	Activity Category
1	Receptors south of 400 North on the west side of the alignment (single family-homes, mobile home park, restaurant with outdoor seating)	B, E
2	Receptors east of the alignments between 400 North and Rosalie Court (single-family homes, hotels)	B, E
3	Receptors west of the alignment between 400 North and Emma Boulevard (multi-family residential, places of worship)	B, D
4	Receptors on the east side of the alignment from approximately Rosalie Court to Sunset Grill entrance (hotel)	E
5	Receptors west of the alignment between Emma Boulevard and North Mi Vida Drive (single-family homes)	B
6	Receptors west of the alignment between North Mi Vida Drive and Marcus Court (single-family homes)	B
7	Receptors west of the alignment between Marcus Court and the undeveloped lands adjacent to Motel 6 (single-family homes, hotel)	B, E
8	Receptors on the east side of the alignment from Sunset Grill entrance to approximately the 500 West intersection (hotel)	E
9	Receptors on the east side of the alignment from approximately the 500 West intersection to Arrowhead Lane (single-family home, bike path)	B, C
10	Receptors on the east side of the alignment from Arrowhead Lane to the entrance to the abandoned tram (hotel, bike path)	E, C
11	Receptors west of the alignment between the Portal RV Resort entrance and the Slick Rock Campground entrance (campground, restaurant with patio seating)	E
12	Receptors west of the alignment along Riverview Drive (hotels)	E
13	Receptors west of the alignment between the Riverview Drive intersection and the Colorado River (campground and bike path)	C
14	Receptors on the east side of the alignment from the entrance to the abandoned tram to the Colorado River (park and bike path)	C

Figure 2a –Noise Study Areas (North)

Figure 2b –Noise Study Areas (South)

2.4 Worst-Case Conditions

When determining noise impacts, traffic noise predictions must be made for the existing and future worst-case (loudest) noise hour. The worst-case noise hour is typically the peak vehicular volume hour with traffic still free-flowing. When modeling future noise levels, the UDOT Noise Policy requires the use of level of service (LOS) C conditions at the posted speed limit, unless there is a compelling reason to use an alternative speed or level of service.

2.5 Noise Abatement Requirements

The UDOT Noise Abatement Policy requires that noise abatement be considered for noise-sensitive receptors that would be impacted by the proposed Project. If no noise-sensitive receptors would be impacted, then no abatement analysis is required. The overall goal of abatement is to obtain substantial noise reductions, which may or may not result in noise levels below NAC levels. Abatement measures that may be considered include: installing noise walls, or noise insulation of Activity Category D land use facilities.

When noise walls are considered, they are analyzed for feasibility and reasonableness. Feasibility is based on engineering and acoustic considerations, including minimum required noise reduction, safety, constructability, sight distance, maximum wall height, drainage, etc. Reasonableness is based on several factors, including noise reduction, cost, and the viewpoints of benefitted receptors (property owners and residents).

2.6 Noise Modeling Methodology

Existing and future-build noise levels were predicted using the FHWA approved Traffic Noise Model Version 2.5 software (TNM), the most recent version available at the time of the analysis. Future no-build noise levels were not modeled as neither FHWA noise regulations nor UDOT noise policy require this, and doing so would not contribute to the analysis for this project. The FHWA and UDOT conventional modeling techniques and recommendations for TNM were implemented for this noise evaluation. These include the following modeling procedures and conventions:

- All roadway pavement types were modeled as “Average”.
- Traffic speeds and volumes for peak traffic hour as provided in the traffic data were modeled to predict worst-case noise levels. Traffic speeds and volumes used in this analysis are listed in Appendix C.
- Existing terrain lines (topography) were modeled where appropriate.
- Appropriate flow control devices were modeled as appropriate
- All TNM model runs were detail checked for accuracy by an independent noise analyst.

2.7 Project Traffic Data

This study is part of a re-evaluation of the 2007 EA and uses the existing traffic volumes from that analysis. These 2005 volumes were used because this is the last phase of the multi-phase project. Additionally, the 2005 traffic volumes are less than the 2016 volumes available from UDOT, thus leading to a more conservative estimate of impacts due to significant increase.

The UDOT Noise Policy requirements for future worst-case noise conditions have changed since the previous study and now require the use of level of service C (LOS C) volumes. Traffic volumes used for analysis are available in Appendix C.

3.0 Existing Noise Environment

3.1 Land Uses and Environment

The Study Area is mixed, with primarily residential land (Category B) uses and some commercial land use between 400 North and the 500 West intersections. Other land uses in this part of the project area include: hotels (Category E), restaurants (category E), and places of worship (Category C). The portion of the project area from the 500 West intersection to the Colorado River bridge is primarily hotels, campgrounds, and the bicycle/pedestrian path on the north side of US-191, all of which are Category C.

3.1.1 Noise Receptor Locations

According to the UDOT Noise Abatement Policy, noise receptor locations are normally restricted to exterior areas beyond the right-of-way (ROW) line where frequent human activity occurs, such as a residential backyard, patio, pool, or play area. Aerial photography was used to identify appropriate receptor locations where outdoor activity could be assumed to occur frequently (e.g. patio/deck, swing set, etc.).

Multiple points were used to model the bicycle/pedestrian path (NSA 9, 10, 13, 14) and the Moab Valley RV Resort and Campground (NSA 13) in order to determine the areas where noise impacts might be experienced, and to facilitate mitigation analysis.

3.2 Existing Noise Levels

3.2.1 Noise Measurements and Model Validation

Five representative noise measurements were conducted in the Study Area for noise model validation. These were conducted using a Larson Davis 820 Type 1 Sound Level Meter (SLM). See Figure 2 for noise measurement and prediction locations. Traffic counts were taken during the time periods of collection (observed traffic data is presented in Appendix C).

FHWA-approved TNM software was used to model noise levels in the Study Area. The noise measurements were used to validate the TNM model by comparing the measured noise levels to predicted noise levels for similar traffic conditions. Proper model validation helps to show that the model accurately predicts measured noise levels. The model is considered valid if the calculated levels differ from the measured levels by less than 3 dBA – the level that is generally considered perceivable to the human ear. All of the calculated levels were within 3 dBA of measured levels as indicated in Table 3.

Table 3 – Measured Noise Levels and TNM Model Validation

Measurement Site	Measured Noise Level (dBA)	Predicted Noise Level (dBA)	Difference in Measured vs. Predicted (dBA)	Model Validation
ST01	68.5[1]	66.5	2.0	Yes
ST02	60.7[1]	60.8	-0.1	Yes
ST03	62.8[1]	63.6	-0.8	Yes
ST04	61.0[1]	63.0	-2.0	Yes
ST05	55.3[1]	57.0	-1.7	Yes

1. Calibration of sound level meter was consistently about 1 dBA low, and levels have been adjusted accordingly.

3.2.2 Existing Noise Levels

Existing noise levels for the identified noise-sensitive receptors were predicted by modeling the receiver locations with TNM, using peak-hour traffic volumes from the original EA. Existing noise levels are summarized by NSA in Table 4. Individual levels can be found in Table 5. Existing traffic data is presented in Appendix C.

4.0 Future Noise Levels and Noise Impacts

Future noise levels for the noise-sensitive receptors were predicted by modeling the receiver locations using TNM software and LOS C traffic volumes for the build conditions (added traffic lanes between SR-128 and 400 North). Future levels for modeled receivers are summarized by NSA in Table 4. Individual levels can be found in Table 5. It should be noted that LOS C traffic volumes are generally considered to represent the worst-case conditions for traffic noise. Future traffic data is presented in Appendix C.

A receiver is considered impacted by traffic noise if predicted future noise levels meet or exceed the UDOT NAC, or if the predicted future noise level is greater than the existing noise level by 10 dBA or greater. Based on the analysis, 24 noise-sensitive receptors would be impacted by the proposed Project.

Table 4 – Summary of Existing and Predicted Noise Levels by NSA

NSA	# of Modeled Receptors	Range of Calculated Noise Levels , Leq(h) (dBA)		Total Number of Noise Impacted Receptors		
		Existing (Worst Hour)	2040 Build (LOS C)	Meet or Exceed NAC	Significant Increase	Total Impacts
1	4	59.2 – 69.1	60.0 – 70.2	1	0	1
2	8	60.9 – 71.7	61.8 – 73.3	3	0	3
3	4	58.4 – 63.2	59.4 – 63.3	0	0	0
4	1	66.0	67.9	0	0	0
5	10	57.2 - 69.7	58.3 - 70.8	2	0	2
6	24	57.8 - 73.0	59.9 - 75.2	9	0	9
7	11	59.8 - 69.9	62.5 - 74.6	3	0	3
8	1	69.5	71.9	1	0	1
9	2[1]	64.8 – 78.4	70.5 – 85	2[1]	0	2[1]

NSA	# of Modeled	Range of Calculated Noise Levels , Leq(h) (dBA)		Total Number of Noise Impacted Receptors		
10	1	62.6 – 74.2	67.8 – 79.3	0	0	0[1]
11	2	62.3 - 65.0	68.1 - 73.4	1	0	1
12	2	57.2 - 61.2	63.5 - 68.2	0	0	0
13	1	68.2	73.6	1	0	1
14	1	64.8 – 71.0	67.6 – 76.4	1	0	1[1]

1. The bicycle/pedestrian path along US-191 is a single noise-sensitive land use, but runs through NSAs 9, 10, and 14. Because the bicycle path varies in distance and grade in relation to the noise source, multiple points were modeled in TNM along the path to identify the range of anticipated noise levels. The noise level ranges for the different NSAs include the values calculated for the bike path, but it is only counted as a receptor in NSA 9.

Table 5 – Existing and Future Noise Levels

Receptor	NSA	Land Use Category	UDOT NAC Leq(h)	Existing Noise (dBA)	Future Noise (dBA)	Increase Greater than 10 dBA?	Future Level Exceeds NAC?	Noise Impact?
1	1	B	66	64.5	65.9	No	No	No
2		B	66	69.1	70.2	No	**Yes**	**Yes**
3		B	66	59.2	60	No	No	No
4	2	E	71	60.9	61.8	No	No	No
5	1	E	71	62.9	63.5	No	No	No
6	2	E	71	71.7	73.2	No	**Yes**	**Yes**
7	3	D	66	58.8	59.4	No	No	No
8		B	66	63.1	63	No	No	No
9	2	E	71	66.1	67.3	No	No	No
10	3	D	66	58.5	59.3	No	No	No
11	2	E	71	70.3	71.9	No	**Yes**	**Yes**
12	3	D	66	59.3	60.3	No	No	No
13	2	E	71	70.5	72	No	**Yes**	**Yes**
14	5	B	66	57.1	58.3	No	No	No
15		B	66	57.7	58.9	No	No	No
16		B	66	68.2	69	No	**Yes**	**Yes**
17		B	66	64.3	65.2	No	No	No
18		B	66	61.3	62.5	No	No	No
19	2	B	66	64	65.4	No	No	No
20		B	66	61.8	63.4	No	No	No
21		B	66	62.1	63.7	No	No	No
22	5	B	66	69.7	70.9	No	**Yes**	**Yes**
23		B	66	64.9	65.7	No	No	No
24		B	66	62.1	63.7	No	No	No
25		B	66	62.2	63.9	No	No	No
26		B	66	59.9	61.9	No	No	No

Receptor	NSA	Land Use Category	UDOT NAC Leq(h)	Existing Noise (dBA)	Future Noise (dBA)	Increase Greater than 10 dBA?	Future Level Exceeds NAC?	Noise Impact?
27	6	B	66	59	61.2	No	No	No
28		B	66	57.8	59.9	No	No	No
29		B	66	62	64.7	No	No	No
30		B	66	61.9	64.8	No	No	No
31		B	66	62.9	66	No	**Yes**	**Yes**
32		B	66	63.7	66.8	No	**Yes**	**Yes**
33		B	66	59.1	61	No	No	No
34		B	66	59.7	61.6	No	No	No
35		B	66	60.7	62.4	No	No	No
36		B	66	64.1	66.9	No	**Yes**	**Yes**
37		B	66	64.4	66.8	No	**Yes**	**Yes**
38		B	66	64.8	66.7	No	**Yes**	**Yes**
39		B	66	63.2	64.6	No	No	No
40		B	66	61.1	62.4	No	No	No
41		B	66	59.5	60.6	No	No	No
42		B	66	65.3	66.6	No	**Yes**	**Yes**
43		B	66	61.4	62.2	No	No	No
44		B	66	59.8	60.7	No	No	No
45		B	66	72.5	74.4	No	**Yes**	**Yes**
46		B	66	68	68.7	No	**Yes**	**Yes**
47		B	66	66.2	66.3	No	**Yes**	**Yes**
48		B	66	64	64.3	No	No	No
49		B	66	62.6	63.2	No	No	No
50		B	66	61	61.8	No	No	No
51	4	E	71	66	67.9	No	No	No
52	7	E	71	67	68.5	No	No	No
53		B	66	60.2	62.3	No	No	No
54		B	66	61.3	63.6	No	No	No
55		B	66	60.6	63.1	No	No	No
56		B	66	59.8	62.4	No	No	No
57	8	E	71	69.4	71.9	No	**Yes**	**Yes**
58	7	B	66	64.2	66.9	No	**Yes**	**Yes**
59		B	66	62.4	65.2	No	No	No
60		B	66	61.3	64.3	No	No	No
61		B	66	60.2	63.3	No	No	No
62		B	66	69.5	72.2	No	**Yes**	**Yes**
63		E	71	66	72	No	**Yes**	**Yes**
64	9	B	66	64.4	70	No	**Yes**	**Yes**

Receptor	NSA	Land Use Category	UDOT NAC Leq(h)	Existing Noise (dBA)	Future Noise (dBA)	Increase Greater than 10 dBA?	Future Level Exceeds NAC?	Noise Impact?
Bike Path	9, 10, 14	C	66	68.6 - 78.4	73.8 - 85.0	No	**Yes**	**Yes**
65	10	E	71	62.6	67.8	No	No	No
66	11	E	71	59.9	66.1	No	No	No
67		C	66	64	70.9	No	**Yes**	**Yes**
68	12	E	71	58.2	65	No	No	No
69		E	71	56.5	63.7	No	No	No
70 - Playground North	13	C	66	67	70.9	No	**Yes***	**Yes***
70 - Chess Board South		C	66	65.3	69.7	No	**Yes***	**Yes***
71	14	C	66	64.8	68.5	No	**Yes**	**Yes**

**Receptor 70 was modeled with multiple points, though it is counted only once as an impacted land use*

5.0 Abatement Analysis

In accordance with the UDOT Noise Policy, noise abatement measures were considered for impacted receivers in the form of noise walls (no Activity Category D land uses were impacted). Proposed noise walls must meet the UDOT policy requirements for feasibility and reasonableness to be incorporated into the project. For a noise wall to be considered feasible, it must meet engineering and safety requirements and provide a minimum of 5.0 dBA noise reduction for at least 50% of front-row receptors. In order to avoid a damaged wall from being a safety hazard on urban non-access controlled roadways, the height of a noise wall shall be no greater than the distance from the back of curb to the noise wall. For a noise wall to be considered reasonable, it must achieve the design goal of 7.0 dBA reduction or greater in noise levels for at least 35% of front row receivers. Also, the estimated cost of construction must not exceed $30,000 per benefited residence (dwelling unit), or $360 per linear foot for non-residential receptor (e.g. park, school, etc.). A benefited receiver is defined as any impacted receiver that gets a noise reduction of 5.0 dBA or more as a result of noise abatement.

If a noise wall achieves the required reduction and meets cost effectiveness criteria, residents and property owners benefited by the proposed noise wall will be polled for their viewpoint, where benefited is defined as receiving a reduction of 5.0 dBA or more as a result of abatement. In the case of non-owner occupied residences, the property owner's vote receives a multiplier factor of 5 compared to residents (non-owners). Additionally, property owners receive one vote per unit in the case of rental homes, multi-family residences and apartments.

If at least 75% of the ballots are returned, and at least 75% of the votes are in favor, the noise wall will be included in final design. If fewer than 75% of the ballots are returned, the noise wall will not be considered reasonable.

A noise wall provides the most benefit when placed either near the noise source or near the receiver and does not have breaks or openings.

Noise walls were not modeled for the following NSAs that included impacted receptors as described below:

- NSAs 1 and 2 - US-191 is lined primarily with commercial uses and hotels with direct driveway access. Noise walls with gaps to accommodate access would not provide the minimum required noise reduction.
- NSAs 7 and 8 – the land uses adjacent to US-191 are commercial and hotels with direct driveway access. Maintaining driveway access would require gaps in the noise walls, which make them not feasible for these NSAs.
- NSA 10 – The bike path is considered a single noise sensitive land use, and runs through NSAs 9, 10, and 14. There is not room between the bike path and the proposed back of curb to place a noise wall.
- NSA 11 – A noise wall is not feasible for this NSA as maintaining driveway access for the campground and restaurant would require gaps in the wall.
- NSA 14 – The impacted receptor in this NSA is the Lions Park. A noise wall is not feasible for this NSA due to the grade difference between the highway and the park

Noise walls were modeled in TNM for several of the NSAs as described below and presented in Figures 3 through 6:

- NSA 5 – Impacted front-row receptors in this NSA are 16 and 22. A noise wall was modeled on the ROW line between the intersection with Mi Vida Drive (about MP 126.55) and approximately MP 126.35.
- NSA 6 – Impacted front-row receptors in this NSA are 31, 32, 36, 37, 38, 42, 45, 46 and 47. A noise wall was modeled on the ROW line from approximately MP 126.71 to approximately MP 126.81.
- NSA 9 – The Impacted front-row receptors in this NSA are 64 and the bicycle/pedestrian path. A noise wall was modeled on the ROW line between approximately MP 127.14 to the intersection with Arrowhead Lane (MP 127.26).
- NSA 13 – The impacted receptor in this NSA is 70 (Moab Valley RV Resort and Campground). It is not feasible to place a noise wall north of the entrance due to the bicycle path and associated retaining wall. Two noise walls were modeled for the campground south of the entrance, one on the ROW line and one at the top of slope.

5.1 NSA 5

Receivers 16 and 22 are the impacted front-row receivers in NSA 5. The ROW line in this area is 10 feet from the proposed back of curb. Per UDOT Noise Policy, this would be the maximum height of a noise wall due to safety restrictions. A noise wall was modeled between approximately MP 126.35 and the intersection North Mi Vida Drive intersection (approximately MP 126.55) with heights varying between 8 and 10 feet (see Figure 3). A noise wall 10 feet tall between MP 126.35 and MP 126.45 would provide a reduction of 7.1 dBA for receiver 22 and a reduction of 4.9 dBA for receiver 16 (see Table 6). This meets the criteria for feasible (5 dBA reduction for 50% of front-row receptors) and reasonable (7 dBA reduction for 35% of front-row receptors). Applying the $20 per square foot unit cost for construction, the proposed noise wall would cost $124,000. Only receiver 22 is benefitted as receiver 16 does not receive a reduction of at least 5.0 dBA. This exceeds the maximum of $30,000 per benefitted receptor, so the noise wall is not deemed reasonable and is not proposed for this project (see Table 7).

Table 6 – NSA5 Noise Wall Analysis Results

Receptor	Dwelling Units	Front Row?	Reduction with Noise Wall (dBA)	Impacted?	Acoustic Feasibility (5.0 dBA reduction)?	Design Goal (7.0 dBA reduction)?
16	1	**Yes**	4.9	**Yes**	No	No
17	1	No	2.2	No	No	No
18	1	No	1.3	No	No	No
22	1	**Yes**	7.1	**Yes**	**Yes**	**Yes**
23	1	No	1.9	No	No	No
Total	5	2		**2**	**1**	**1**

Table 7 – NSA5 Noise Wall Feasible and Reasonable Evaluation

Percent Front-Row 5.0 dBA Reduction	Percent Front-Row Design Goal	Benefitted Receptors	Total Estimated Cost	Cost per Benefited Receiver	Conclusion
50%	50%	1	$124,000	$124,000	**Not reasonable** (exceeds cost per benefitted receptor allowance)

Figure 3 – Modeled Noise Wall Locations – NSA5

5.2 NSA 6

Receivers 31, 32, 36, 37, 38, 42, 45, 46, and 47 are the impacted front-row receivers in NSA 6. While not directly adjacent to US-191, receivers 46 and 47 were considered front-row for analysis due to the vacant land that is on the north side between these receivers and the highway.

In order to maintain driveway access for the commercial uses facing on US-191 in this NSA, the only area a noise wall could be placed would be between approximately MP 126.71 to approximately MP 126.81 (see Figure 4). In this area, the ROW line is 10 feet from the proposed back of curb. Receivers that might be benefited by such a wall would include 42, 45, 46, and 47. A noise wall 10 feet tall would provide 8.2 dBA reduction for receiver 45, but would not provide 5.0 dBA reduction for any of the other front-row receptors (see Table 8), so the noise wall is not deemed feasible and is not proposed for this project (see Table 9).

Table 8 – NSA6 Noise Wall Analysis Results

Receptor	Dwelling Units	Front Row?	Reduction with Noise Wall (dBA)	Impacted?	Acoustic Feasibility (5.0 dBA reduction)?	Design Goal (7.0 dBA reduction)?
31	1	**Yes**	0.1	**Yes**	No	No
32	1	**Yes**	0.1	**Yes**	No	No
36	1	**Yes**	0.1	**Yes**	No	No
37	1	**Yes**	0.2	**Yes**	No	No
38	1	**Yes**	0.3	**Yes**	No	No
42	1	**Yes**	0.9	**Yes**	No	No
45	1	**Yes**	8.2	**Yes**	**Yes**	**Yes**
46	1	**Yes**	4.4	**Yes**	No	No
47	1	**Yes**	1.9	**Yes**	No	No
48	1	No	1.1	No	No	No
49	1	No	0.7	No	No	No
50	1	No	0.5	No	No	No
Total	12	9		**9**	**1**	**1**

Table 9 – NSA6 Noise Wall Feasible and Reasonable Evaluation

Percent Front-Row 5.0 dBA Reduction	Percent Front-Row Design Goal	Benefitted Receptors	Total Estimated Cost	Cost per Benefited Receptor	Conclusion
25%	25%	1	-	-	**Not feasible** (less than 50% of front-row receptors receive 5.0 dBA reduction)

Figure 4 – Modeled Noise Wall Locations – NSA6

5.3 NSA 9

The only noise-sensitive land use in NSA 9 is receiver 64, which is the residence at 1050 North Main (Hwy 191). A noise wall is most effective when placed near either the source or the receiver. In this area, the bicycle/pedestrian path is adjacent to the proposed back of curb. A noise wall was modeled on the ROW line which is 30 feet from the proposed back of curb (see Figure 5). A noise wall with segment heights varying between 14 feet and 20 feet – average height of 19.6 – would provide a 7.0 dBA reduction for receiver 64 (see Table 10). Applying the $20 unit cost, this noise wall would cost $220,036 to construct (see Table 11). This exceeds the $30,000 per benefitted receptor maximum and the noise wall is not proposed for this project.

Table 10 – NSA9 Noise Wall Analysis Results

Receptor	Dwelling Units	Front Row?	Reduction with Noise Wall (dBA)	Impacted?	Acoustic Feasibility (5.0 dBA reduction)?	Design Goal (7.0 dBA reduction)?
64	1	**Yes**	7.0	**Yes**	**Yes**	**Yes**
Total	1	1		**1**	**1**	**1**

Table 11 – NSA9 Noise Wall Feasible and Reasonable Evaluation

Percent Front-Row 5.0 dBA Reduction	Percent Front-Row Design Goal	Benefitted Receptors	Total Estimated Cost	Cost per Benefited Receptor	Conclusion
100%	100%	1	$220,036	$220,036	**Not reasonable** (exceeds cost per benefitted receptor allowance)

Figure 5 – Modeled Noise Wall Locations – NSA9

5.4 NSA 13

The noise sensitive receiver in NSA 13 is the Moab Valley RV Resort and Campground, which includes lawn areas for each RV site, and other outdoor use areas like games, a pool, and a picnic pavilion. The campground is at a lower elevation than the highway and includes an entrance in the middle of the property. While the previous noise study represented the campground as a single receptor at the swimming pool, this analysis considers the other outdoor use areas, focused primarily on the outdoor game and picnic areas adjacent to the highway.

North of the entrance, there is a paved bicycle path between the highway and the campground with a ROW fence on a retaining wall immediately adjacent. Due to these engineering constraints, a noise wall is not feasible for the part of the campground north of the entrance.

South of the entrance, the areas of outdoor human use are a mini-golf area, a game area and a picnic pavilion. Additionally, the RV sites have grassy areas with picnic tables. While the campground is a single land use, the game areas were included in the noise model for the purposes of analyzing mitigation. Two noise walls were modeled for this south portion of the campground: one at the top of slope to be nearest the source, and one on the ROW line on the toe of slope to be nearest the receiver. Both were modeled from approximately the Frontage Road intersection to the entrance to Moab Valley RV Resort and Campground (see Figure 6).

5.4.1 Top of Slope

The noise wall at the top of slope would be 14 feet from the proposed back of curb. A noise wall 14 feet tall at the top of slope would provide a 7.2 dBA reduction in noise levels for the game area (see Table 12). This wall does not provide a 5.0 dBA reduction for any of the other modeled receptors and is therefore not acoustically feasible (see Table 13). This noise wall is not proposed for this project.

Figure 6 – Modeled Noise Wall Locations – NSA13

Table 12 – NSA13 Noise Wall Analysis Results – Top of Slope

Receptor	Dwelling Units	Front Row?	Reduction with Noise Wall (dBA)	Impacted?	Acoustic Feasibility (5.0 dBA reduction)?	Design Goal (7.0 dBA reduction)?
Mini-golf	1	**Yes**	3.9	**Yes**	No	No
Games	1	**Yes**	7.2	**Yes**	**Yes**	**Yes**
Picnic Pavilion	1	**Yes**	3.8	**Yes**	No	No
Total	1	**3**		**3**	**1**	**1**

Table 13 – NSA13 Noise Wall Feasible and Reasonable Evaluation – Top of Slope

Percent Front-Row 5.0 dBA Reduction	Percent Front-Row Design Goal	Benefitted Receptors	Total Estimated Cost	Cost per Benefited Receptor	Conclusion
33%	33%	1	-	-	**Not feasible** (less than 50% of front-row receptors receive 5.0 dBA reduction)

5.4.1 Toe of Slope (ROW Line)

The noise wall on the ROW line would be at the toe of slope which is approximately 28 feet (horizontally) from the proposed back of curb. A noise wall with a height of 22 feet would provide a 9.1 dBA reduction for the outdoor game area. It would also provide a 5.0 dBA or greater reduction for the other outdoor use areas: 5.3 dBA reduction for the picnic area and 6.0 dBA reduction for the mini-golf area.

The UDOT Noise Policy does not specify an approach to analyzing impacts and mitigation for land uses such as a campground. Analysis applied similar criteria to the modeled receptors as is used for residential land uses, i.e. each front-row outdoor use area is considered a receptor and the same percentages of receptors receiving reduction of 5.0 dBA for acoustic feasibility and 7.0 dBA for design goal must be met. Under these requirements, this noise wall would not meet the design goal criteria for reasonableness, as it only provides 7.0 dBA or greater reduction for one of the 3 receptors (see Table 14). Therefore this noise wall is not proposed for the project.

Table 14 – NSA13 Noise Wall Analysis Results – Toe of Slope

Receptor	Dwelling Units	Front Row?	Reduction with Noise Wall (dBA)	Impacted?	Acoustic Feasibility (5.0 dBA reduction)?	Design Goal (7.0 dBA reduction)?
Mini-golf	1	**Yes**	6.0	**Yes**	**Yes**	No
Games	1	**Yes**	9.1	**Yes**	**Yes**	**Yes**
Picnic Pavilion	1	**Yes**	5.3	**Yes**	**Yes**	No
Total	1	**3**		**3**	**3**	**1**

Table 15 – NSA13 Noise Wall Feasible and Reasonable Evaluation – Toe of Slope

Percent Front-Row 5.0 dBA Reduction	Percent Front-Row Design Goal	Benefitted Receptors	Total Estimated Cost	Cost per Benefited Receptor	Conclusion
100%	33%	1	-	-	**Not reasonable** (less than 35% of front-row receptors receive 7.0 dBA reduction)

6.0 Conclusion and Recommendations

The noise analysis included a total of 72 identified receptors located along the proposed project. Modeling future noise levels under worst-case traffic volumes showed noise impacts to 24 receptors. Noise wall analyses were conducted for those areas with impacted receptors, but none of the modeled noise walls meet the requirements for feasibility and reasonableness.

6.1 Noise Levels on Undeveloped Lands (Information for Local Officials)

According to the UDOT Noise Abatement Policy, an estimated distance from the edge of pavement to where the worst hour Leq(h) levels of 66 dBA and 71 dBA occurs must be provided to local governments for land uses with Activity Category G. Table 16 summarizes of the distances to these levels on undeveloped lands (Category G) in the project area.

Table 16 – Distance to NAC Levels for Undeveloped Lands

Location	Distance to 71 dBA (ft)	Distance to 66 dBA (ft)
Between Moab Valley RV Resort & Campground and Aarchway Inn	40	160
Between Holiday Inn Express & Suites and Slickrock Campground	50	165
Between Rubicon Trail intersection and Motel 6	75	225
Between Super 8 and residential neighborhood	85	200
Between N Mi Vida Dr and residence (2 Rosalie Ct)	40	130
Residence (3 Rosalie Ct) and Ultimate UTV Adventures	50	150

7.0 Statement of Limitations

Portions of this report have been prepared based on certain assumptions made by AECOM which substantially affect the conclusions and recommendations of this report. These assumptions, although thought to be reasonable and appropriate, may not prove to be true in the future. Noise levels found in this report were predicted with the FHWA TNM Version 2.5 computer program as approved by UDOT for this project. This report assumes that the algorithms within the traffic noise model are correct and comply with UDOT standards for predictive noise modeling.

8.0 References

American Association of State Highway and Transportation Officials (AASHTO). A Policy on Geometric Design of Highways and Streets. 2011.

Federal Highway Administration (FHWA). 2011. Highway Traffic Noise: Analysis and Abatement Guidance. U.S. Department of Transportation, Federal Highway Administration, Washington, DC.

Federal Highway Administration, 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, July 2010.

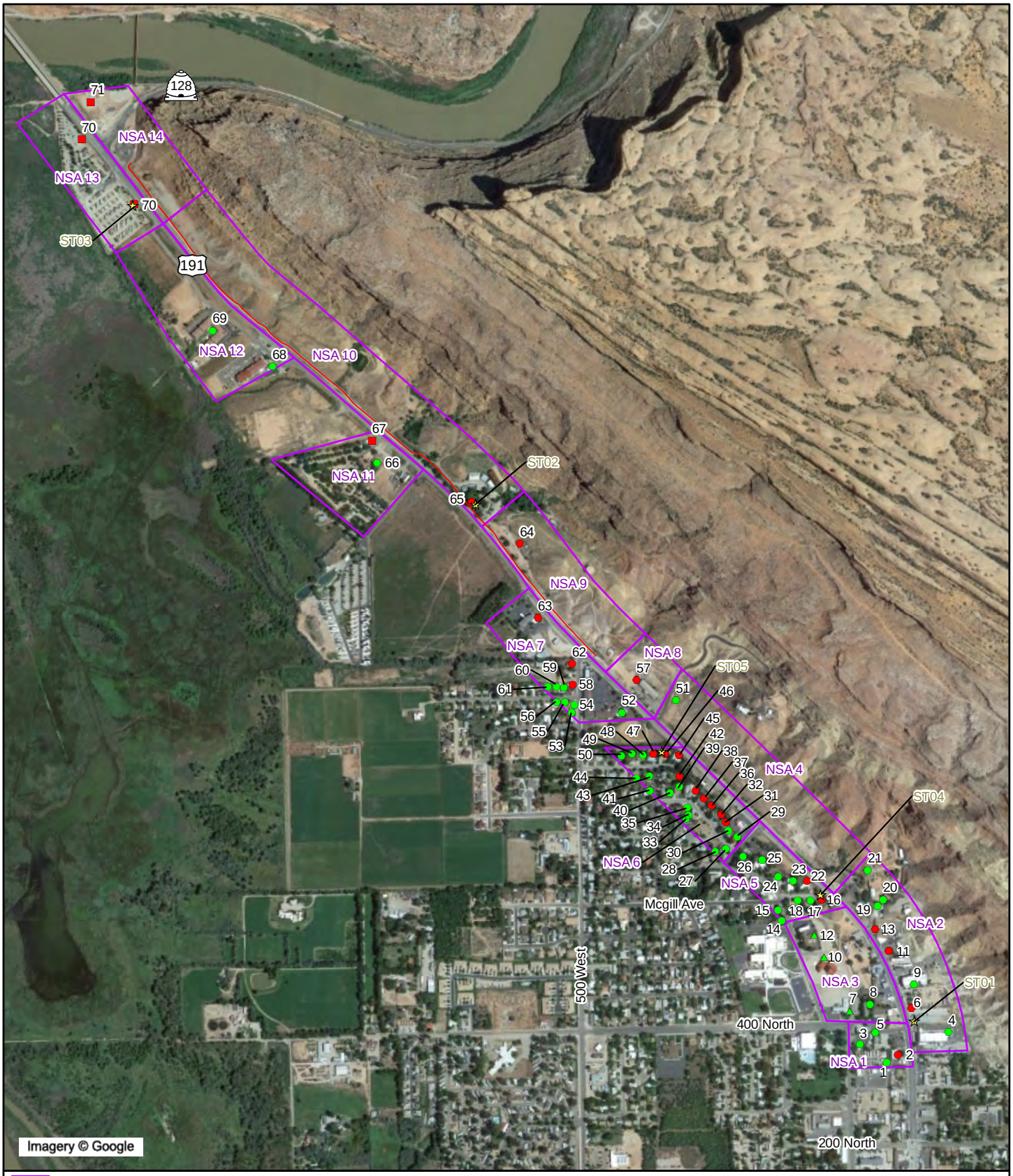
Lee, C.S.Y. and G.G. Fleming. 1996. Measurement of Highway Related Noise, Federal Highway Administration Report FHWA-PD-96-046. U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Cambridge, MA.

Utah Department of Transportation Noise Abatement Policy, UDOT 08A2-01, June 15, 2017.

Utah Department of Transportation. US-191 Colorado Bridge, Environmental Assessment. Project No. BHF-0191(27)129E. May, 2007.

Appendix A

Selected TNM Tables



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Noise Study Area

Noise Sensitive Receptor

- Category B (not impacted)
- Category B (impacted)
- Category C (impacted)
- Category D (not impacted)
- Category E (not impacted)
- Category E (impacted)
- Measurement Location
- Bike/Ped Path

N W E S

0 500 1,000 2,000 Feet

Noise Sensitive Receivers

Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS

AECOM
Seth Anderson
23 July 2018
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US-191 EA Re-evaluation
RUN: US-191 Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
1	1	1	0.0	64.5	66	64.5	10	----	64.5	0.0	7	-7.0
2	2	1	0.0	69.1	66	69.1	10	Snd Lvl	69.1	0.0	7	-7.0
3	3	1	0.0	59.2	66	59.2	10	----	59.2	0.0	7	-7.0
4	4	1	0.0	60.9	71	60.9	10	----	60.9	0.0	7	-7.0
5	5	1	0.0	62.9	71	62.9	10	----	62.9	0.0	7	-7.0
6	6	1	0.0	71.7	71	71.7	10	Snd Lvl	71.7	0.0	7	-7.0
7	7	1	0.0	58.8	66	58.8	10	----	58.8	0.0	7	-7.0
8	8	1	0.0	63.1	66	63.1	10	----	63.1	0.0	7	-7.0
9	9	1	0.0	66.1	71	66.1	10	----	66.1	0.0	7	-7.0
10	10	1	0.0	58.5	66	58.5	10	----	58.5	0.0	7	-7.0
11	11	1	0.0	70.3	71	70.3	10	----	70.3	0.0	7	-7.0
12	12	1	0.0	59.3	66	59.3	10	----	59.3	0.0	7	-7.0
13	13	1	0.0	70.5	71	70.5	10	----	70.5	0.0	7	-7.0
14	14	1	0.0	57.1	66	57.1	10	----	57.1	0.0	7	-7.0
15	15	1	0.0	57.7	66	57.7	10	----	57.7	0.0	7	-7.0
16	16	1	0.0	68.2	66	68.2	10	Snd Lvl	68.2	0.0	7	-7.0
17	17	1	0.0	64.3	66	64.3	10	----	64.3	0.0	7	-7.0
18	18	1	0.0	61.3	66	61.3	10	----	61.3	0.0	7	-7.0
19	19	1	0.0	64.0	66	64.0	10	----	64.0	0.0	7	-7.0
20	20	1	0.0	61.8	66	61.8	10	----	61.8	0.0	7	-7.0
21	22	1	0.0	62.1	66	62.1	10	----	62.1	0.0	7	-7.0
22	23	1	0.0	69.7	66	69.7	10	Snd Lvl	69.7	0.0	7	-7.0
23	24	1	0.0	64.9	66	64.9	10	----	64.9	0.0	7	-7.0
24	25	1	0.0	62.1	66	62.1	10	----	62.1	0.0	7	-7.0

25	26	1	0.0	62.2	66	62.2	10	----	62.2	0.0	7	-7.0
26	27	1	0.0	59.9	66	59.9	10	----	59.9	0.0	7	-7.0
27	28	1	0.0	59.0	66	59.0	10	----	59.0	0.0	7	-7.0
28	29	1	0.0	57.8	66	57.8	10	----	57.8	0.0	7	-7.0
29	30	1	0.0	62.0	66	62.0	10	----	62.0	0.0	7	-7.0
30	31	1	0.0	61.9	66	61.9	10	----	61.9	0.0	7	-7.0
31	32	1	0.0	62.9	66	62.9	10	----	62.9	0.0	7	-7.0
32	33	1	0.0	63.7	66	63.7	10	----	63.7	0.0	7	-7.0
33	34	1	0.0	59.1	66	59.1	10	----	59.1	0.0	7	-7.0
34	35	1	0.0	59.7	66	59.7	10	----	59.7	0.0	7	-7.0
35	36	1	0.0	60.7	66	60.7	10	----	60.7	0.0	7	-7.0
36	37	1	0.0	64.1	66	64.1	10	----	64.1	0.0	7	-7.0
37	38	1	0.0	64.4	66	64.4	10	----	64.4	0.0	7	-7.0
38	39	1	0.0	64.8	66	64.8	10	----	64.8	0.0	7	-7.0
39	40	1	0.0	63.2	66	63.2	10	----	63.2	0.0	7	-7.0
40	41	1	0.0	61.1	66	61.1	10	----	61.1	0.0	7	-7.0
41	43	1	0.0	59.5	66	59.5	10	----	59.5	0.0	7	-7.0
42	44	1	0.0	65.3	66	65.3	10	----	65.3	0.0	7	-7.0
43	45	1	0.0	61.4	66	61.4	10	----	61.4	0.0	7	-7.0
44	46	1	0.0	59.8	66	59.8	10	----	59.8	0.0	7	-7.0
45	47	1	0.0	72.5	66	72.5	10	Snd Lvl	72.5	0.0	7	-7.0
46	48	1	0.0	68.0	66	68.0	10	Snd Lvl	68.0	0.0	7	-7.0
47	49	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	7	-7.0
48	50	1	0.0	64.0	66	64.0	10	----	64.0	0.0	7	-7.0
49	51	1	0.0	62.6	66	62.6	10	----	62.6	0.0	7	-7.0
50	52	1	0.0	61.0	66	61.0	10	----	61.0	0.0	7	-7.0
52	53	1	0.0	67.0	71	67.0	10	----	67.0	0.0	7	-7.0
53	54	1	0.0	60.2	66	60.2	10	----	60.2	0.0	7	-7.0
54	55	1	0.0	61.3	66	61.3	10	----	61.3	0.0	7	-7.0
55	56	1	0.0	60.6	66	60.6	10	----	60.6	0.0	7	-7.0
56	57	1	0.0	59.8	66	59.8	10	----	59.8	0.0	7	-7.0
57	58	1	0.0	69.4	71	69.4	10	----	69.4	0.0	7	-7.0
58	59	1	0.0	64.2	66	64.2	10	----	64.2	0.0	7	-7.0
59	60	1	0.0	62.4	66	62.4	10	----	62.4	0.0	7	-7.0
60	61	1	0.0	61.3	66	61.3	10	----	61.3	0.0	7	-7.0
61	62	1	0.0	60.2	66	60.2	10	----	60.2	0.0	7	-7.0
62	64	1	0.0	69.5	66	69.5	10	Snd Lvl	69.5	0.0	7	-7.0
63	65	1	0.0	66.0	71	66.0	10	----	66.0	0.0	7	-7.0
64	66	1	0.0	64.4	66	64.4	10	----	64.4	0.0	7	-7.0
65	67	1	0.0	62.6	71	62.6	10	----	62.6	0.0	7	-7.0
66	68	1	0.0	59.9	71	59.9	10	----	59.9	0.0	7	-7.0

67	69	1	0.0	64.0	66	64.0	10	----	64.0	0.0	7	-7.0
68	70	1	0.0	58.2	71	58.2	10	----	58.2	0.0	7	-7.0
Bike Path	71	1	0.0	71.1	66	71.1	10	Snd Lvl	71.1	0.0	7	-7.0
69	72	1	0.0	56.5	71	56.5	10	----	56.5	0.0	7	-7.0
70 - Picnic Pavilion	73	1	0.0	64.2	66	64.2	10	----	64.2	0.0	7	-7.0
Bike Path	74	1	0.0	69.1	66	69.1	10	Snd Lvl	69.1	0.0	7	-7.0
70 - Chess Board North	75	1	0.0	67.0	66	67.0	10	Snd Lvl	67.0	0.0	7	-7.0
71	76	1	0.0	64.8	66	64.8	10	----	64.8	0.0	7	-7.0
ST01	78	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST02	80	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST03	82	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST04	84	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST05	86	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
51	90	1	0.0	66.0	71	66.0	10	----	66.0	0.0	7	-7.0
70 - Pool	92	1	0.0	63.2	66	63.2	10	----	63.2	0.0	7	-7.0
70 - Mini Golf	93	1	0.0	66.1	66	66.1	10	Snd Lvl	66.1	0.0	7	-7.0
70 - Chess Board South	95	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.0	0.0	0.0
All Impacted	12	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

AECOM 23 July 2018
Seth Anderson TNM 2.5
Calculated with TNM 2.5
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US-191 EA Re-evaluation
RUN: US-191 Future
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
1	1	1	64.5	65.9	66	1.4	10	----	65.9	0.0	7	-7.0
2	2	1	69.1	70.2	66	1.1	10	Snd Lvl	70.2	0.0	7	-7.0
3	3	1	59.2	60.0	66	0.8	10	----	60.0	0.0	7	-7.0
4	4	1	60.9	61.8	71	0.9	10	----	61.8	0.0	7	-7.0
5	5	1	62.9	63.5	71	0.6	10	----	63.5	0.0	7	-7.0
6	6	1	71.7	73.2	71	1.5	10	Snd Lvl	73.2	0.0	7	-7.0
7	7	1	58.8	59.4	66	0.6	10	----	59.4	0.0	7	-7.0
8	8	1	63.1	63.0	66	-0.1	10	----	63.0	0.0	7	-7.0
9	9	1	66.1	67.3	71	1.2	10	----	67.3	0.0	7	-7.0
10	10	1	58.5	59.3	66	0.8	10	----	59.3	0.0	7	-7.0
11	11	1	70.3	71.9	71	1.6	10	Snd Lvl	71.9	0.0	7	-7.0
12	12	1	59.3	60.3	66	1.0	10	----	60.3	0.0	7	-7.0
13	13	1	70.5	72.0	71	1.5	10	Snd Lvl	72.0	0.0	7	-7.0
14	14	1	57.1	58.3	66	1.2	10	----	58.3	0.0	7	-7.0
15	15	1	57.7	58.9	66	1.2	10	----	58.9	0.0	7	-7.0
16	16	1	68.2	69.0	66	0.8	10	Snd Lvl	69.0	0.0	7	-7.0
17	17	1	64.3	65.2	66	0.9	10	----	65.2	0.0	7	-7.0
18	18	1	61.3	62.5	66	1.2	10	----	62.5	0.0	7	-7.0
19	19	1	64.0	65.4	66	1.4	10	----	65.4	0.0	7	-7.0
20	20	1	61.8	63.4	66	1.6	10	----	63.4	0.0	7	-7.0
21	22	1	62.1	63.7	66	1.6	10	----	63.7	0.0	7	-7.0
22	23	1	69.7	70.9	66	1.2	10	Snd Lvl	70.9	0.0	7	-7.0
23	24	1	64.9	65.7	66	0.8	10	----	65.7	0.0	7	-7.0
24	25	1	62.1	63.7	66	1.6	10	----	63.7	0.0	7	-7.0

25	26	1	62.2	63.9	66	1.7	10	----	63.9	0.0	7	-7.0
26	27	1	59.9	61.9	66	2.0	10	----	61.9	0.0	7	-7.0
27	28	1	59.0	61.2	66	2.2	10	----	61.2	0.0	7	-7.0
28	29	1	57.8	59.9	66	2.1	10	----	59.9	0.0	7	-7.0
29	30	1	62.0	64.7	66	2.7	10	----	64.7	0.0	7	-7.0
30	31	1	61.9	64.8	66	2.9	10	----	64.8	0.0	7	-7.0
31	32	1	62.9	66.0	66	3.1	10	Snd Lvl	66.0	0.0	7	-7.0
32	33	1	63.7	66.8	66	3.1	10	Snd Lvl	66.8	0.0	7	-7.0
33	34	1	59.1	61.0	66	1.9	10	----	61.0	0.0	7	-7.0
34	35	1	59.7	61.6	66	1.9	10	----	61.6	0.0	7	-7.0
35	36	1	60.7	62.4	66	1.7	10	----	62.4	0.0	7	-7.0
36	37	1	64.1	66.9	66	2.8	10	Snd Lvl	66.9	0.0	7	-7.0
37	38	1	64.4	66.8	66	2.4	10	Snd Lvl	66.8	0.0	7	-7.0
38	39	1	64.8	66.7	66	1.9	10	Snd Lvl	66.7	0.0	7	-7.0
39	40	1	63.2	64.6	66	1.4	10	----	64.6	0.0	7	-7.0
40	41	1	61.1	62.4	66	1.3	10	----	62.4	0.0	7	-7.0
41	43	1	59.5	60.6	66	1.1	10	----	60.6	0.0	7	-7.0
42	44	1	65.3	66.6	66	1.3	10	Snd Lvl	66.6	0.0	7	-7.0
43	45	1	61.4	62.2	66	0.8	10	----	62.2	0.0	7	-7.0
44	46	1	59.8	60.7	66	0.9	10	----	60.7	0.0	7	-7.0
45	47	1	72.5	74.4	66	1.9	10	Snd Lvl	74.4	0.0	7	-7.0
46	48	1	68.0	68.7	66	0.7	10	Snd Lvl	68.7	0.0	7	-7.0
47	49	1	66.2	66.3	66	0.1	10	Snd Lvl	66.3	0.0	7	-7.0
48	50	1	64.0	64.3	66	0.3	10	----	64.3	0.0	7	-7.0
49	51	1	62.6	63.2	66	0.6	10	----	63.2	0.0	7	-7.0
50	52	1	61.0	61.8	66	0.8	10	----	61.8	0.0	7	-7.0
52	53	1	67.0	68.5	71	1.5	10	----	68.5	0.0	7	-7.0
53	54	1	60.2	62.3	66	2.1	10	----	62.3	0.0	7	-7.0
54	55	1	61.3	63.6	66	2.3	10	----	63.6	0.0	7	-7.0
55	56	1	60.6	63.1	66	2.5	10	----	63.1	0.0	7	-7.0
56	57	1	59.8	62.4	66	2.6	10	----	62.4	0.0	7	-7.0
57	58	1	69.4	71.8	71	2.4	10	Snd Lvl	71.8	0.0	7	-7.0
58	59	1	64.2	66.9	66	2.7	10	Snd Lvl	66.9	0.0	7	-7.0
59	60	1	62.4	65.2	66	2.8	10	----	65.2	0.0	7	-7.0
60	61	1	61.3	64.3	66	3.0	10	----	64.3	0.0	7	-7.0
61	62	1	60.2	63.3	66	3.1	10	----	63.3	0.0	7	-7.0
62	64	1	69.5	72.2	66	2.7	10	Snd Lvl	72.2	0.0	7	-7.0
63	65	1	66.0	72.0	71	6.0	10	Snd Lvl	72.0	0.0	7	-7.0
64	66	1	64.4	70.0	66	5.6	10	Snd Lvl	70.0	0.0	7	-7.0
65	67	1	62.6	67.8	71	5.2	10	----	67.8	0.0	7	-7.0
66	68	1	59.9	66.1	71	6.2	10	----	66.1	0.0	7	-7.0

67	69	1	64.0	70.9	66	6.9	10	Snd Lvl	70.9	0.0	7	-7.0
68	70	1	58.2	65.0	71	6.8	10	----	65.0	0.0	7	-7.0
Bike Path	71	1	71.1	76.0	66	4.9	10	Snd Lvl	76.0	0.0	7	-7.0
69	72	1	57.2	63.8	71	6.6	10	----	63.8	0.0	7	-7.0
70 - Picnic Pavilion	73	1	56.5	69.1	66	12.6	10	Both	69.1	0.0	7	-7.0
Bike Path	74	1	64.2	75.2	66	11.0	10	Both	75.2	0.0	7	-7.0
70 - Playground North	75	1	67.0	70.6	66	3.6	10	Snd Lvl	70.6	0.0	7	-7.0
71	76	1	64.8	68.5	66	3.7	10	Snd Lvl	68.5	0.0	7	-7.0
ST01	78	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST02	80	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST03	82	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST04	84	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
ST05	86	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	7	0.0
51	90	1	66.0	67.9	71	1.9	10	----	67.9	0.0	7	-7.0
70 - Pool	92	1	0.0	66.0	66	66.0	10	Snd Lvl	66.0	0.0	7	-7.0
70 - Mini Golf	93	1	0.0	70.0	66	70.0	10	Snd Lvl	70.0	0.0	7	-7.0
70 - Chess Board South	94	1	0.0	69.7	66	69.7	10	Snd Lvl	69.7	0.0	7	-7.0
RV1	96	1	0.0	67.0	66	67.0	10	Snd Lvl	67.0	0.0	7	-7.0
RV2	97	1	0.0	67.0	66	67.0	10	Snd Lvl	67.0	0.0	7	-7.0
RV3	98	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	7	-7.0
RV4	99	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	7	-7.0
RV5	100	1	0.0	66.5	66	66.5	10	Snd Lvl	66.5	0.0	7	-7.0
RV6	101	1	0.0	66.5	66	66.5	10	Snd Lvl	66.5	0.0	7	-7.0

Dwelling Units		**# DUs**	**Noise Reduction**		
			Min	**Avg**	**Max**
			dB	**dB**	**dB**
All Selected		88	0.0	0.0	0.0
All Impacted		35	0.0	0.0	0.0
All that meet NR Goal		0	0.0	0.0	0.0

AECOM **23 July 2018**
Seth Anderson **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **US-191 EA Re-evaluation**
RUN: **US-191 Existing**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Center 1	point1	1	0	0	0	0	0	0	0	0	0	0
	point2	2	0	0	0	0	0	0	0	0	0	0
	point3	3	0	0	0	0	0	0	0	0	0	0
	point4	4	0	0	0	0	0	0	0	0	0	0
	point5	5	0	0	0	0	0	0	0	0	0	0
	point6	6	0	0	0	0	0	0	0	0	0	0
	point7	7	0	0	0	0	0	0	0	0	0	0
	point8	8	0	0	0	0	0	0	0	0	0	0
	point9	9	0	0	0	0	0	0	0	0	0	0
	point10	10	0	0	0	0	0	0	0	0	0	0
	point11	11	0	0	0	0	0	0	0	0	0	0
	point12	12	0	0	0	0	0	0	0	0	0	0
	point13	13	0	0	0	0	0	0	0	0	0	0
	point14	14	0	0	0	0	0	0	0	0	0	0
	point15	15	0	0	0	0	0	0	0	0	0	0
	point16	16	0	0	0	0	0	0	0	0	0	0
	point17	17	0	0	0	0	0	0	0	0	0	0
	point18	18	0	0	0	0	0	0	0	0	0	0
	point19	19	0	0	0	0	0	0	0	0	0	0
	point20	20	0	0	0	0	0	0	0	0	0	0
	point21	21	0	0	0	0	0	0	0	0	0	0
	point22	22	0	0	0	0	0	0	0	0	0	0
	point23	23	0	0	0	0	0	0	0	0	0	0

	point24	24	0	0	0	0	0	0	0	0	0	0
	point25	25	0	0	0	0	0	0	0	0	0	0
	point26	26	0	0	0	0	0	0	0	0	0	0
	point27	27	0	0	0	0	0	0	0	0	0	0
	point28	28	0	0	0	0	0	0	0	0	0	0
	point29	29	0	0	0	0	0	0	0	0	0	0
	point30	30	0	0	0	0	0	0	0	0	0	0
	point31	31	0	0	0	0	0	0	0	0	0	0
	point32	32	0	0	0	0	0	0	0	0	0	0
	point33	33	0	0	0	0	0	0	0	0	0	0
	point34	34	0	0	0	0	0	0	0	0	0	0
	point35	35	0	0	0	0	0	0	0	0	0	0
	point36	36	0	0	0	0	0	0	0	0	0	0
	point37	37	0	0	0	0	0	0	0	0	0	0
	point38	38	0	0	0	0	0	0	0	0	0	0
	point39	39	0	0	0	0	0	0	0	0	0	0
	point40	40	0	0	0	0	0	0	0	0	0	0
	point41	41	0	0	0	0	0	0	0	0	0	0
	point42	42	0	0	0	0	0	0	0	0	0	0
	point43	43	0	0	0	0	0	0	0	0	0	0
	point44	44	0	0	0	0	0	0	0	0	0	0
	point45	45	0	0	0	0	0	0	0	0	0	0
	point46	46	0	0	0	0	0	0	0	0	0	0
	point48	47	0	0	0	0	0	0	0	0	0	0
	point49	48	0	0	0	0	0	0	0	0	0	0
	point50	49	0	0	0	0	0	0	0	0	0	0
	point47	50										
Center 2	point51	51	0	0	0	0	0	0	0	0	0	0
	point1039	52	0	0	0	0	0	0	0	0	0	0
	point52	53	0	0	0	0	0	0	0	0	0	0
	point53	54	0	0	0	0	0	0	0	0	0	0
	point54	55	0	0	0	0	0	0	0	0	0	0
	point55	56	0	0	0	0	0	0	0	0	0	0
	point56	57	0	0	0	0	0	0	0	0	0	0
	point57	58	0	0	0	0	0	0	0	0	0	0
	point58	59	0	0	0	0	0	0	0	0	0	0

	point59	60	0	0	0	0	0	0	0	0	0	0
	point60	61	0	0	0	0	0	0	0	0	0	0
	point61	62	0	0	0	0	0	0	0	0	0	0
	point62	63	0	0	0	0	0	0	0	0	0	0
	point63	64	0	0	0	0	0	0	0	0	0	0
	point64	65	0	0	0	0	0	0	0	0	0	0
	point65	66	0	0	0	0	0	0	0	0	0	0
	point66	67	0	0	0	0	0	0	0	0	0	0
	point67	68										
Center 3	point68	69	0	0	0	0	0	0	0	0	0	0
	point69	70	0	0	0	0	0	0	0	0	0	0
	point70	71	0	0	0	0	0	0	0	0	0	0
	point71	72	0	0	0	0	0	0	0	0	0	0
	point72	73	0	0	0	0	0	0	0	0	0	0
	point73	74	0	0	0	0	0	0	0	0	0	0
	point74	75	0	0	0	0	0	0	0	0	0	0
	point75	76	0	0	0	0	0	0	0	0	0	0
	point76	77	0	0	0	0	0	0	0	0	0	0
	point77	78	0	0	0	0	0	0	0	0	0	0
	point78	79	0	0	0	0	0	0	0	0	0	0
	point79	80	0	0	0	0	0	0	0	0	0	0
	point80	81	0	0	0	0	0	0	0	0	0	0
	point81	82	0	0	0	0	0	0	0	0	0	0
	point82	83	0	0	0	0	0	0	0	0	0	0
	point83	84	0	0	0	0	0	0	0	0	0	0
	point84	85	0	0	0	0	0	0	0	0	0	0
	point85	86	0	0	0	0	0	0	0	0	0	0
	point86	87	0	0	0	0	0	0	0	0	0	0
	point87	88	0	0	0	0	0	0	0	0	0	0
	point88	89	0	0	0	0	0	0	0	0	0	0
	point89	90	0	0	0	0	0	0	0	0	0	0
	point90	91	0	0	0	0	0	0	0	0	0	0
	point91	92	0	0	0	0	0	0	0	0	0	0
	point92	93	0	0	0	0	0	0	0	0	0	0
	point93	94	0	0	0	0	0	0	0	0	0	0
	point94	95	0	0	0	0	0	0	0	0	0	0

	point95	96	0	0	0	0	0	0	0	0	0	0
	point96	97	0	0	0	0	0	0	0	0	0	0
	point97	98	0	0	0	0	0	0	0	0	0	0
	point98	99	0	0	0	0	0	0	0	0	0	0
	point99	100	0	0	0	0	0	0	0	0	0	0
	point100	101	0	0	0	0	0	0	0	0	0	0
	point101	102	0	0	0	0	0	0	0	0	0	0
	point102	103	0	0	0	0	0	0	0	0	0	0
	point103	104	0	0	0	0	0	0	0	0	0	0
	point104	105	0	0	0	0	0	0	0	0	0	0
	point105	106	0	0	0	0	0	0	0	0	0	0
	point106	107	0	0	0	0	0	0	0	0	0	0
	point107	108	0	0	0	0	0	0	0	0	0	0
	point108	109	0	0	0	0	0	0	0	0	0	0
	point109	110	0	0	0	0	0	0	0	0	0	0
	point110	111	0	0	0	0	0	0	0	0	0	0
	point111	112	0	0	0	0	0	0	0	0	0	0
	point112	113	0	0	0	0	0	0	0	0	0	0
	point113	114	0	0	0	0	0	0	0	0	0	0
	point114	115	0	0	0	0	0	0	0	0	0	0
	point115	116	0	0	0	0	0	0	0	0	0	0
	point116	117	0	0	0	0	0	0	0	0	0	0
	point117	118	0	0	0	0	0	0	0	0	0	0
	point118	119	0	0	0	0	0	0	0	0	0	0
	point119	120	0	0	0	0	0	0	0	0	0	0
	point120	121	0	0	0	0	0	0	0	0	0	0
	point121	122	0	0	0	0	0	0	0	0	0	0
	point122	123	0	0	0	0	0	0	0	0	0	0
	point123	124	0	0	0	0	0	0	0	0	0	0
	point124	125	0	0	0	0	0	0	0	0	0	0
	point125	126	0	0	0	0	0	0	0	0	0	0
	point126	127	0	0	0	0	0	0	0	0	0	0
	point127	128										
Center 4	point128	129	0	0	0	0	0	0	0	0	0	0
	point1030	130	0	0	0	0	0	0	0	0	0	0
	point129	131	0	0	0	0	0	0	0	0	0	0

	point130	132	0	0	0	0	0	0	0	0	0	0
	point131	133	0	0	0	0	0	0	0	0	0	0
	point132	134	0	0	0	0	0	0	0	0	0	0
	point133	135	0	0	0	0	0	0	0	0	0	0
	point134	136	0	0	0	0	0	0	0	0	0	0
	point135	137	0	0	0	0	0	0	0	0	0	0
	point136	138	0	0	0	0	0	0	0	0	0	0
	point137	139	0	0	0	0	0	0	0	0	0	0
	point138	140	0	0	0	0	0	0	0	0	0	0
	point139	141	0	0	0	0	0	0	0	0	0	0
	point140	142	0	0	0	0	0	0	0	0	0	0
	point141	143	0	0	0	0	0	0	0	0	0	0
	point142	144	0	0	0	0	0	0	0	0	0	0
	point143	145	0	0	0	0	0	0	0	0	0	0
	point144	146	0	0	0	0	0	0	0	0	0	0
	point145	147	0	0	0	0	0	0	0	0	0	0
	point146	148	0	0	0	0	0	0	0	0	0	0
	point147	149	0	0	0	0	0	0	0	0	0	0
	point148	150	0	0	0	0	0	0	0	0	0	0
	point149	151	0	0	0	0	0	0	0	0	0	0
	point150	152	0	0	0	0	0	0	0	0	0	0
	point151	153	0	0	0	0	0	0	0	0	0	0
	point152	154	0	0	0	0	0	0	0	0	0	0
	point153	155	0	0	0	0	0	0	0	0	0	0
	point154	156	0	0	0	0	0	0	0	0	0	0
	point155	157	0	0	0	0	0	0	0	0	0	0
	point156	158										
Center 5	point157	159	0	0	0	0	0	0	0	0	0	0
	point158	160	0	0	0	0	0	0	0	0	0	0
	point159	161	0	0	0	0	0	0	0	0	0	0
	point160	162	0	0	0	0	0	0	0	0	0	0
	point161	163	0	0	0	0	0	0	0	0	0	0
	point162	164	0	0	0	0	0	0	0	0	0	0
	point163	165	0	0	0	0	0	0	0	0	0	0
	point164	166	0	0	0	0	0	0	0	0	0	0
	point165	167	0	0	0	0	0	0	0	0	0	0

	point166	168										
EB Acceleration Lane	point167	169	0	0	0	0	0	0	0	0	0	0
	point1036	170	0	0	0	0	0	0	0	0	0	0
	point927	171	0	0	0	0	0	0	0	0	0	0
	point168	172	0	0	0	0	0	0	0	0	0	0
	point169	173	0	0	0	0	0	0	0	0	0	0
	point170	174	0	0	0	0	0	0	0	0	0	0
	point171	175	0	0	0	0	0	0	0	0	0	0
	point172	176	0	0	0	0	0	0	0	0	0	0
	point173	177	0	0	0	0	0	0	0	0	0	0
	point174	178	0	0	0	0	0	0	0	0	0	0
	point175	179	0	0	0	0	0	0	0	0	0	0
	point176	180	0	0	0	0	0	0	0	0	0	0
	point177	181	0	0	0	0	0	0	0	0	0	0
	point178	182	0	0	0	0	0	0	0	0	0	0
	point179	183	0	0	0	0	0	0	0	0	0	0
	point180	184	0	0	0	0	0	0	0	0	0	0
	point181	185										
EB Inside 1	point182	186	787	30	191	30	215	30	0	0	0	0
	point1038	187	787	30	191	30	215	30	0	0	0	0
	point928	188	787	30	191	30	215	30	0	0	0	0
	point183	189	787	30	191	30	215	30	0	0	0	0
	point184	190	787	30	191	30	215	30	0	0	0	0
	point185	191	787	30	191	30	215	30	0	0	0	0
	point186	192	787	30	191	30	215	30	0	0	0	0
	point187	193	787	30	191	30	215	30	0	0	0	0
	point188	194	787	30	191	30	215	30	0	0	0	0
	point189	195	787	30	191	30	215	30	0	0	0	0
	point190	196	787	30	191	30	215	30	0	0	0	0
	point191	197	787	30	191	30	215	30	0	0	0	0
	point192	198	787	30	191	30	215	30	0	0	0	0
	point193	199	787	30	191	30	215	30	0	0	0	0
	point194	200	787	30	191	30	215	30	0	0	0	0
	point195	201	787	30	191	30	215	30	0	0	0	0
	point196	202	787	30	191	30	215	30	0	0	0	0
	point197	203										

EB Inside 2	point296	204	146	45	35	45	40	45	0	0	0	0
	point1029	205	146	45	35	45	40	45	0	0	0	0
	point297	206	146	45	35	45	40	45	0	0	0	0
	point298	207	146	45	35	45	40	45	0	0	0	0
	point299	208	146	45	35	45	40	45	0	0	0	0
	point300	209	146	45	35	45	40	45	0	0	0	0
	point301	210	146	45	35	45	40	45	0	0	0	0
	point302	211	146	45	35	45	40	45	0	0	0	0
	point303	212	146	45	35	45	40	45	0	0	0	0
	point304	213	146	45	35	45	40	45	0	0	0	0
	point305	214	146	45	35	45	40	45	0	0	0	0
	point306	215	146	45	35	45	40	45	0	0	0	0
	point307	216	146	45	35	45	40	45	0	0	0	0
	point1035	217	146	45	35	45	40	45	0	0	0	0
	point308	218										
EB Inside 3	point336	219	146	45	35	45	40	45	0	0	0	0
	point335	220	146	45	35	45	40	45	0	0	0	0
	point334	221	146	45	35	45	40	45	0	0	0	0
	point333	222	146	45	35	45	40	45	0	0	0	0
	point332	223	146	45	35	45	40	45	0	0	0	0
	point331	224	146	45	35	45	40	45	0	0	0	0
	point330	225	146	45	35	45	40	45	0	0	0	0
	point329	226	146	45	35	45	40	45	0	0	0	0
	point328	227	146	45	35	45	40	45	0	0	0	0
	point327	228	146	45	35	45	40	45	0	0	0	0
	point326	229	146	45	35	45	40	45	0	0	0	0
	point325	230	146	45	35	45	40	45	0	0	0	0
	point324	231	146	45	35	45	40	45	0	0	0	0
	point323	232	146	45	35	45	40	45	0	0	0	0
	point322	233	146	45	35	45	40	45	0	0	0	0
	point321	234	146	45	35	45	40	45	0	0	0	0
	point320	235	146	45	35	45	40	45	0	0	0	0
	point319	236	146	45	35	45	40	45	0	0	0	0
	point318	237	146	45	35	45	40	45	0	0	0	0
	point317	238	146	45	35	45	40	45	0	0	0	0
	point316	239	146	45	35	45	40	45	0	0	0	0

	point315	240	146	45	35	45	40	45	0	0	0	0
	point314	241	146	45	35	45	40	45	0	0	0	0
	point313	242	146	45	35	45	40	45	0	0	0	0
	point312	243	146	45	35	45	40	45	0	0	0	0
	point311	244	146	45	35	45	40	45	0	0	0	0
	point310	245	146	45	35	45	40	45	0	0	0	0
	point340	246	146	45	35	45	40	45	0	0	0	0
	point341	247	146	45	35	45	40	45	0	0	0	0
	point342	248	146	45	35	45	40	45	0	0	0	0
	point926	249	146	45	35	45	40	45	0	0	0	0
	point309	250										
EB Outside 1	point343	251	393	30	95	30	107	30	0	0	0	0
	point344	252	393	30	95	30	107	30	0	0	0	0
	point345	253	393	30	95	30	107	30	0	0	0	0
	point346	254	393	30	95	30	107	30	0	0	0	0
	point347	255	393	30	95	30	107	30	0	0	0	0
	point348	256	393	30	95	30	107	30	0	0	0	0
	point349	257	393	30	95	30	107	30	0	0	0	0
	point350	258	393	30	95	30	107	30	0	0	0	0
	point351	259	393	30	95	30	107	30	0	0	0	0
	point352	260	393	30	95	30	107	30	0	0	0	0
	point353	261	393	30	95	30	107	30	0	0	0	0
	point354	262	393	30	95	30	107	30	0	0	0	0
	point355	263	393	30	95	30	107	30	0	0	0	0
	point356	264	393	30	95	30	107	30	0	0	0	0
	point357	265	393	30	95	30	107	30	0	0	0	0
	point358	266	393	30	95	30	107	30	0	0	0	0
	point359	267	393	30	95	30	107	30	0	0	0	0
	point360	268	393	30	95	30	107	30	0	0	0	0
	point361	269	393	30	95	30	107	30	0	0	0	0
	point362	270	393	30	95	30	107	30	0	0	0	0
	point363	271	393	30	95	30	107	30	0	0	0	0
	point364	272	393	30	95	30	107	30	0	0	0	0
	point365	273	393	30	95	30	107	30	0	0	0	0
	point366	274	393	30	95	30	107	30	0	0	0	0
	point367	275	393	30	95	30	107	30	0	0	0	0

	point368	276	393	30	95	30	107	30	0	0	0	0
	point369	277	393	30	95	30	107	30	0	0	0	0
	point370	278	393	30	95	30	107	30	0	0	0	0
	point371	279	393	30	95	30	107	30	0	0	0	0
	point372	280	393	30	95	30	107	30	0	0	0	0
	point373	281	393	30	95	30	107	30	0	0	0	0
	point374	282	393	30	95	30	107	30	0	0	0	0
	point375	283	393	30	95	30	107	30	0	0	0	0
	point376	284	393	30	95	30	107	30	0	0	0	0
	point377	285	393	30	95	30	107	30	0	0	0	0
	point378	286	393	30	95	30	107	30	0	0	0	0
	point379	287	393	30	95	30	107	30	0	0	0	0
	point380	288	393	30	95	30	107	30	0	0	0	0
	point381	289	393	30	95	30	107	30	0	0	0	0
	point382	290	393	30	95	30	107	30	0	0	0	0
	point383	291	393	30	95	30	107	30	0	0	0	0
	point384	292	393	30	95	30	107	30	0	0	0	0
	point385	293	393	30	95	30	107	30	0	0	0	0
	point386	294										
EB Outside 2	point389	295	291	45	71	45	79	45	0	0	0	0
	point395	296	291	45	71	45	79	45	0	0	0	0
	point396	297	291	45	71	45	79	45	0	0	0	0
	point397	298	291	45	71	45	79	45	0	0	0	0
	point398	299	291	45	71	45	79	45	0	0	0	0
	point399	300	291	45	71	45	79	45	0	0	0	0
	point400	301	291	45	71	45	79	45	0	0	0	0
	point401	302	291	45	71	45	79	45	0	0	0	0
	point402	303	291	45	71	45	79	45	0	0	0	0
	point403	304	291	45	71	45	79	45	0	0	0	0
	point404	305	291	45	71	45	79	45	0	0	0	0
	point405	306	291	45	71	45	79	45	0	0	0	0
	point406	307	291	45	71	45	79	45	0	0	0	0
	point407	308	291	45	71	45	79	45	0	0	0	0
	point408	309	291	45	71	45	79	45	0	0	0	0
	point409	310	291	45	71	45	79	45	0	0	0	0
	point410	311	291	45	71	45	79	45	0	0	0	0

	point411	312	291	45	71	45	79	45	0	0	0	0
	point412	313	291	45	71	45	79	45	0	0	0	0
	point413	314	291	45	71	45	79	45	0	0	0	0
	point390	315	291	45	71	45	79	45	0	0	0	0
	point414	316	291	45	71	45	79	45	0	0	0	0
	point415	317	291	45	71	45	79	45	0	0	0	0
	point416	318	291	45	71	45	79	45	0	0	0	0
	point417	319	291	45	71	45	79	45	0	0	0	0
	point418	320	291	45	71	45	79	45	0	0	0	0
	point419	321	291	45	71	45	79	45	0	0	0	0
	point420	322	291	45	71	45	79	45	0	0	0	0
	point421	323	291	45	71	45	79	45	0	0	0	0
	point422	324	291	45	71	45	79	45	0	0	0	0
	point423	325	291	45	71	45	79	45	0	0	0	0
	point424	326	291	45	71	45	79	45	0	0	0	0
	point490	327	291	45	71	45	79	45	0	0	0	0
	point491	328	291	45	71	45	79	45	0	0	0	0
	point492	329	291	45	71	45	79	45	0	0	0	0
	point493	330	291	45	71	45	79	45	0	0	0	0
	point494	331	291	45	71	45	79	45	0	0	0	0
	point495	332	291	45	71	45	79	45	0	0	0	0
	point496	333	291	45	71	45	79	45	0	0	0	0
	point497	334	291	45	71	45	79	45	0	0	0	0
	point498	335	291	45	71	45	79	45	0	0	0	0
	point499	336	291	45	71	45	79	45	0	0	0	0
	point500	337	291	45	71	45	79	45	0	0	0	0
	point425	338	291	45	71	45	79	45	0	0	0	0
	point426	339	291	45	71	45	79	45	0	0	0	0
	point427	340	291	45	71	45	79	45	0	0	0	0
	point428	341	291	45	71	45	79	45	0	0	0	0
	point429	342	291	45	71	45	79	45	0	0	0	0
	point430	343	291	45	71	45	79	45	0	0	0	0
	point431	344	291	45	71	45	79	45	0	0	0	0
	point432	345	291	45	71	45	79	45	0	0	0	0
	point391	346	291	45	71	45	79	45	0	0	0	0
	point433	347	291	45	71	45	79	45	0	0	0	0

	point434	348	291	45	71	45	79	45	0	0	0	0
	point435	349	291	45	71	45	79	45	0	0	0	0
	point436	350	291	45	71	45	79	45	0	0	0	0
	point437	351	291	45	71	45	79	45	0	0	0	0
	point438	352	291	45	71	45	79	45	0	0	0	0
	point439	353	291	45	71	45	79	45	0	0	0	0
	point440	354	291	45	71	45	79	45	0	0	0	0
	point441	355	291	45	71	45	79	45	0	0	0	0
	point442	356	291	45	71	45	79	45	0	0	0	0
	point443	357	291	45	71	45	79	45	0	0	0	0
	point444	358	291	45	71	45	79	45	0	0	0	0
	point445	359	291	45	71	45	79	45	0	0	0	0
	point446	360	291	45	71	45	79	45	0	0	0	0
	point447	361	291	45	71	45	79	45	0	0	0	0
	point448	362	291	45	71	45	79	45	0	0	0	0
	point449	363	291	45	71	45	79	45	0	0	0	0
	point450	364	291	45	71	45	79	45	0	0	0	0
	point451	365	291	45	71	45	79	45	0	0	0	0
	point392	366	291	45	71	45	79	45	0	0	0	0
	point452	367	291	45	71	45	79	45	0	0	0	0
	point453	368	291	45	71	45	79	45	0	0	0	0
	point454	369	291	45	71	45	79	45	0	0	0	0
	point455	370	291	45	71	45	79	45	0	0	0	0
	point456	371	291	45	71	45	79	45	0	0	0	0
	point457	372	291	45	71	45	79	45	0	0	0	0
	point458	373	291	45	71	45	79	45	0	0	0	0
	point459	374	291	45	71	45	79	45	0	0	0	0
	point460	375	291	45	71	45	79	45	0	0	0	0
	point461	376	291	45	71	45	79	45	0	0	0	0
	point462	377	291	45	71	45	79	45	0	0	0	0
	point463	378	291	45	71	45	79	45	0	0	0	0
	point464	379	291	45	71	45	79	45	0	0	0	0
	point465	380	291	45	71	45	79	45	0	0	0	0
	point466	381	291	45	71	45	79	45	0	0	0	0
	point467	382	291	45	71	45	79	45	0	0	0	0
	point468	383	291	45	71	45	79	45	0	0	0	0

	point469	384	291	45	71	45	79	45	0	0	0	0
	point470	385	291	45	71	45	79	45	0	0	0	0
	point393	386	291	45	71	45	79	45	0	0	0	0
	point471	387	291	45	71	45	79	45	0	0	0	0
	point472	388	291	45	71	45	79	45	0	0	0	0
	point473	389	291	45	71	45	79	45	0	0	0	0
	point474	390	291	45	71	45	79	45	0	0	0	0
	point475	391	291	45	71	45	79	45	0	0	0	0
	point476	392	291	45	71	45	79	45	0	0	0	0
	point477	393	291	45	71	45	79	45	0	0	0	0
	point478	394	291	45	71	45	79	45	0	0	0	0
	point479	395										
EB Outside 3	point502	396	146	45	35	45	40	45	0	0	0	0
	point1028	397	146	45	35	45	40	45	0	0	0	0
	point503	398	146	45	35	45	40	45	0	0	0	0
	point504	399	146	45	35	45	40	45	0	0	0	0
	point505	400	146	45	35	45	40	45	0	0	0	0
	point506	401	146	45	35	45	40	45	0	0	0	0
	point507	402	146	45	35	45	40	45	0	0	0	0
	point508	403	146	45	35	45	40	45	0	0	0	0
	point509	404	146	45	35	45	40	45	0	0	0	0
	point510	405	146	45	35	45	40	45	0	0	0	0
	point511	406	146	45	35	45	40	45	0	0	0	0
	point512	407	146	45	35	45	40	45	0	0	0	0
	point513	408	146	45	35	45	40	45	0	0	0	0
	point514	409	146	45	35	45	40	45	0	0	0	0
	point515	410	146	45	35	45	40	45	0	0	0	0
	point516	411										
EB Outside 4	point517	412	146	45	35	45	40	45	0	0	0	0
	point518	413	146	45	35	45	40	45	0	0	0	0
	point519	414	146	45	35	45	40	45	0	0	0	0
	point520	415	146	45	35	45	40	45	0	0	0	0
	point521	416	146	45	35	45	40	45	0	0	0	0
	point522	417	146	45	35	45	40	45	0	0	0	0
	point523	418	146	45	35	45	40	45	0	0	0	0
	point524	419	146	45	35	45	40	45	0	0	0	0

	point525	420	146	45	35	45	40	45	0	0	0	0
	point526	421	146	45	35	45	40	45	0	0	0	0
	point527	422	146	45	35	45	40	45	0	0	0	0
	point528	423	146	45	35	45	40	45	0	0	0	0
	point529	424	146	45	35	45	40	45	0	0	0	0
	point530	425	146	45	35	45	40	45	0	0	0	0
	point531	426	146	45	35	45	40	45	0	0	0	0
	point532	427	146	45	35	45	40	45	0	0	0	0
	point533	428	146	45	35	45	40	45	0	0	0	0
	point534	429	146	45	35	45	40	45	0	0	0	0
	point535	430	146	45	35	45	40	45	0	0	0	0
	point536	431	146	45	35	45	40	45	0	0	0	0
	point537	432	146	45	35	45	40	45	0	0	0	0
	point538	433	146	45	35	45	40	45	0	0	0	0
	point539	434	146	45	35	45	40	45	0	0	0	0
	point540	435	146	45	35	45	40	45	0	0	0	0
	point541	436	146	45	35	45	40	45	0	0	0	0
	point542	437	146	45	35	45	40	45	0	0	0	0
	point543	438	146	45	35	45	40	45	0	0	0	0
	point544	439	146	45	35	45	40	45	0	0	0	0
	point545	440	146	45	35	45	40	45	0	0	0	0
	point546	441	146	45	35	45	40	45	0	0	0	0
	point547	442	146	45	35	45	40	45	0	0	0	0
	point548	443										
EB Right Turn	point549	444	0	0	0	0	0	0	0	0	0	0
	point550	445	0	0	0	0	0	0	0	0	0	0
	point551	446	0	0	0	0	0	0	0	0	0	0
	point552	447	0	0	0	0	0	0	0	0	0	0
	point553	448	0	0	0	0	0	0	0	0	0	0
	point554	449	0	0	0	0	0	0	0	0	0	0
	point555	450	0	0	0	0	0	0	0	0	0	0
	point556	451	0	0	0	0	0	0	0	0	0	0
	point557	452	0	0	0	0	0	0	0	0	0	0
	point558	453	0	0	0	0	0	0	0	0	0	0
	point559	454	0	0	0	0	0	0	0	0	0	0
	point560	455										

WB Inside 2	point676	456	146	45	35	45	40	45	0	0	0	0
	point1034	457	146	45	35	45	40	45	0	0	0	0
	point677	458	146	45	35	45	40	45	0	0	0	0
	point678	459	146	45	35	45	40	45	0	0	0	0
	point679	460	146	45	35	45	40	45	0	0	0	0
	point680	461	146	45	35	45	40	45	0	0	0	0
	point681	462	146	45	35	45	40	45	0	0	0	0
	point682	463	146	45	35	45	40	45	0	0	0	0
	point683	464	146	45	35	45	40	45	0	0	0	0
	point684	465	146	45	35	45	40	45	0	0	0	0
	point685	466	146	45	35	45	40	45	0	0	0	0
	point686	467	146	45	35	45	40	45	0	0	0	0
	point687	468	146	45	35	45	40	45	0	0	0	0
	point688	469										
WB Inside 3	point689	470	146	45	35	45	40	45	0	0	0	0
	point1031	471	146	45	35	45	40	45	0	0	0	0
	point690	472	146	45	35	45	40	45	0	0	0	0
	point691	473	146	45	35	45	40	45	0	0	0	0
	point692	474	146	45	35	45	40	45	0	0	0	0
	point693	475	146	45	35	45	40	45	0	0	0	0
	point694	476	146	45	35	45	40	45	0	0	0	0
	point695	477	146	45	35	45	40	45	0	0	0	0
	point696	478	146	45	35	45	40	45	0	0	0	0
	point697	479	146	45	35	45	40	45	0	0	0	0
	point698	480	146	45	35	45	40	45	0	0	0	0
	point699	481	146	45	35	45	40	45	0	0	0	0
	point700	482	146	45	35	45	40	45	0	0	0	0
	point701	483	146	45	35	45	40	45	0	0	0	0
	point702	484	146	45	35	45	40	45	0	0	0	0
	point703	485	146	45	35	45	40	45	0	0	0	0
	point704	486	146	45	35	45	40	45	0	0	0	0
	point705	487	146	45	35	45	40	45	0	0	0	0
	point706	488	146	45	35	45	40	45	0	0	0	0
	point707	489	146	45	35	45	40	45	0	0	0	0
	point708	490	146	45	35	45	40	45	0	0	0	0
	point709	491	146	45	35	45	40	45	0	0	0	0

	point710	492	146	45	35	45	40	45	0	0	0	0
	point711	493	146	45	35	45	40	45	0	0	0	0
	point712	494	146	45	35	45	40	45	0	0	0	0
	point713	495	146	45	35	45	40	45	0	0	0	0
	point714	496	146	45	35	45	40	45	0	0	0	0
	point715	497	146	45	35	45	40	45	0	0	0	0
	point716	498	146	45	35	45	40	45	0	0	0	0
	point717	499	146	45	35	45	40	45	0	0	0	0
	point718	500	146	45	35	45	40	45	0	0	0	0
	point719	501										
WB Left Turn 1	point720	502	0	0	0	0	0	0	0	0	0	0
	point721	503	0	0	0	0	0	0	0	0	0	0
	point722	504	0	0	0	0	0	0	0	0	0	0
	point723	505	0	0	0	0	0	0	0	0	0	0
	point724	506	0	0	0	0	0	0	0	0	0	0
	point725	507	0	0	0	0	0	0	0	0	0	0
	point726	508	0	0	0	0	0	0	0	0	0	0
	point727	509	0	0	0	0	0	0	0	0	0	0
	point728	510	0	0	0	0	0	0	0	0	0	0
	point729	511	0	0	0	0	0	0	0	0	0	0
	point730	512	0	0	0	0	0	0	0	0	0	0
	point731	513	0	0	0	0	0	0	0	0	0	0
	point732	514	0	0	0	0	0	0	0	0	0	0
	point929	515	0	0	0	0	0	0	0	0	0	0
	point733	516										
WB Outside 1	point736	517	393	30	95	30	107	30	0	0	0	0
	point737	518	393	30	95	30	107	30	0	0	0	0
	point738	519	393	30	95	30	107	30	0	0	0	0
	point739	520	393	30	95	30	107	30	0	0	0	0
	point740	521	393	30	95	30	107	30	0	0	0	0
	point741	522	393	30	95	30	107	30	0	0	0	0
	point742	523	393	30	95	30	107	30	0	0	0	0
	point743	524	393	30	95	30	107	30	0	0	0	0
	point744	525	393	30	95	30	107	30	0	0	0	0
	point745	526	393	30	95	30	107	30	0	0	0	0
	point746	527	393	30	95	30	107	30	0	0	0	0

	point747	528	393	30	95	30	107	30	0	0	0	0
	point748	529	393	30	95	30	107	30	0	0	0	0
	point749	530	393	30	95	30	107	30	0	0	0	0
	point750	531	393	30	95	30	107	30	0	0	0	0
	point751	532	393	30	95	30	107	30	0	0	0	0
	point752	533	393	30	95	30	107	30	0	0	0	0
	point753	534	393	30	95	30	107	30	0	0	0	0
	point754	535	393	30	95	30	107	30	0	0	0	0
	point755	536	393	30	95	30	107	30	0	0	0	0
	point756	537	393	30	95	30	107	30	0	0	0	0
	point757	538	393	30	95	30	107	30	0	0	0	0
	point758	539	393	30	95	30	107	30	0	0	0	0
	point759	540	393	30	95	30	107	30	0	0	0	0
	point760	541	393	30	95	30	107	30	0	0	0	0
	point761	542	393	30	95	30	107	30	0	0	0	0
	point762	543	393	30	95	30	107	30	0	0	0	0
	point933	544	393	30	95	30	107	30	0	0	0	0
	point763	545										
WB Outside 2	point766	546	291	45	71	45	79	45	0	0	0	0
	point1037	547	291	45	71	45	79	45	0	0	0	0
	point767	548	291	45	71	45	79	45	0	0	0	0
	point768	549	291	45	71	45	79	45	0	0	0	0
	point769	550	291	45	71	45	79	45	0	0	0	0
	point770	551	291	45	71	45	79	45	0	0	0	0
	point771	552	291	45	71	45	79	45	0	0	0	0
	point772	553	291	45	71	45	79	45	0	0	0	0
	point773	554	291	45	71	45	79	45	0	0	0	0
	point774	555	291	45	71	45	79	45	0	0	0	0
	point775	556	291	45	71	45	79	45	0	0	0	0
	point776	557	291	45	71	45	79	45	0	0	0	0
	point777	558	291	45	71	45	79	45	0	0	0	0
	point778	559	291	45	71	45	79	45	0	0	0	0
	point779	560	291	45	71	45	79	45	0	0	0	0
	point780	561	291	45	71	45	79	45	0	0	0	0
	point781	562	291	45	71	45	79	45	0	0	0	0
	point782	563	291	45	71	45	79	45	0	0	0	0

	point783	564	291	45	71	45	79	45	0	0	0	0
	point784	565	291	45	71	45	79	45	0	0	0	0
	point785	566	291	45	71	45	79	45	0	0	0	0
	point786	567	291	45	71	45	79	45	0	0	0	0
	point787	568	291	45	71	45	79	45	0	0	0	0
	point788	569	291	45	71	45	79	45	0	0	0	0
	point789	570	291	45	71	45	79	45	0	0	0	0
	point790	571	291	45	71	45	79	45	0	0	0	0
	point791	572	291	45	71	45	79	45	0	0	0	0
	point792	573	291	45	71	45	79	45	0	0	0	0
	point793	574	291	45	71	45	79	45	0	0	0	0
	point794	575	291	45	71	45	79	45	0	0	0	0
	point795	576	291	45	71	45	79	45	0	0	0	0
	point796	577	291	45	71	45	79	45	0	0	0	0
	point797	578	291	45	71	45	79	45	0	0	0	0
	point798	579	291	45	71	45	79	45	0	0	0	0
	point799	580	291	45	71	45	79	45	0	0	0	0
	point800	581	291	45	71	45	79	45	0	0	0	0
	point801	582	291	45	71	45	79	45	0	0	0	0
	point802	583	291	45	71	45	79	45	0	0	0	0
	point803	584	291	45	71	45	79	45	0	0	0	0
	point804	585	291	45	71	45	79	45	0	0	0	0
	point805	586	291	45	71	45	79	45	0	0	0	0
	point806	587	291	45	71	45	79	45	0	0	0	0
	point807	588	291	45	71	45	79	45	0	0	0	0
	point808	589	291	45	71	45	79	45	0	0	0	0
	point809	590	291	45	71	45	79	45	0	0	0	0
	point810	591	291	45	71	45	79	45	0	0	0	0
	point811	592	291	45	71	45	79	45	0	0	0	0
	point812	593	291	45	71	45	79	45	0	0	0	0
	point813	594	291	45	71	45	79	45	0	0	0	0
	point814	595	291	45	71	45	79	45	0	0	0	0
	point815	596	291	45	71	45	79	45	0	0	0	0
	point816	597	291	45	71	45	79	45	0	0	0	0
	point817	598	291	45	71	45	79	45	0	0	0	0
	point818	599	291	45	71	45	79	45	0	0	0	0

	point819	600	291	45	71	45	79	45	0	0	0	0
	point820	601	291	45	71	45	79	45	0	0	0	0
	point821	602	291	45	71	45	79	45	0	0	0	0
	point822	603	291	45	71	45	79	45	0	0	0	0
	point823	604	291	45	71	45	79	45	0	0	0	0
	point824	605	291	45	71	45	79	45	0	0	0	0
	point825	606	291	45	71	45	79	45	0	0	0	0
	point826	607	291	45	71	45	79	45	0	0	0	0
	point827	608	291	45	71	45	79	45	0	0	0	0
	point828	609	291	45	71	45	79	45	0	0	0	0
	point829	610	291	45	71	45	79	45	0	0	0	0
	point830	611	291	45	71	45	79	45	0	0	0	0
	point831	612	291	45	71	45	79	45	0	0	0	0
	point832	613	291	45	71	45	79	45	0	0	0	0
	point833	614	291	45	71	45	79	45	0	0	0	0
	point834	615	291	45	71	45	79	45	0	0	0	0
	point835	616	291	45	71	45	79	45	0	0	0	0
	point836	617	291	45	71	45	79	45	0	0	0	0
	point837	618	291	45	71	45	79	45	0	0	0	0
	point838	619	291	45	71	45	79	45	0	0	0	0
	point839	620	291	45	71	45	79	45	0	0	0	0
	point840	621	291	45	71	45	79	45	0	0	0	0
	point841	622	291	45	71	45	79	45	0	0	0	0
	point842	623	291	45	71	45	79	45	0	0	0	0
	point843	624	291	45	71	45	79	45	0	0	0	0
	point844	625	291	45	71	45	79	45	0	0	0	0
	point845	626	291	45	71	45	79	45	0	0	0	0
	point846	627	291	45	71	45	79	45	0	0	0	0
	point847	628	291	45	71	45	79	45	0	0	0	0
	point848	629	291	45	71	45	79	45	0	0	0	0
	point849	630	291	45	71	45	79	45	0	0	0	0
	point850	631	291	45	71	45	79	45	0	0	0	0
	point851	632	291	45	71	45	79	45	0	0	0	0
	point852	633	291	45	71	45	79	45	0	0	0	0
	point853	634	291	45	71	45	79	45	0	0	0	0
	point854	635	291	45	71	45	79	45	0	0	0	0

	point855	636	291	45	71	45	79	45	0	0	0	0
	point856	637	291	45	71	45	79	45	0	0	0	0
	point857	638	291	45	71	45	79	45	0	0	0	0
	point858	639	291	45	71	45	79	45	0	0	0	0
	point859	640	291	45	71	45	79	45	0	0	0	0
	point860	641	291	45	71	45	79	45	0	0	0	0
	point861	642	291	45	71	45	79	45	0	0	0	0
	point862	643	291	45	71	45	79	45	0	0	0	0
	point863	644	291	45	71	45	79	45	0	0	0	0
	point864	645	291	45	71	45	79	45	0	0	0	0
	point865	646	291	45	71	45	79	45	0	0	0	0
	point866	647	291	45	71	45	79	45	0	0	0	0
	point867	648	291	45	71	45	79	45	0	0	0	0
	point868	649	291	45	71	45	79	45	0	0	0	0
	point869	650	291	45	71	45	79	45	0	0	0	0
	point870	651	291	45	71	45	79	45	0	0	0	0
	point871	652	291	45	71	45	79	45	0	0	0	0
	point872	653	291	45	71	45	79	45	0	0	0	0
	point873	654	291	45	71	45	79	45	0	0	0	0
	point874	655	291	45	71	45	79	45	0	0	0	0
	point875	656	291	45	71	45	79	45	0	0	0	0
	point876	657	291	45	71	45	79	45	0	0	0	0
	point877	658										
WB Outside 3	point893	659	146	45	35	45	40	45	0	0	0	0
	point1033	660	146	45	35	45	40	45	0	0	0	0
	point892	661	146	45	35	45	40	45	0	0	0	0
	point891	662	146	45	35	45	40	45	0	0	0	0
	point890	663	146	45	35	45	40	45	0	0	0	0
	point889	664	146	45	35	45	40	45	0	0	0	0
	point888	665	146	45	35	45	40	45	0	0	0	0
	point887	666	146	45	35	45	40	45	0	0	0	0
	point886	667	146	45	35	45	40	45	0	0	0	0
	point885	668	146	45	35	45	40	45	0	0	0	0
	point884	669	146	45	35	45	40	45	0	0	0	0
	point883	670	146	45	35	45	40	45	0	0	0	0
	point882	671	146	45	35	45	40	45	0	0	0	0

	point881	672	146	45	35	45	40	45	0	0	0	0
	point880	673										
WB Outside 4	point894	674	146	45	35	45	40	45	0	0	0	0
	point1032	675	146	45	35	45	40	45	0	0	0	0
	point895	676	146	45	35	45	40	45	0	0	0	0
	point896	677	146	45	35	45	40	45	0	0	0	0
	point897	678	146	45	35	45	40	45	0	0	0	0
	point898	679	146	45	35	45	40	45	0	0	0	0
	point899	680	146	45	35	45	40	45	0	0	0	0
	point900	681	146	45	35	45	40	45	0	0	0	0
	point901	682	146	45	35	45	40	45	0	0	0	0
	point902	683	146	45	35	45	40	45	0	0	0	0
	point903	684	146	45	35	45	40	45	0	0	0	0
	point904	685	146	45	35	45	40	45	0	0	0	0
	point905	686	146	45	35	45	40	45	0	0	0	0
	point906	687	146	45	35	45	40	45	0	0	0	0
	point907	688	146	45	35	45	40	45	0	0	0	0
	point908	689	146	45	35	45	40	45	0	0	0	0
	point909	690	146	45	35	45	40	45	0	0	0	0
	point910	691	146	45	35	45	40	45	0	0	0	0
	point911	692	146	45	35	45	40	45	0	0	0	0
	point912	693	146	45	35	45	40	45	0	0	0	0
	point913	694	146	45	35	45	40	45	0	0	0	0
	point914	695	146	45	35	45	40	45	0	0	0	0
	point915	696	146	45	35	45	40	45	0	0	0	0
	point916	697	146	45	35	45	40	45	0	0	0	0
	point917	698	146	45	35	45	40	45	0	0	0	0
	point918	699	146	45	35	45	40	45	0	0	0	0
	point919	700	146	45	35	45	40	45	0	0	0	0
	point920	701	146	45	35	45	40	45	0	0	0	0
	point921	702	146	45	35	45	40	45	0	0	0	0
	point922	703	146	45	35	45	40	45	0	0	0	0
	point923	704	146	45	35	45	40	45	0	0	0	0
	point924	705										
WB Inside 1	point563	706	393	30	95	30	107	30	0	0	0	0
	point930	707	393	30	95	30	107	30	0	0	0	0

	point573	708	393	30	95	30	107	30	0	0	0	0
	point574	709	393	30	95	30	107	30	0	0	0	0
	point575	710	393	30	95	30	107	30	0	0	0	0
	point576	711	393	30	95	30	107	30	0	0	0	0
	point577	712	393	30	95	30	107	30	0	0	0	0
	point578	713	393	30	95	30	107	30	0	0	0	0
	point579	714	393	30	95	30	107	30	0	0	0	0
	point580	715	393	30	95	30	107	30	0	0	0	0
	point581	716	393	30	95	30	107	30	0	0	0	0
	point582	717	393	30	95	30	107	30	0	0	0	0
	point583	718	393	30	95	30	107	30	0	0	0	0
	point584	719	393	30	95	30	107	30	0	0	0	0
	point585	720	393	30	95	30	107	30	0	0	0	0
	point586	721	393	30	95	30	107	30	0	0	0	0
	point587	722	393	30	95	30	107	30	0	0	0	0
	point588	723	393	30	95	30	107	30	0	0	0	0
	point589	724	393	30	95	30	107	30	0	0	0	0
	point590	725	393	30	95	30	107	30	0	0	0	0
	point591	726	393	30	95	30	107	30	0	0	0	0
	point564	727	393	30	95	30	107	30	0	0	0	0
	point592	728	393	30	95	30	107	30	0	0	0	0
	point593	729	393	30	95	30	107	30	0	0	0	0
	point594	730	393	30	95	30	107	30	0	0	0	0
	point595	731	393	30	95	30	107	30	0	0	0	0
	point931	732	393	30	95	30	107	30	0	0	0	0
	point597	733										
WB Inside 1-2	point932	734	787	30	191	30	215	30	0	0	0	0
	point598	735	787	30	191	30	215	30	0	0	0	0
	point599	736	787	30	191	30	215	30	0	0	0	0
	point600	737	787	30	191	30	215	30	0	0	0	0
	point601	738	787	30	191	30	215	30	0	0	0	0
	point602	739	787	30	191	30	215	30	0	0	0	0
	point603	740	787	30	191	30	215	30	0	0	0	0
	point604	741	787	30	191	30	215	30	0	0	0	0
	point605	742	787	30	191	30	215	30	0	0	0	0
	point606	743	787	30	191	30	215	30	0	0	0	0

	point607	744	787	30	191	30	215	30	0	0	0	0
	point608	745	787	30	191	30	215	30	0	0	0	0
	point609	746	787	30	191	30	215	30	0	0	0	0
	point610	747	787	30	191	30	215	30	0	0	0	0
	point565	748	787	30	191	30	215	30	0	0	0	0
	point611	749	787	30	191	30	215	30	0	0	0	0
	point612	750	787	30	191	30	215	30	0	0	0	0
	point613	751	787	30	191	30	215	30	0	0	0	0
	point614	752	787	30	191	30	215	30	0	0	0	0
	point615	753	787	30	191	30	215	30	0	0	0	0
	point616	754	787	30	191	30	215	30	0	0	0	0
	point617	755	787	30	191	30	215	30	0	0	0	0
	point618	756	787	30	191	30	215	30	0	0	0	0
	point619	757	787	30	191	30	215	30	0	0	0	0
	point620	758	787	30	191	30	215	30	0	0	0	0
	point621	759	787	30	191	30	215	30	0	0	0	0
	point622	760	787	30	191	30	215	30	0	0	0	0
	point623	761	787	30	191	30	215	30	0	0	0	0
	point624	762	787	30	191	30	215	30	0	0	0	0
	point625	763	787	30	191	30	215	30	0	0	0	0
	point626	764	787	30	191	30	215	30	0	0	0	0
	point627	765	787	30	191	30	215	30	0	0	0	0
	point628	766	787	30	191	30	215	30	0	0	0	0
	point629	767	787	30	191	30	215	30	0	0	0	0
	point630	768	787	30	191	30	215	30	0	0	0	0
	point631	769	787	30	191	30	215	30	0	0	0	0
	point566	770	787	30	191	30	215	30	0	0	0	0
	point632	771	787	30	191	30	215	30	0	0	0	0
	point633	772	787	30	191	30	215	30	0	0	0	0
	point634	773	787	30	191	30	215	30	0	0	0	0
	point635	774	787	30	191	30	215	30	0	0	0	0
	point636	775	787	30	191	30	215	30	0	0	0	0
	point637	776	787	30	191	30	215	30	0	0	0	0
	point638	777	787	30	191	30	215	30	0	0	0	0
	point639	778	787	30	191	30	215	30	0	0	0	0
	point640	779	787	30	191	30	215	30	0	0	0	0

	point641	780	787	30	191	30	215	30	0	0	0	0
	point642	781	787	30	191	30	215	30	0	0	0	0
	point643	782	787	30	191	30	215	30	0	0	0	0
	point644	783	787	30	191	30	215	30	0	0	0	0
	point645	784	787	30	191	30	215	30	0	0	0	0
	point646	785	787	30	191	30	215	30	0	0	0	0
	point647	786	787	30	191	30	215	30	0	0	0	0
	point648	787	787	30	191	30	215	30	0	0	0	0
	point649	788	787	30	191	30	215	30	0	0	0	0
	point650	789	787	30	191	30	215	30	0	0	0	0
	point651	790	787	30	191	30	215	30	0	0	0	0
	point652	791	787	30	191	30	215	30	0	0	0	0
	point567	792	787	30	191	30	215	30	0	0	0	0
	point653	793	787	30	191	30	215	30	0	0	0	0
	point654	794	787	30	191	30	215	30	0	0	0	0
	point655	795	787	30	191	30	215	30	0	0	0	0
	point656	796	787	30	191	30	215	30	0	0	0	0
	point657	797	787	30	191	30	215	30	0	0	0	0
	point658	798	787	30	191	30	215	30	0	0	0	0
	point659	799	787	30	191	30	215	30	0	0	0	0
	point660	800	787	30	191	30	215	30	0	0	0	0
	point661	801	787	30	191	30	215	30	0	0	0	0
	point662	802	787	30	191	30	215	30	0	0	0	0
	point663	803	787	30	191	30	215	30	0	0	0	0
	point664	804	787	30	191	30	215	30	0	0	0	0
	point665	805	787	30	191	30	215	30	0	0	0	0
	point666	806	787	30	191	30	215	30	0	0	0	0
	point667	807	787	30	191	30	215	30	0	0	0	0
	point668	808	787	30	191	30	215	30	0	0	0	0
	point669	809	787	30	191	30	215	30	0	0	0	0
	point670	810	787	30	191	30	215	30	0	0	0	0
	point671	811	787	30	191	30	215	30	0	0	0	0
	point672	812	787	30	191	30	215	30	0	0	0	0
	point673	813	787	30	191	30	215	30	0	0	0	0
	point568	814	787	30	191	30	215	30	0	0	0	0
	point674	815	787	30	191	30	215	30	0	0	0	0

	point675	816	787	30	191	30	215	30	0	0	0	0
	point569	817	787	30	191	30	215	30	0	0	0	0
	point570	818	787	30	191	30	215	30	0	0	0	0
	point571	819										
EB Inside 1-2	point934	820	393	30	95	30	107	30	0	0	0	0
	point251	821	393	30	95	30	107	30	0	0	0	0
	point252	822	393	30	95	30	107	30	0	0	0	0
	point253	823	393	30	95	30	107	30	0	0	0	0
	point254	824	393	30	95	30	107	30	0	0	0	0
	point255	825	393	30	95	30	107	30	0	0	0	0
	point256	826	393	30	95	30	107	30	0	0	0	0
	point257	827	393	30	95	30	107	30	0	0	0	0
	point258	828	393	30	95	30	107	30	0	0	0	0
	point259	829	393	30	95	30	107	30	0	0	0	0
	point260	830	393	30	95	30	107	30	0	0	0	0
	point261	831	393	30	95	30	107	30	0	0	0	0
	point262	832	393	30	95	30	107	30	0	0	0	0
	point263	833	393	30	95	30	107	30	0	0	0	0
	point264	834	393	30	95	30	107	30	0	0	0	0
	point265	835	393	30	95	30	107	30	0	0	0	0
	point266	836	393	30	95	30	107	30	0	0	0	0
	point267	837	393	30	95	30	107	30	0	0	0	0
	point268	838	393	30	95	30	107	30	0	0	0	0
	point269	839	393	30	95	30	107	30	0	0	0	0
	point270	840	393	30	95	30	107	30	0	0	0	0
	point271	841	393	30	95	30	107	30	0	0	0	0
	point272	842	393	30	95	30	107	30	0	0	0	0
	point273	843	393	30	95	30	107	30	0	0	0	0
	point274	844	393	30	95	30	107	30	0	0	0	0
	point275	845	393	30	95	30	107	30	0	0	0	0
	point276	846	393	30	95	30	107	30	0	0	0	0
	point277	847	393	30	95	30	107	30	0	0	0	0
	point278	848	393	30	95	30	107	30	0	0	0	0
	point279	849	393	30	95	30	107	30	0	0	0	0
	point280	850	393	30	95	30	107	30	0	0	0	0
	point281	851	393	30	95	30	107	30	0	0	0	0

	point282	852	393	30	95	30	107	30	0	0	0	0
	point283	853	393	30	95	30	107	30	0	0	0	0
	point284	854	393	30	95	30	107	30	0	0	0	0
	point285	855	393	30	95	30	107	30	0	0	0	0
	point286	856	393	30	95	30	107	30	0	0	0	0
	point287	857	393	30	95	30	107	30	0	0	0	0
	point288	858	393	30	95	30	107	30	0	0	0	0
	point289	859	393	30	95	30	107	30	0	0	0	0
	point290	860	393	30	95	30	107	30	0	0	0	0
	point291	861	393	30	95	30	107	30	0	0	0	0
	point292	862	393	30	95	30	107	30	0	0	0	0
	point293	863										
Bike Path	point935	864	0	0	0	0	0	0	0	0	0	0
	point936	865	0	0	0	0	0	0	0	0	0	0
	point937	866	0	0	0	0	0	0	0	0	0	0
	point938	867	0	0	0	0	0	0	0	0	0	0
	point939	868	0	0	0	0	0	0	0	0	0	0
	point940	869	0	0	0	0	0	0	0	0	0	0
	point941	870	0	0	0	0	0	0	0	0	0	0
	point942	871	0	0	0	0	0	0	0	0	0	0
	point943	872	0	0	0	0	0	0	0	0	0	0
	point944	873	0	0	0	0	0	0	0	0	0	0
	point945	874	0	0	0	0	0	0	0	0	0	0
	point946	875	0	0	0	0	0	0	0	0	0	0
	point947	876	0	0	0	0	0	0	0	0	0	0
	point948	877	0	0	0	0	0	0	0	0	0	0
	point949	878	0	0	0	0	0	0	0	0	0	0
	point950	879	0	0	0	0	0	0	0	0	0	0
	point951	880	0	0	0	0	0	0	0	0	0	0
	point952	881	0	0	0	0	0	0	0	0	0	0
	point953	882	0	0	0	0	0	0	0	0	0	0
	point954	883	0	0	0	0	0	0	0	0	0	0
	point955	884	0	0	0	0	0	0	0	0	0	0
	point956	885	0	0	0	0	0	0	0	0	0	0
	point957	886	0	0	0	0	0	0	0	0	0	0
	point958	887	0	0	0	0	0	0	0	0	0	0

	point959	888	0	0	0	0	0	0	0	0	0	0
	point960	889	0	0	0	0	0	0	0	0	0	0
	point961	890	0	0	0	0	0	0	0	0	0	0
	point962	891	0	0	0	0	0	0	0	0	0	0
	point1027	892	0	0	0	0	0	0	0	0	0	0
	point963	893	0	0	0	0	0	0	0	0	0	0
	point964	894	0	0	0	0	0	0	0	0	0	0
	point965	895	0	0	0	0	0	0	0	0	0	0
	point966	896	0	0	0	0	0	0	0	0	0	0
	point967	897	0	0	0	0	0	0	0	0	0	0
	point968	898	0	0	0	0	0	0	0	0	0	0
	point969	899	0	0	0	0	0	0	0	0	0	0
	point970	900	0	0	0	0	0	0	0	0	0	0
	point971	901	0	0	0	0	0	0	0	0	0	0
	point972	902	0	0	0	0	0	0	0	0	0	0
	point973	903	0	0	0	0	0	0	0	0	0	0
	point974	904	0	0	0	0	0	0	0	0	0	0
	point975	905	0	0	0	0	0	0	0	0	0	0
	point976	906	0	0	0	0	0	0	0	0	0	0
	point977	907	0	0	0	0	0	0	0	0	0	0
	point978	908	0	0	0	0	0	0	0	0	0	0
	point979	909	0	0	0	0	0	0	0	0	0	0
	point980	910	0	0	0	0	0	0	0	0	0	0
	point981	911	0	0	0	0	0	0	0	0	0	0
	point982	912	0	0	0	0	0	0	0	0	0	0
	point983	913	0	0	0	0	0	0	0	0	0	0
	point1022	914	0	0	0	0	0	0	0	0	0	0
	point1023	915	0	0	0	0	0	0	0	0	0	0
	point1024	916	0	0	0	0	0	0	0	0	0	0
	point1025	917	0	0	0	0	0	0	0	0	0	0
	point1026	918	0	0	0	0	0	0	0	0	0	0
	point984	919	0	0	0	0	0	0	0	0	0	0
	point985	920	0	0	0	0	0	0	0	0	0	0
	point986	921	0	0	0	0	0	0	0	0	0	0
	point987	922	0	0	0	0	0	0	0	0	0	0
	point988	923	0	0	0	0	0	0	0	0	0	0

	point989	924	0	0	0	0	0	0	0	0	0	0
	point1013	925	0	0	0	0	0	0	0	0	0	0
	point1014	926	0	0	0	0	0	0	0	0	0	0
	point1015	927	0	0	0	0	0	0	0	0	0	0
	point1016	928	0	0	0	0	0	0	0	0	0	0
	point1017	929	0	0	0	0	0	0	0	0	0	0
	point1018	930	0	0	0	0	0	0	0	0	0	0
	point1019	931	0	0	0	0	0	0	0	0	0	0
	point1020	932	0	0	0	0	0	0	0	0	0	0
	point1021	933	0	0	0	0	0	0	0	0	0	0
	point990	934	0	0	0	0	0	0	0	0	0	0
	point991	935	0	0	0	0	0	0	0	0	0	0
	point992	936	0	0	0	0	0	0	0	0	0	0
	point993	937	0	0	0	0	0	0	0	0	0	0
	point994	938	0	0	0	0	0	0	0	0	0	0
	point995	939	0	0	0	0	0	0	0	0	0	0
	point996	940	0	0	0	0	0	0	0	0	0	0
	point997	941	0	0	0	0	0	0	0	0	0	0
	point998	942	0	0	0	0	0	0	0	0	0	0
	point999	943	0	0	0	0	0	0	0	0	0	0
	point1000	944	0	0	0	0	0	0	0	0	0	0
	point1001	945	0	0	0	0	0	0	0	0	0	0
	point1002	946	0	0	0	0	0	0	0	0	0	0
	point1003	947	0	0	0	0	0	0	0	0	0	0
	point1004	948	0	0	0	0	0	0	0	0	0	0
	point1005	949	0	0	0	0	0	0	0	0	0	0
	point1006	950	0	0	0	0	0	0	0	0	0	0
	point1007	951	0	0	0	0	0	0	0	0	0	0
	point1008	952	0	0	0	0	0	0	0	0	0	0
	point1009	953	0	0	0	0	0	0	0	0	0	0
	point1010	954	0	0	0	0	0	0	0	0	0	0
	point1011	955	0	0	0	0	0	0	0	0	0	0
	point1012	956										
EB Inside 1-2	point1040	957	787	30	191	30	215	30	0	0	0	0
	point198	958	787	30	191	30	215	30	0	0	0	0
	point199	959	787	30	191	30	215	30	0	0	0	0

	point200	960	787	30	191	30	215	30	0	0	0	0
	point201	961	787	30	191	30	215	30	0	0	0	0
	point202	962	787	30	191	30	215	30	0	0	0	0
	point203	963	787	30	191	30	215	30	0	0	0	0
	point204	964	787	30	191	30	215	30	0	0	0	0
	point205	965	787	30	191	30	215	30	0	0	0	0
	point206	966	787	30	191	30	215	30	0	0	0	0
	point207	967	787	30	191	30	215	30	0	0	0	0
	point208	968	787	30	191	30	215	30	0	0	0	0
	point209	969	787	30	191	30	215	30	0	0	0	0
	point210	970	787	30	191	30	215	30	0	0	0	0
	point211	971	787	30	191	30	215	30	0	0	0	0
	point212	972	787	30	191	30	215	30	0	0	0	0
	point213	973	787	30	191	30	215	30	0	0	0	0
	point214	974	787	30	191	30	215	30	0	0	0	0
	point215	975	787	30	191	30	215	30	0	0	0	0
	point216	976	787	30	191	30	215	30	0	0	0	0
	point217	977	787	30	191	30	215	30	0	0	0	0
	point218	978	787	30	191	30	215	30	0	0	0	0
	point219	979	787	30	191	30	215	30	0	0	0	0
	point220	980	787	30	191	30	215	30	0	0	0	0
	point221	981	787	30	191	30	215	30	0	0	0	0
	point222	982	787	30	191	30	215	30	0	0	0	0
	point223	983	787	30	191	30	215	30	0	0	0	0
	point224	984	787	30	191	30	215	30	0	0	0	0
	point225	985	787	30	191	30	215	30	0	0	0	0
	point226	986	787	30	191	30	215	30	0	0	0	0
	point227	987	787	30	191	30	215	30	0	0	0	0
	point228	988	787	30	191	30	215	30	0	0	0	0
	point229	989	787	30	191	30	215	30	0	0	0	0
	point230	990	787	30	191	30	215	30	0	0	0	0
	point231	991	787	30	191	30	215	30	0	0	0	0
	point232	992	787	30	191	30	215	30	0	0	0	0
	point233	993	787	30	191	30	215	30	0	0	0	0
	point234	994	787	30	191	30	215	30	0	0	0	0
	point235	995	787	30	191	30	215	30	0	0	0	0

	point236	996	787	30	191	30	215	30	0	0	0	0
	point237	997	787	30	191	30	215	30	0	0	0	0
	point238	998	787	30	191	30	215	30	0	0	0	0
	point239	999	787	30	191	30	215	30	0	0	0	0
	point240	1000	787	30	191	30	215	30	0	0	0	0
	point241	1001	787	30	191	30	215	30	0	0	0	0
	point242	1002	787	30	191	30	215	30	0	0	0	0
	point243	1003	787	30	191	30	215	30	0	0	0	0
	point244	1004	787	30	191	30	215	30	0	0	0	0
	point245	1005	787	30	191	30	215	30	0	0	0	0
	point246	1006	787	30	191	30	215	30	0	0	0	0
	point247	1007	787	30	191	30	215	30	0	0	0	0
	point248	1008	787	30	191	30	215	30	0	0	0	0
	point249	1009	787	30	191	30	215	30	0	0	0	0
	point250	1010										
EB Outside 2-2	point1041	1011	291	45	71	45	79	45	0	0	0	0
	point480	1012	291	45	71	45	79	45	0	0	0	0
	point481	1013	291	45	71	45	79	45	0	0	0	0
	point482	1014	291	45	71	45	79	45	0	0	0	0
	point483	1015	291	45	71	45	79	45	0	0	0	0
	point484	1016	291	45	71	45	79	45	0	0	0	0
	point485	1017	291	45	71	45	79	45	0	0	0	0
	point486	1018	291	45	71	45	79	45	0	0	0	0
	point501	1019	291	45	71	45	79	45	0	0	0	0
	point487	1020	291	45	71	45	79	45	0	0	0	0
	point488	1021	291	45	71	45	79	45	0	0	0	0
	point489	1022										
EB Shoulder 1	point1042	1023	0	0	0	0	0	0	0	0	0	0
	point1091	1024	0	0	0	0	0	0	0	0	0	0
	point1092	1025	0	0	0	0	0	0	0	0	0	0
	point1093	1026	0	0	0	0	0	0	0	0	0	0
	point1094	1027	0	0	0	0	0	0	0	0	0	0
	point1095	1028	0	0	0	0	0	0	0	0	0	0
	point1096	1029	0	0	0	0	0	0	0	0	0	0
	point1097	1030	0	0	0	0	0	0	0	0	0	0
	point1098	1031	0	0	0	0	0	0	0	0	0	0

	point1099	1032	0	0	0	0	0	0	0	0	0	0
	point1100	1033	0	0	0	0	0	0	0	0	0	0
	point1101	1034	0	0	0	0	0	0	0	0	0	0
	point1102	1035	0	0	0	0	0	0	0	0	0	0
	point1103	1036	0	0	0	0	0	0	0	0	0	0
	point1104	1037	0	0	0	0	0	0	0	0	0	0
	point1105	1038	0	0	0	0	0	0	0	0	0	0
	point1106	1039	0	0	0	0	0	0	0	0	0	0
	point1107	1040	0	0	0	0	0	0	0	0	0	0
	point1108	1041	0	0	0	0	0	0	0	0	0	0
	point1109	1042	0	0	0	0	0	0	0	0	0	0
	point1043	1043	0	0	0	0	0	0	0	0	0	0
	point1044	1044	0	0	0	0	0	0	0	0	0	0
	point1045	1045	0	0	0	0	0	0	0	0	0	0
	point1046	1046	0	0	0	0	0	0	0	0	0	0
	point1047	1047	0	0	0	0	0	0	0	0	0	0
	point1148	1048	0	0	0	0	0	0	0	0	0	0
	point1149	1049	0	0	0	0	0	0	0	0	0	0
	point1150	1050	0	0	0	0	0	0	0	0	0	0
	point1151	1051	0	0	0	0	0	0	0	0	0	0
	point1152	1052	0	0	0	0	0	0	0	0	0	0
	point1153	1053	0	0	0	0	0	0	0	0	0	0
	point1048	1054	0	0	0	0	0	0	0	0	0	0
	point1129	1055	0	0	0	0	0	0	0	0	0	0
	point1130	1056	0	0	0	0	0	0	0	0	0	0
	point1131	1057	0	0	0	0	0	0	0	0	0	0
	point1132	1058	0	0	0	0	0	0	0	0	0	0
	point1133	1059	0	0	0	0	0	0	0	0	0	0
	point1134	1060	0	0	0	0	0	0	0	0	0	0
	point1135	1061	0	0	0	0	0	0	0	0	0	0
	point1136	1062	0	0	0	0	0	0	0	0	0	0
	point1137	1063	0	0	0	0	0	0	0	0	0	0
	point1138	1064	0	0	0	0	0	0	0	0	0	0
	point1139	1065	0	0	0	0	0	0	0	0	0	0
	point1140	1066	0	0	0	0	0	0	0	0	0	0
	point1141	1067	0	0	0	0	0	0	0	0	0	0

	point1142	1068	0	0	0	0	0	0	0	0	0	0
	point1143	1069	0	0	0	0	0	0	0	0	0	0
	point1144	1070	0	0	0	0	0	0	0	0	0	0
	point1145	1071	0	0	0	0	0	0	0	0	0	0
	point1146	1072	0	0	0	0	0	0	0	0	0	0
	point1147	1073	0	0	0	0	0	0	0	0	0	0
	point1049	1074	0	0	0	0	0	0	0	0	0	0
	point1050	1075	0	0	0	0	0	0	0	0	0	0
	point1072	1076	0	0	0	0	0	0	0	0	0	0
	point1073	1077	0	0	0	0	0	0	0	0	0	0
	point1074	1078	0	0	0	0	0	0	0	0	0	0
	point1075	1079	0	0	0	0	0	0	0	0	0	0
	point1076	1080	0	0	0	0	0	0	0	0	0	0
	point1077	1081	0	0	0	0	0	0	0	0	0	0
	point1078	1082	0	0	0	0	0	0	0	0	0	0
	point1079	1083	0	0	0	0	0	0	0	0	0	0
	point1080	1084	0	0	0	0	0	0	0	0	0	0
	point1081	1085	0	0	0	0	0	0	0	0	0	0
	point1082	1086	0	0	0	0	0	0	0	0	0	0
	point1083	1087	0	0	0	0	0	0	0	0	0	0
	point1084	1088	0	0	0	0	0	0	0	0	0	0
	point1085	1089	0	0	0	0	0	0	0	0	0	0
	point1086	1090	0	0	0	0	0	0	0	0	0	0
	point1087	1091	0	0	0	0	0	0	0	0	0	0
	point1088	1092	0	0	0	0	0	0	0	0	0	0
	point1089	1093	0	0	0	0	0	0	0	0	0	0
	point1090	1094	0	0	0	0	0	0	0	0	0	0
	point1051	1095	0	0	0	0	0	0	0	0	0	0
	point1052	1096	0	0	0	0	0	0	0	0	0	0
	point1053	1097	0	0	0	0	0	0	0	0	0	0
	point1110	1098	0	0	0	0	0	0	0	0	0	0
	point1111	1099	0	0	0	0	0	0	0	0	0	0
	point1112	1100	0	0	0	0	0	0	0	0	0	0
	point1113	1101	0	0	0	0	0	0	0	0	0	0
	point1114	1102	0	0	0	0	0	0	0	0	0	0
	point1115	1103	0	0	0	0	0	0	0	0	0	0

	point1116	1104	0	0	0	0	0	0	0	0	0	0
	point1117	1105	0	0	0	0	0	0	0	0	0	0
	point1118	1106	0	0	0	0	0	0	0	0	0	0
	point1119	1107	0	0	0	0	0	0	0	0	0	0
	point1120	1108	0	0	0	0	0	0	0	0	0	0
	point1121	1109	0	0	0	0	0	0	0	0	0	0
	point1122	1110	0	0	0	0	0	0	0	0	0	0
	point1123	1111	0	0	0	0	0	0	0	0	0	0
	point1124	1112	0	0	0	0	0	0	0	0	0	0
	point1125	1113	0	0	0	0	0	0	0	0	0	0
	point1126	1114	0	0	0	0	0	0	0	0	0	0
	point1127	1115	0	0	0	0	0	0	0	0	0	0
	point1128	1116	0	0	0	0	0	0	0	0	0	0
	point1054	1117	0	0	0	0	0	0	0	0	0	0
	point1055	1118	0	0	0	0	0	0	0	0	0	0
	point1056	1119	0	0	0	0	0	0	0	0	0	0
	point1057	1120	0	0	0	0	0	0	0	0	0	0
	point1058	1121	0	0	0	0	0	0	0	0	0	0
	point1059	1122	0	0	0	0	0	0	0	0	0	0
	point1060	1123	0	0	0	0	0	0	0	0	0	0
	point1061	1124	0	0	0	0	0	0	0	0	0	0
	point1062	1125	0	0	0	0	0	0	0	0	0	0
	point1063	1126	0	0	0	0	0	0	0	0	0	0
	point1064	1127	0	0	0	0	0	0	0	0	0	0
	point1065	1128	0	0	0	0	0	0	0	0	0	0
	point1066	1129	0	0	0	0	0	0	0	0	0	0
	point1067	1130	0	0	0	0	0	0	0	0	0	0
	point1068	1131	0	0	0	0	0	0	0	0	0	0
	point1069	1132										
EB Shoulder 2	point1154	1133	0	0	0	0	0	0	0	0	0	0
	point1155	1134	0	0	0	0	0	0	0	0	0	0
	point1156	1135	0	0	0	0	0	0	0	0	0	0
	point1157	1136	0	0	0	0	0	0	0	0	0	0
	point1158	1137	0	0	0	0	0	0	0	0	0	0
	point1159	1138	0	0	0	0	0	0	0	0	0	0
	point1160	1139	0	0	0	0	0	0	0	0	0	0

	point1161	1140	0	0	0	0	0	0	0	0	0	0
	point1162	1141	0	0	0	0	0	0	0	0	0	0
	point1163	1142	0	0	0	0	0	0	0	0	0	0
	point1164	1143	0	0	0	0	0	0	0	0	0	0
	point1165	1144	0	0	0	0	0	0	0	0	0	0
	point1166	1145	0	0	0	0	0	0	0	0	0	0
	point1167	1146	0	0	0	0	0	0	0	0	0	0
	point1168	1147	0	0	0	0	0	0	0	0	0	0
	point1169	1148	0	0	0	0	0	0	0	0	0	0
	point1170	1149										
EB Shoulder 3	point1171	1150	0	0	0	0	0	0	0	0	0	0
	point1172	1151	0	0	0	0	0	0	0	0	0	0
	point1173	1152	0	0	0	0	0	0	0	0	0	0
	point1212	1153	0	0	0	0	0	0	0	0	0	0
	point1213	1154	0	0	0	0	0	0	0	0	0	0
	point1214	1155	0	0	0	0	0	0	0	0	0	0
	point1215	1156	0	0	0	0	0	0	0	0	0	0
	point1216	1157	0	0	0	0	0	0	0	0	0	0
	point1217	1158	0	0	0	0	0	0	0	0	0	0
	point1218	1159	0	0	0	0	0	0	0	0	0	0
	point1219	1160	0	0	0	0	0	0	0	0	0	0
	point1220	1161	0	0	0	0	0	0	0	0	0	0
	point1221	1162	0	0	0	0	0	0	0	0	0	0
	point1222	1163	0	0	0	0	0	0	0	0	0	0
	point1223	1164	0	0	0	0	0	0	0	0	0	0
	point1224	1165	0	0	0	0	0	0	0	0	0	0
	point1225	1166	0	0	0	0	0	0	0	0	0	0
	point1226	1167	0	0	0	0	0	0	0	0	0	0
	point1227	1168	0	0	0	0	0	0	0	0	0	0
	point1228	1169	0	0	0	0	0	0	0	0	0	0
	point1229	1170	0	0	0	0	0	0	0	0	0	0
	point1230	1171	0	0	0	0	0	0	0	0	0	0
	point1211	1172	0	0	0	0	0	0	0	0	0	0
	point1174	1173	0	0	0	0	0	0	0	0	0	0
	point1175	1174	0	0	0	0	0	0	0	0	0	0
	point1176	1175	0	0	0	0	0	0	0	0	0	0

	point1177	1176	0	0	0	0	0	0	0	0	0	0
	point1231	1177	0	0	0	0	0	0	0	0	0	0
	point1232	1178	0	0	0	0	0	0	0	0	0	0
	point1233	1179	0	0	0	0	0	0	0	0	0	0
	point1234	1180	0	0	0	0	0	0	0	0	0	0
	point1235	1181	0	0	0	0	0	0	0	0	0	0
	point1236	1182	0	0	0	0	0	0	0	0	0	0
	point1237	1183	0	0	0	0	0	0	0	0	0	0
	point1238	1184	0	0	0	0	0	0	0	0	0	0
	point1239	1185	0	0	0	0	0	0	0	0	0	0
	point1240	1186	0	0	0	0	0	0	0	0	0	0
	point1241	1187	0	0	0	0	0	0	0	0	0	0
	point1242	1188	0	0	0	0	0	0	0	0	0	0
	point1243	1189	0	0	0	0	0	0	0	0	0	0
	point1244	1190	0	0	0	0	0	0	0	0	0	0
	point1245	1191	0	0	0	0	0	0	0	0	0	0
	point1246	1192	0	0	0	0	0	0	0	0	0	0
	point1247	1193	0	0	0	0	0	0	0	0	0	0
	point1248	1194	0	0	0	0	0	0	0	0	0	0
	point1249	1195	0	0	0	0	0	0	0	0	0	0
	point1178	1196	0	0	0	0	0	0	0	0	0	0
	point1179	1197	0	0	0	0	0	0	0	0	0	0
	point1180	1198	0	0	0	0	0	0	0	0	0	0
	point1181	1199	0	0	0	0	0	0	0	0	0	0
	point1182	1200	0	0	0	0	0	0	0	0	0	0
	point1183	1201	0	0	0	0	0	0	0	0	0	0
	point1184	1202	0	0	0	0	0	0	0	0	0	0
	point1185	1203	0	0	0	0	0	0	0	0	0	0
	point1186	1204	0	0	0	0	0	0	0	0	0	0
	point1187	1205	0	0	0	0	0	0	0	0	0	0
	point1188	1206	0	0	0	0	0	0	0	0	0	0
	point1189	1207	0	0	0	0	0	0	0	0	0	0
	point1190	1208	0	0	0	0	0	0	0	0	0	0
	point1191	1209	0	0	0	0	0	0	0	0	0	0
	point1192	1210	0	0	0	0	0	0	0	0	0	0
	point1193	1211	0	0	0	0	0	0	0	0	0	0

	point1194	1212	0	0	0	0	0	0	0	0	0	0
	point1250	1213	0	0	0	0	0	0	0	0	0	0
	point1251	1214	0	0	0	0	0	0	0	0	0	0
	point1252	1215	0	0	0	0	0	0	0	0	0	0
	point1253	1216	0	0	0	0	0	0	0	0	0	0
	point1254	1217	0	0	0	0	0	0	0	0	0	0
	point1255	1218	0	0	0	0	0	0	0	0	0	0
	point1256	1219	0	0	0	0	0	0	0	0	0	0
	point1257	1220	0	0	0	0	0	0	0	0	0	0
	point1258	1221	0	0	0	0	0	0	0	0	0	0
	point1259	1222	0	0	0	0	0	0	0	0	0	0
	point1260	1223	0	0	0	0	0	0	0	0	0	0
	point1261	1224	0	0	0	0	0	0	0	0	0	0
	point1262	1225	0	0	0	0	0	0	0	0	0	0
	point1263	1226	0	0	0	0	0	0	0	0	0	0
	point1264	1227	0	0	0	0	0	0	0	0	0	0
	point1265	1228	0	0	0	0	0	0	0	0	0	0
	point1266	1229	0	0	0	0	0	0	0	0	0	0
	point1195	1230	0	0	0	0	0	0	0	0	0	0
	point1196	1231	0	0	0	0	0	0	0	0	0	0
	point1197	1232	0	0	0	0	0	0	0	0	0	0
	point1198	1233	0	0	0	0	0	0	0	0	0	0
	point1199	1234	0	0	0	0	0	0	0	0	0	0
	point1200	1235	0	0	0	0	0	0	0	0	0	0
	point1201	1236	0	0	0	0	0	0	0	0	0	0
	point1202	1237	0	0	0	0	0	0	0	0	0	0
	point1203	1238	0	0	0	0	0	0	0	0	0	0
	point1204	1239	0	0	0	0	0	0	0	0	0	0
	point1205	1240	0	0	0	0	0	0	0	0	0	0
	point1206	1241	0	0	0	0	0	0	0	0	0	0
	point1207	1242	0	0	0	0	0	0	0	0	0	0
	point1208	1243	0	0	0	0	0	0	0	0	0	0
	point1209	1244	0	0	0	0	0	0	0	0	0	0
	point1210	1245										
WB Shoulder 1	point1267	1246	0	0	0	0	0	0	0	0	0	0
	point1268	1247	0	0	0	0	0	0	0	0	0	0

	point1269	1248	0	0	0	0	0	0	0	0	0	0
	point1270	1249	0	0	0	0	0	0	0	0	0	0
	point1271	1250	0	0	0	0	0	0	0	0	0	0
	point1272	1251	0	0	0	0	0	0	0	0	0	0
	point1273	1252	0	0	0	0	0	0	0	0	0	0
	point1274	1253	0	0	0	0	0	0	0	0	0	0
	point1275	1254	0	0	0	0	0	0	0	0	0	0
	point1276	1255	0	0	0	0	0	0	0	0	0	0
	point1277	1256	0	0	0	0	0	0	0	0	0	0
	point1278	1257	0	0	0	0	0	0	0	0	0	0
	point1279	1258	0	0	0	0	0	0	0	0	0	0
	point1280	1259	0	0	0	0	0	0	0	0	0	0
	point1281	1260	0	0	0	0	0	0	0	0	0	0
	point1282	1261	0	0	0	0	0	0	0	0	0	0
	point1283	1262										
WB Shoulder 2	point1286	1263	0	0	0	0	0	0	0	0	0	0
	point1337	1264	0	0	0	0	0	0	0	0	0	0
	point1338	1265	0	0	0	0	0	0	0	0	0	0
	point1339	1266	0	0	0	0	0	0	0	0	0	0
	point1340	1267	0	0	0	0	0	0	0	0	0	0
	point1341	1268	0	0	0	0	0	0	0	0	0	0
	point1342	1269	0	0	0	0	0	0	0	0	0	0
	point1343	1270	0	0	0	0	0	0	0	0	0	0
	point1344	1271	0	0	0	0	0	0	0	0	0	0
	point1345	1272	0	0	0	0	0	0	0	0	0	0
	point1346	1273	0	0	0	0	0	0	0	0	0	0
	point1347	1274	0	0	0	0	0	0	0	0	0	0
	point1348	1275	0	0	0	0	0	0	0	0	0	0
	point1349	1276	0	0	0	0	0	0	0	0	0	0
	point1350	1277	0	0	0	0	0	0	0	0	0	0
	point1351	1278	0	0	0	0	0	0	0	0	0	0
	point1352	1279	0	0	0	0	0	0	0	0	0	0
	point1353	1280	0	0	0	0	0	0	0	0	0	0
	point1354	1281	0	0	0	0	0	0	0	0	0	0
	point1355	1282	0	0	0	0	0	0	0	0	0	0
	point1287	1283	0	0	0	0	0	0	0	0	0	0

	point1288	1284	0	0	0	0	0	0	0	0	0	0
	point1356	1285	0	0	0	0	0	0	0	0	0	0
	point1357	1286	0	0	0	0	0	0	0	0	0	0
	point1358	1287	0	0	0	0	0	0	0	0	0	0
	point1359	1288	0	0	0	0	0	0	0	0	0	0
	point1360	1289	0	0	0	0	0	0	0	0	0	0
	point1361	1290	0	0	0	0	0	0	0	0	0	0
	point1362	1291	0	0	0	0	0	0	0	0	0	0
	point1363	1292	0	0	0	0	0	0	0	0	0	0
	point1364	1293	0	0	0	0	0	0	0	0	0	0
	point1365	1294	0	0	0	0	0	0	0	0	0	0
	point1366	1295	0	0	0	0	0	0	0	0	0	0
	point1367	1296	0	0	0	0	0	0	0	0	0	0
	point1368	1297	0	0	0	0	0	0	0	0	0	0
	point1369	1298	0	0	0	0	0	0	0	0	0	0
	point1370	1299	0	0	0	0	0	0	0	0	0	0
	point1371	1300	0	0	0	0	0	0	0	0	0	0
	point1372	1301	0	0	0	0	0	0	0	0	0	0
	point1373	1302	0	0	0	0	0	0	0	0	0	0
	point1374	1303	0	0	0	0	0	0	0	0	0	0
	point1289	1304	0	0	0	0	0	0	0	0	0	0
	point1375	1305	0	0	0	0	0	0	0	0	0	0
	point1376	1306	0	0	0	0	0	0	0	0	0	0
	point1377	1307	0	0	0	0	0	0	0	0	0	0
	point1378	1308	0	0	0	0	0	0	0	0	0	0
	point1379	1309	0	0	0	0	0	0	0	0	0	0
	point1380	1310	0	0	0	0	0	0	0	0	0	0
	point1381	1311	0	0	0	0	0	0	0	0	0	0
	point1382	1312	0	0	0	0	0	0	0	0	0	0
	point1383	1313	0	0	0	0	0	0	0	0	0	0
	point1384	1314	0	0	0	0	0	0	0	0	0	0
	point1385	1315	0	0	0	0	0	0	0	0	0	0
	point1386	1316	0	0	0	0	0	0	0	0	0	0
	point1387	1317	0	0	0	0	0	0	0	0	0	0
	point1388	1318	0	0	0	0	0	0	0	0	0	0
	point1389	1319	0	0	0	0	0	0	0	0	0	0

	point1390	1320	0	0	0	0	0	0	0	0	0	0
	point1391	1321	0	0	0	0	0	0	0	0	0	0
	point1392	1322	0	0	0	0	0	0	0	0	0	0
	point1393	1323	0	0	0	0	0	0	0	0	0	0
	point1290	1324	0	0	0	0	0	0	0	0	0	0
	point1291	1325	0	0	0	0	0	0	0	0	0	0
	point1292	1326	0	0	0	0	0	0	0	0	0	0
	point1293	1327	0	0	0	0	0	0	0	0	0	0
	point1294	1328	0	0	0	0	0	0	0	0	0	0
	point1295	1329	0	0	0	0	0	0	0	0	0	0
	point1296	1330	0	0	0	0	0	0	0	0	0	0
	point1297	1331	0	0	0	0	0	0	0	0	0	0
	point1298	1332	0	0	0	0	0	0	0	0	0	0
	point1299	1333	0	0	0	0	0	0	0	0	0	0
	point1300	1334	0	0	0	0	0	0	0	0	0	0
	point1301	1335	0	0	0	0	0	0	0	0	0	0
	point1302	1336	0	0	0	0	0	0	0	0	0	0
	point1303	1337	0	0	0	0	0	0	0	0	0	0
	point1394	1338	0	0	0	0	0	0	0	0	0	0
	point1395	1339	0	0	0	0	0	0	0	0	0	0
	point1304	1340	0	0	0	0	0	0	0	0	0	0
	point1305	1341	0	0	0	0	0	0	0	0	0	0
	point1306	1342	0	0	0	0	0	0	0	0	0	0
	point1307	1343	0	0	0	0	0	0	0	0	0	0
	point1308	1344	0	0	0	0	0	0	0	0	0	0
	point1309	1345	0	0	0	0	0	0	0	0	0	0
	point1310	1346	0	0	0	0	0	0	0	0	0	0
	point1311	1347	0	0	0	0	0	0	0	0	0	0
	point1312	1348	0	0	0	0	0	0	0	0	0	0
	point1313	1349	0	0	0	0	0	0	0	0	0	0
	point1314	1350	0	0	0	0	0	0	0	0	0	0
	point1315	1351	0	0	0	0	0	0	0	0	0	0
	point1316	1352	0	0	0	0	0	0	0	0	0	0
	point1317	1353	0	0	0	0	0	0	0	0	0	0
	point1318	1354	0	0	0	0	0	0	0	0	0	0
	point1319	1355	0	0	0	0	0	0	0	0	0	0

	point1320	1356	0	0	0	0	0	0	0	0	0	0
	point1321	1357	0	0	0	0	0	0	0	0	0	0
	point1322	1358	0	0	0	0	0	0	0	0	0	0
	point1323	1359	0	0	0	0	0	0	0	0	0	0
	point1324	1360	0	0	0	0	0	0	0	0	0	0
	point1325	1361	0	0	0	0	0	0	0	0	0	0
	point1326	1362	0	0	0	0	0	0	0	0	0	0
	point1327	1363	0	0	0	0	0	0	0	0	0	0
	point1328	1364	0	0	0	0	0	0	0	0	0	0
	point1329	1365	0	0	0	0	0	0	0	0	0	0
	point1330	1366	0	0	0	0	0	0	0	0	0	0
	point1331	1367	0	0	0	0	0	0	0	0	0	0
	point1332	1368	0	0	0	0	0	0	0	0	0	0
	point1333	1369	0	0	0	0	0	0	0	0	0	0
	point1334	1370	0	0	0	0	0	0	0	0	0	0
	point1335	1371	0	0	0	0	0	0	0	0	0	0
	point1336	1372										
WB Shoulder 3	point1396	1373	0	0	0	0	0	0	0	0	0	0
	point1397	1374	0	0	0	0	0	0	0	0	0	0
	point1398	1375	0	0	0	0	0	0	0	0	0	0
	point1445	1376	0	0	0	0	0	0	0	0	0	0
	point1446	1377	0	0	0	0	0	0	0	0	0	0
	point1447	1378	0	0	0	0	0	0	0	0	0	0
	point1448	1379	0	0	0	0	0	0	0	0	0	0
	point1449	1380	0	0	0	0	0	0	0	0	0	0
	point1450	1381	0	0	0	0	0	0	0	0	0	0
	point1451	1382	0	0	0	0	0	0	0	0	0	0
	point1452	1383	0	0	0	0	0	0	0	0	0	0
	point1453	1384	0	0	0	0	0	0	0	0	0	0
	point1454	1385	0	0	0	0	0	0	0	0	0	0
	point1455	1386	0	0	0	0	0	0	0	0	0	0
	point1456	1387	0	0	0	0	0	0	0	0	0	0
	point1457	1388	0	0	0	0	0	0	0	0	0	0
	point1458	1389	0	0	0	0	0	0	0	0	0	0
	point1459	1390	0	0	0	0	0	0	0	0	0	0
	point1460	1391	0	0	0	0	0	0	0	0	0	0

	point1461	1392	0	0	0	0	0	0	0	0	0	0
	point1462	1393	0	0	0	0	0	0	0	0	0	0
	point1463	1394	0	0	0	0	0	0	0	0	0	0
	point1399	1395	0	0	0	0	0	0	0	0	0	0
	point1464	1396	0	0	0	0	0	0	0	0	0	0
	point1465	1397	0	0	0	0	0	0	0	0	0	0
	point1466	1398	0	0	0	0	0	0	0	0	0	0
	point1467	1399	0	0	0	0	0	0	0	0	0	0
	point1468	1400	0	0	0	0	0	0	0	0	0	0
	point1469	1401	0	0	0	0	0	0	0	0	0	0
	point1470	1402	0	0	0	0	0	0	0	0	0	0
	point1471	1403	0	0	0	0	0	0	0	0	0	0
	point1472	1404	0	0	0	0	0	0	0	0	0	0
	point1473	1405	0	0	0	0	0	0	0	0	0	0
	point1474	1406	0	0	0	0	0	0	0	0	0	0
	point1475	1407	0	0	0	0	0	0	0	0	0	0
	point1476	1408	0	0	0	0	0	0	0	0	0	0
	point1477	1409	0	0	0	0	0	0	0	0	0	0
	point1478	1410	0	0	0	0	0	0	0	0	0	0
	point1479	1411	0	0	0	0	0	0	0	0	0	0
	point1480	1412	0	0	0	0	0	0	0	0	0	0
	point1400	1413	0	0	0	0	0	0	0	0	0	0
	point1401	1414	0	0	0	0	0	0	0	0	0	0
	point1402	1415	0	0	0	0	0	0	0	0	0	0
	point1403	1416	0	0	0	0	0	0	0	0	0	0
	point1404	1417	0	0	0	0	0	0	0	0	0	0
	point1405	1418	0	0	0	0	0	0	0	0	0	0
	point1406	1419	0	0	0	0	0	0	0	0	0	0
	point1407	1420	0	0	0	0	0	0	0	0	0	0
	point1408	1421	0	0	0	0	0	0	0	0	0	0
	point1409	1422	0	0	0	0	0	0	0	0	0	0
	point1410	1423	0	0	0	0	0	0	0	0	0	0
	point1411	1424	0	0	0	0	0	0	0	0	0	0
	point1412	1425	0	0	0	0	0	0	0	0	0	0
	point1413	1426	0	0	0	0	0	0	0	0	0	0
	point1414	1427	0	0	0	0	0	0	0	0	0	0

	point1415	1428	0	0	0	0	0	0	0	0	0	0
	point1416	1429	0	0	0	0	0	0	0	0	0	0
	point1417	1430	0	0	0	0	0	0	0	0	0	0
	point1418	1431	0	0	0	0	0	0	0	0	0	0
	point1419	1432	0	0	0	0	0	0	0	0	0	0
	point1420	1433	0	0	0	0	0	0	0	0	0	0
	point1421	1434	0	0	0	0	0	0	0	0	0	0
	point1422	1435	0	0	0	0	0	0	0	0	0	0
	point1423	1436	0	0	0	0	0	0	0	0	0	0
	point1424	1437	0	0	0	0	0	0	0	0	0	0
	point1425	1438	0	0	0	0	0	0	0	0	0	0
	point1426	1439	0	0	0	0	0	0	0	0	0	0
	point1427	1440	0	0	0	0	0	0	0	0	0	0
	point1428	1441	0	0	0	0	0	0	0	0	0	0
	point1429	1442	0	0	0	0	0	0	0	0	0	0
	point1430	1443	0	0	0	0	0	0	0	0	0	0
	point1431	1444	0	0	0	0	0	0	0	0	0	0
	point1432	1445	0	0	0	0	0	0	0	0	0	0
	point1433	1446	0	0	0	0	0	0	0	0	0	0
	point1434	1447	0	0	0	0	0	0	0	0	0	0
	point1435	1448	0	0	0	0	0	0	0	0	0	0
	point1436	1449	0	0	0	0	0	0	0	0	0	0
	point1437	1450	0	0	0	0	0	0	0	0	0	0
	point1438	1451	0	0	0	0	0	0	0	0	0	0
	point1439	1452	0	0	0	0	0	0	0	0	0	0
	point1440	1453	0	0	0	0	0	0	0	0	0	0
	point1441	1454	0	0	0	0	0	0	0	0	0	0
	point1442	1455	0	0	0	0	0	0	0	0	0	0
	point1443	1456	0	0	0	0	0	0	0	0	0	0
	point1444	1457										
WB Shoulder 4	point1481	1458	0	0	0	0	0	0	0	0	0	0
	point1482	1459	0	0	0	0	0	0	0	0	0	0
	point1483	1460	0	0	0	0	0	0	0	0	0	0
	point1484	1461	0	0	0	0	0	0	0	0	0	0
	point1485	1462	0	0	0	0	0	0	0	0	0	0
	point1486	1463	0	0	0	0	0	0	0	0	0	0

	point1487	1464	0	0	0	0	0	0	0	0	0	0
	point1488	1465	0	0	0	0	0	0	0	0	0	0
	point1489	1466	0	0	0	0	0	0	0	0	0	0
	point1490	1467	0	0	0	0	0	0	0	0	0	0
	point1491	1468	0	0	0	0	0	0	0	0	0	0
	point1492	1469	0	0	0	0	0	0	0	0	0	0
	point1493	1470	0	0	0	0	0	0	0	0	0	0
	point1494	1471	0	0	0	0	0	0	0	0	0	0
	point1495	1472	0	0	0	0	0	0	0	0	0	0
	point1496	1473	0	0	0	0	0	0	0	0	0	0
	point1497	1474	0	0	0	0	0	0	0	0	0	0
	point1498	1475	0	0	0	0	0	0	0	0	0	0
	point1499	1476	0	0	0	0	0	0	0	0	0	0
	point1500	1477	0	0	0	0	0	0	0	0	0	0
	point1501	1478	0	0	0	0	0	0	0	0	0	0
	point1502	1479	0	0	0	0	0	0	0	0	0	0
	point1503	1480	0	0	0	0	0	0	0	0	0	0
	point1504	1481	0	0	0	0	0	0	0	0	0	0
	point1505	1482	0	0	0	0	0	0	0	0	0	0
	point1506	1483	0	0	0	0	0	0	0	0	0	0
	point1507	1484	0	0	0	0	0	0	0	0	0	0
	point1508	1485										

AECOM **23 July 2018**
Seth Anderson **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **US-191 EA Re-evaluation**
RUN: **US-191 Future**

Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Bike Path	point935	935	0	0	0	0	0	0	0	0	0	0
	point936	936	0	0	0	0	0	0	0	0	0	0
	point937	937	0	0	0	0	0	0	0	0	0	0
	point938	938	0	0	0	0	0	0	0	0	0	0
	point939	939	0	0	0	0	0	0	0	0	0	0
	point940	940	0	0	0	0	0	0	0	0	0	0
	point941	941	0	0	0	0	0	0	0	0	0	0
	point942	942	0	0	0	0	0	0	0	0	0	0
	point943	943	0	0	0	0	0	0	0	0	0	0
	point944	944	0	0	0	0	0	0	0	0	0	0
	point945	945	0	0	0	0	0	0	0	0	0	0
	point946	946	0	0	0	0	0	0	0	0	0	0
	point947	947	0	0	0	0	0	0	0	0	0	0
	point948	948	0	0	0	0	0	0	0	0	0	0
	point949	949	0	0	0	0	0	0	0	0	0	0
	point950	950	0	0	0	0	0	0	0	0	0	0
	point951	951	0	0	0	0	0	0	0	0	0	0
	point952	952	0	0	0	0	0	0	0	0	0	0
	point953	953	0	0	0	0	0	0	0	0	0	0
	point954	954	0	0	0	0	0	0	0	0	0	0
	point955	955	0	0	0	0	0	0	0	0	0	0
	point956	956	0	0	0	0	0	0	0	0	0	0
	point957	957	0	0	0	0	0	0	0	0	0	0

	point958	958	0	0	0	0	0	0	0	0	0	0
	point959	959	0	0	0	0	0	0	0	0	0	0
	point960	960	0	0	0	0	0	0	0	0	0	0
	point961	961	0	0	0	0	0	0	0	0	0	0
	point962	962	0	0	0	0	0	0	0	0	0	0
	point1027	1027	0	0	0	0	0	0	0	0	0	0
	point963	963	0	0	0	0	0	0	0	0	0	0
	point964	964	0	0	0	0	0	0	0	0	0	0
	point965	965	0	0	0	0	0	0	0	0	0	0
	point966	966	0	0	0	0	0	0	0	0	0	0
	point967	967	0	0	0	0	0	0	0	0	0	0
	point968	968	0	0	0	0	0	0	0	0	0	0
	point969	969	0	0	0	0	0	0	0	0	0	0
	point970	970	0	0	0	0	0	0	0	0	0	0
	point971	971	0	0	0	0	0	0	0	0	0	0
	point972	972	0	0	0	0	0	0	0	0	0	0
	point973	973	0	0	0	0	0	0	0	0	0	0
	point974	974	0	0	0	0	0	0	0	0	0	0
	point975	975	0	0	0	0	0	0	0	0	0	0
	point976	976	0	0	0	0	0	0	0	0	0	0
	point977	977	0	0	0	0	0	0	0	0	0	0
	point978	978	0	0	0	0	0	0	0	0	0	0
	point979	979	0	0	0	0	0	0	0	0	0	0
	point980	980	0	0	0	0	0	0	0	0	0	0
	point981	981	0	0	0	0	0	0	0	0	0	0
	point982	982	0	0	0	0	0	0	0	0	0	0
	point983	983	0	0	0	0	0	0	0	0	0	0
	point1022	1022	0	0	0	0	0	0	0	0	0	0
	point1023	1023	0	0	0	0	0	0	0	0	0	0
	point1024	1024	0	0	0	0	0	0	0	0	0	0
	point1025	1025	0	0	0	0	0	0	0	0	0	0
	point1026	1026	0	0	0	0	0	0	0	0	0	0
	point984	984	0	0	0	0	0	0	0	0	0	0
	point985	985	0	0	0	0	0	0	0	0	0	0
	point986	986	0	0	0	0	0	0	0	0	0	0
	point987	987	0	0	0	0	0	0	0	0	0	0

	point988	988	0	0	0	0	0	0	0	0	0	0
	point989	989	0	0	0	0	0	0	0	0	0	0
	point1013	1013	0	0	0	0	0	0	0	0	0	0
	point1014	1014	0	0	0	0	0	0	0	0	0	0
	point1015	1015	0	0	0	0	0	0	0	0	0	0
	point1016	1016	0	0	0	0	0	0	0	0	0	0
	point1017	1017	0	0	0	0	0	0	0	0	0	0
	point1018	1018	0	0	0	0	0	0	0	0	0	0
	point1019	1019	0	0	0	0	0	0	0	0	0	0
	point1020	1020	0	0	0	0	0	0	0	0	0	0
	point1021	1021	0	0	0	0	0	0	0	0	0	0
	point990	990	0	0	0	0	0	0	0	0	0	0
	point991	991	0	0	0	0	0	0	0	0	0	0
	point992	992	0	0	0	0	0	0	0	0	0	0
	point993	993	0	0	0	0	0	0	0	0	0	0
	point994	994	0	0	0	0	0	0	0	0	0	0
	point995	995	0	0	0	0	0	0	0	0	0	0
	point996	996	0	0	0	0	0	0	0	0	0	0
	point997	997	0	0	0	0	0	0	0	0	0	0
	point998	998	0	0	0	0	0	0	0	0	0	0
	point999	999	0	0	0	0	0	0	0	0	0	0
	point1000	1000	0	0	0	0	0	0	0	0	0	0
	point1001	1001	0	0	0	0	0	0	0	0	0	0
	point1002	1002	0	0	0	0	0	0	0	0	0	0
	point1003	1003	0	0	0	0	0	0	0	0	0	0
	point1004	1004	0	0	0	0	0	0	0	0	0	0
	point1005	1005	0	0	0	0	0	0	0	0	0	0
	point1006	1006	0	0	0	0	0	0	0	0	0	0
	point1007	1007	0	0	0	0	0	0	0	0	0	0
	point1008	1008	0	0	0	0	0	0	0	0	0	0
	point1009	1009	0	0	0	0	0	0	0	0	0	0
	point1010	1010	0	0	0	0	0	0	0	0	0	0
	point1011	1011	0	0	0	0	0	0	0	0	0	0
	point1012	1012										
Center Turn 3	point1090	1090	0	0	0	0	0	0	0	0	0	0
	point1100	1100	0	0	0	0	0	0	0	0	0	0

	point1101	1101	0	0	0	0	0	0	0	0	0	0
	point1102	1102	0	0	0	0	0	0	0	0	0	0
	point1103	1103	0	0	0	0	0	0	0	0	0	0
	point1104	1104	0	0	0	0	0	0	0	0	0	0
	point1105	1105	0	0	0	0	0	0	0	0	0	0
	point1106	1106	0	0	0	0	0	0	0	0	0	0
	point1107	1107	0	0	0	0	0	0	0	0	0	0
	point1108	1108	0	0	0	0	0	0	0	0	0	0
	point1109	1109	0	0	0	0	0	0	0	0	0	0
	point1110	1110	0	0	0	0	0	0	0	0	0	0
	point1111	1111	0	0	0	0	0	0	0	0	0	0
	point1112	1112	0	0	0	0	0	0	0	0	0	0
	point1113	1113	0	0	0	0	0	0	0	0	0	0
	point1114	1114	0	0	0	0	0	0	0	0	0	0
	point1115	1115	0	0	0	0	0	0	0	0	0	0
	point1116	1116	0	0	0	0	0	0	0	0	0	0
	point1117	1117	0	0	0	0	0	0	0	0	0	0
	point1118	1118	0	0	0	0	0	0	0	0	0	0
	point1119	1119	0	0	0	0	0	0	0	0	0	0
	point1120	1120	0	0	0	0	0	0	0	0	0	0
	point1121	1121	0	0	0	0	0	0	0	0	0	0
	point1122	1122	0	0	0	0	0	0	0	0	0	0
	point1123	1123	0	0	0	0	0	0	0	0	0	0
	point1091	1091	0	0	0	0	0	0	0	0	0	0
	point1148	1148	0	0	0	0	0	0	0	0	0	0
	point1149	1149	0	0	0	0	0	0	0	0	0	0
	point1150	1150	0	0	0	0	0	0	0	0	0	0
	point1151	1151	0	0	0	0	0	0	0	0	0	0
	point1152	1152	0	0	0	0	0	0	0	0	0	0
	point1153	1153	0	0	0	0	0	0	0	0	0	0
	point1154	1154	0	0	0	0	0	0	0	0	0	0
	point1155	1155	0	0	0	0	0	0	0	0	0	0
	point1156	1156	0	0	0	0	0	0	0	0	0	0
	point1157	1157	0	0	0	0	0	0	0	0	0	0
	point1158	1158	0	0	0	0	0	0	0	0	0	0
	point1159	1159	0	0	0	0	0	0	0	0	0	0

	point1160	1160	0	0	0	0	0	0	0	0	0	0
	point1161	1161	0	0	0	0	0	0	0	0	0	0
	point1162	1162	0	0	0	0	0	0	0	0	0	0
	point1163	1163	0	0	0	0	0	0	0	0	0	0
	point1164	1164	0	0	0	0	0	0	0	0	0	0
	point1092	1092	0	0	0	0	0	0	0	0	0	0
	point1093	1093	0	0	0	0	0	0	0	0	0	0
	point1094	1094	0	0	0	0	0	0	0	0	0	0
	point1095	1095	0	0	0	0	0	0	0	0	0	0
	point1096	1096	0	0	0	0	0	0	0	0	0	0
	point1124	1124	0	0	0	0	0	0	0	0	0	0
	point1125	1125	0	0	0	0	0	0	0	0	0	0
	point1126	1126	0	0	0	0	0	0	0	0	0	0
	point1127	1127	0	0	0	0	0	0	0	0	0	0
	point1128	1128	0	0	0	0	0	0	0	0	0	0
	point1129	1129	0	0	0	0	0	0	0	0	0	0
	point1130	1130	0	0	0	0	0	0	0	0	0	0
	point1131	1131	0	0	0	0	0	0	0	0	0	0
	point1132	1132	0	0	0	0	0	0	0	0	0	0
	point1133	1133	0	0	0	0	0	0	0	0	0	0
	point1134	1134	0	0	0	0	0	0	0	0	0	0
	point1135	1135	0	0	0	0	0	0	0	0	0	0
	point1136	1136	0	0	0	0	0	0	0	0	0	0
	point1137	1137	0	0	0	0	0	0	0	0	0	0
	point1138	1138	0	0	0	0	0	0	0	0	0	0
	point1139	1139	0	0	0	0	0	0	0	0	0	0
	point1140	1140	0	0	0	0	0	0	0	0	0	0
	point1141	1141	0	0	0	0	0	0	0	0	0	0
	point1142	1142	0	0	0	0	0	0	0	0	0	0
	point1143	1143	0	0	0	0	0	0	0	0	0	0
	point1144	1144	0	0	0	0	0	0	0	0	0	0
	point1145	1145	0	0	0	0	0	0	0	0	0	0
	point1146	1146	0	0	0	0	0	0	0	0	0	0
	point1147	1147	0	0	0	0	0	0	0	0	0	0
	point1097	1097	0	0	0	0	0	0	0	0	0	0
	point2333	2333	0	0	0	0	0	0	0	0	0	0

	point1098	1098										
Center Turn 4	point1165	1165	0	0	0	0	0	0	0	0	0	0
	point1166	1166	0	0	0	0	0	0	0	0	0	0
	point1167	1167	0	0	0	0	0	0	0	0	0	0
	point1168	1168	0	0	0	0	0	0	0	0	0	0
	point1169	1169	0	0	0	0	0	0	0	0	0	0
	point1170	1170	0	0	0	0	0	0	0	0	0	0
	point1205	1205	0	0	0	0	0	0	0	0	0	0
	point1206	1206	0	0	0	0	0	0	0	0	0	0
	point1207	1207	0	0	0	0	0	0	0	0	0	0
	point1208	1208	0	0	0	0	0	0	0	0	0	0
	point1171	1171	0	0	0	0	0	0	0	0	0	0
	point1172	1172	0	0	0	0	0	0	0	0	0	0
	point1173	1173	0	0	0	0	0	0	0	0	0	0
	point1174	1174	0	0	0	0	0	0	0	0	0	0
	point1175	1175	0	0	0	0	0	0	0	0	0	0
	point1176	1176	0	0	0	0	0	0	0	0	0	0
	point1177	1177	0	0	0	0	0	0	0	0	0	0
	point1178	1178	0	0	0	0	0	0	0	0	0	0
	point1179	1179	0	0	0	0	0	0	0	0	0	0
	point1180	1180	0	0	0	0	0	0	0	0	0	0
	point1181	1181	0	0	0	0	0	0	0	0	0	0
	point1182	1182	0	0	0	0	0	0	0	0	0	0
	point1183	1183	0	0	0	0	0	0	0	0	0	0
	point1184	1184	0	0	0	0	0	0	0	0	0	0
	point1186	1186	0	0	0	0	0	0	0	0	0	0
	point1187	1187	0	0	0	0	0	0	0	0	0	0
	point1188	1188	0	0	0	0	0	0	0	0	0	0
	point1189	1189	0	0	0	0	0	0	0	0	0	0
	point1190	1190	0	0	0	0	0	0	0	0	0	0
	point1191	1191	0	0	0	0	0	0	0	0	0	0
	point1192	1192	0	0	0	0	0	0	0	0	0	0
	point1193	1193	0	0	0	0	0	0	0	0	0	0
	point1194	1194	0	0	0	0	0	0	0	0	0	0
	point1195	1195	0	0	0	0	0	0	0	0	0	0
	point1196	1196	0	0	0	0	0	0	0	0	0	0

	point1197	1197	0	0	0	0	0	0	0	0	0	0
	point1198	1198	0	0	0	0	0	0	0	0	0	0
	point1199	1199	0	0	0	0	0	0	0	0	0	0
	point1200	1200	0	0	0	0	0	0	0	0	0	0
	point1201	1201	0	0	0	0	0	0	0	0	0	0
	point1202	1202	0	0	0	0	0	0	0	0	0	0
	point1203	1203	0	0	0	0	0	0	0	0	0	0
	point1204	1204	0	0	0	0	0	0	0	0	0	0
	point2324	2324	0	0	0	0	0	0	0	0	0	0
	point1185	1185										
Center Turn 5	point1209	1209	0	0	0	0	0	0	0	0	0	0
	point1219	1219	0	0	0	0	0	0	0	0	0	0
	point1220	1220	0	0	0	0	0	0	0	0	0	0
	point1221	1221	0	0	0	0	0	0	0	0	0	0
	point1222	1222	0	0	0	0	0	0	0	0	0	0
	point1223	1223	0	0	0	0	0	0	0	0	0	0
	point1224	1224	0	0	0	0	0	0	0	0	0	0
	point1225	1225	0	0	0	0	0	0	0	0	0	0
	point1226	1226	0	0	0	0	0	0	0	0	0	0
	point1227	1227	0	0	0	0	0	0	0	0	0	0
	point1228	1228	0	0	0	0	0	0	0	0	0	0
	point1229	1229	0	0	0	0	0	0	0	0	0	0
	point1230	1230	0	0	0	0	0	0	0	0	0	0
	point1231	1231	0	0	0	0	0	0	0	0	0	0
	point1232	1232	0	0	0	0	0	0	0	0	0	0
	point1233	1233	0	0	0	0	0	0	0	0	0	0
	point1234	1234	0	0	0	0	0	0	0	0	0	0
	point1235	1235	0	0	0	0	0	0	0	0	0	0
	point1236	1236	0	0	0	0	0	0	0	0	0	0
	point1237	1237	0	0	0	0	0	0	0	0	0	0
	point1238	1238	0	0	0	0	0	0	0	0	0	0
	point1239	1239	0	0	0	0	0	0	0	0	0	0
	point1240	1240	0	0	0	0	0	0	0	0	0	0
	point1241	1241	0	0	0	0	0	0	0	0	0	0
	point1242	1242	0	0	0	0	0	0	0	0	0	0
	point1210	1210	0	0	0	0	0	0	0	0	0	0

	point1211	1211	0	0	0	0	0	0	0	0	0	0
	point1212	1212	0	0	0	0	0	0	0	0	0	0
	point1213	1213	0	0	0	0	0	0	0	0	0	0
	point1243	1243	0	0	0	0	0	0	0	0	0	0
	point1244	1244	0	0	0	0	0	0	0	0	0	0
	point1245	1245	0	0	0	0	0	0	0	0	0	0
	point1246	1246	0	0	0	0	0	0	0	0	0	0
	point1247	1247	0	0	0	0	0	0	0	0	0	0
	point1248	1248	0	0	0	0	0	0	0	0	0	0
	point1249	1249	0	0	0	0	0	0	0	0	0	0
	point1250	1250	0	0	0	0	0	0	0	0	0	0
	point1251	1251	0	0	0	0	0	0	0	0	0	0
	point1252	1252	0	0	0	0	0	0	0	0	0	0
	point1253	1253	0	0	0	0	0	0	0	0	0	0
	point1254	1254	0	0	0	0	0	0	0	0	0	0
	point1214	1214	0	0	0	0	0	0	0	0	0	0
	point1215	1215	0	0	0	0	0	0	0	0	0	0
	point1216	1216	0	0	0	0	0	0	0	0	0	0
	point1217	1217	0	0	0	0	0	0	0	0	0	0
	point2319	2319	0	0	0	0	0	0	0	0	0	0
	point1218	1218										
EB Inside 3	point1305	1305	568	45	153	45	127	45	0	0	0	0
	point1306	1306	568	45	153	45	127	45	0	0	0	0
	point1307	1307	568	45	153	45	127	45	0	0	0	0
	point1308	1308	568	45	153	45	127	45	0	0	0	0
	point1363	1363	568	45	153	45	127	45	0	0	0	0
	point1364	1364	568	45	153	45	127	45	0	0	0	0
	point1365	1365	568	45	153	45	127	45	0	0	0	0
	point1366	1366	568	45	153	45	127	45	0	0	0	0
	point1367	1367	568	45	153	45	127	45	0	0	0	0
	point1368	1368	568	45	153	45	127	45	0	0	0	0
	point1369	1369	568	45	153	45	127	45	0	0	0	0
	point1370	1370	568	45	153	45	127	45	0	0	0	0
	point1371	1371	568	45	153	45	127	45	0	0	0	0
	point1372	1372	568	45	153	45	127	45	0	0	0	0
	point1373	1373	568	45	153	45	127	45	0	0	0	0

	point1374	1374	568	45	153	45	127	45	0	0	0	0
	point1375	1375	568	45	153	45	127	45	0	0	0	0
	point1376	1376	568	45	153	45	127	45	0	0	0	0
	point1377	1377	568	45	153	45	127	45	0	0	0	0
	point1378	1378	568	45	153	45	127	45	0	0	0	0
	point1309	1309	568	45	153	45	127	45	0	0	0	0
	point1310	1310	568	45	153	45	127	45	0	0	0	0
	point1311	1311	568	45	153	45	127	45	0	0	0	0
	point1312	1312	568	45	153	45	127	45	0	0	0	0
	point1339	1339	568	45	153	45	127	45	0	0	0	0
	point1340	1340	568	45	153	45	127	45	0	0	0	0
	point1341	1341	568	45	153	45	127	45	0	0	0	0
	point1342	1342	568	45	153	45	127	45	0	0	0	0
	point1343	1343	568	45	153	45	127	45	0	0	0	0
	point1344	1344	568	45	153	45	127	45	0	0	0	0
	point1345	1345	568	45	153	45	127	45	0	0	0	0
	point1346	1346	568	45	153	45	127	45	0	0	0	0
	point1347	1347	568	45	153	45	127	45	0	0	0	0
	point1348	1348	568	45	153	45	127	45	0	0	0	0
	point1349	1349	568	45	153	45	127	45	0	0	0	0
	point1350	1350	568	45	153	45	127	45	0	0	0	0
	point1351	1351	568	45	153	45	127	45	0	0	0	0
	point1352	1352	568	45	153	45	127	45	0	0	0	0
	point1353	1353	568	45	153	45	127	45	0	0	0	0
	point1354	1354	568	45	153	45	127	45	0	0	0	0
	point1355	1355	568	45	153	45	127	45	0	0	0	0
	point1356	1356	568	45	153	45	127	45	0	0	0	0
	point1357	1357	568	45	153	45	127	45	0	0	0	0
	point1358	1358	568	45	153	45	127	45	0	0	0	0
	point1359	1359	568	45	153	45	127	45	0	0	0	0
	point1360	1360	568	45	153	45	127	45	0	0	0	0
	point1361	1361	568	45	153	45	127	45	0	0	0	0
	point1362	1362	568	45	153	45	127	45	0	0	0	0
	point1313	1313	568	45	153	45	127	45	0	0	0	0
	point1315	1315	568	45	153	45	127	45	0	0	0	0
	point1316	1316	568	45	153	45	127	45	0	0	0	0

	point1317	1317	568	45	153	45	127	45	0	0	0	0
	point1318	1318	568	45	153	45	127	45	0	0	0	0
	point1319	1319	568	45	153	45	127	45	0	0	0	0
	point1320	1320	568	45	153	45	127	45	0	0	0	0
	point1321	1321	568	45	153	45	127	45	0	0	0	0
	point1322	1322	568	45	153	45	127	45	0	0	0	0
	point1323	1323	568	45	153	45	127	45	0	0	0	0
	point1324	1324	568	45	153	45	127	45	0	0	0	0
	point1325	1325	568	45	153	45	127	45	0	0	0	0
	point1326	1326	568	45	153	45	127	45	0	0	0	0
	point1327	1327	568	45	153	45	127	45	0	0	0	0
	point1328	1328	568	45	153	45	127	45	0	0	0	0
	point1329	1329	568	45	153	45	127	45	0	0	0	0
	point1330	1330	568	45	153	45	127	45	0	0	0	0
	point1331	1331	568	45	153	45	127	45	0	0	0	0
	point1332	1332	568	45	153	45	127	45	0	0	0	0
	point1333	1333	568	45	153	45	127	45	0	0	0	0
	point1334	1334	568	45	153	45	127	0	0	0	0	0
	point1335	1335	568	45	153	45	127	45	0	0	0	0
	point1336	1336	568	45	153	45	127	45	0	0	0	0
	point1337	1337	568	45	153	45	127	45	0	0	0	0
	point1338	1338	568	45	153	45	127	45	0	0	0	0
	point2325	2325										
EB Inside 4	point1379	1379	568	45	153	45	127	45	0	0	0	0
	point2327	2327	568	45	153	45	127	45	0	0	0	0
	point1389	1389	568	45	153	45	127	45	0	0	0	0
	point1390	1390	568	45	153	45	127	45	0	0	0	0
	point1391	1391	568	45	153	45	127	45	0	0	0	0
	point1392	1392	568	45	153	45	127	45	0	0	0	0
	point1393	1393	568	45	153	45	127	45	0	0	0	0
	point1394	1394	568	45	153	45	127	45	0	0	0	0
	point1395	1395	568	45	153	45	127	45	0	0	0	0
	point1396	1396	568	45	153	45	127	45	0	0	0	0
	point1397	1397	568	45	153	45	127	45	0	0	0	0
	point1398	1398	568	45	153	45	127	45	0	0	0	0
	point1399	1399	568	45	153	45	127	45	0	0	0	0

	point1400	1400	568	45	153	45	127	45	0	0	0	0
	point1401	1401	568	45	153	45	127	45	0	0	0	0
	point1402	1402	568	45	153	45	127	45	0	0	0	0
	point1403	1403	568	45	153	45	127	45	0	0	0	0
	point1404	1404	568	45	153	45	127	45	0	0	0	0
	point1405	1405	568	45	153	45	127	45	0	0	0	0
	point1406	1406	568	45	153	45	127	45	0	0	0	0
	point1407	1407	568	45	153	45	127	45	0	0	0	0
	point1408	1408	568	45	153	45	127	45	0	0	0	0
	point1409	1409	568	45	153	45	127	45	0	0	0	0
	point1410	1410	568	45	153	45	127	45	0	0	0	0
	point1411	1411	568	45	153	45	127	45	0	0	0	0
	point1412	1412	568	45	153	45	127	45	0	0	0	0
	point1380	1380	568	45	153	45	127	45	0	0	0	0
	point1381	1381	568	45	153	45	127	45	0	0	0	0
	point1382	1382	568	45	153	45	127	45	0	0	0	0
	point1383	1383	568	45	153	45	127	45	0	0	0	0
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	point1413	1413	568	45	153	45	127	45	0	0	0	0
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	point1386	1386	568	45	153	45	127	45	0	0	0	0
	point1387	1387	568	45	153	45	127	45	0	0	0	0
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	point1388	1388										
EB Inside 5	point1423	1423	568	30	153	30	127	30	0	0	0	0
	point1424	1424	568	30	153	30	127	30	0	0	0	0
	point1425	1425	568	30	153	30	127	30	0	0	0	0

	point1426	1426	568	30	153	30	127	30	0	0	0	0
	point1427	1427	568	30	153	30	127	30	0	0	0	0
	point1428	1428	568	30	153	30	127	30	0	0	0	0
	point1433	1433	568	30	153	30	127	30	0	0	0	0
	point1434	1434	568	30	153	30	127	30	0	0	0	0
	point1435	1435	568	30	153	30	127	30	0	0	0	0
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	point1438	1438	568	30	153	30	127	30	0	0	0	0
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	point1443	1443	568	30	153	30	127	30	0	0	0	0
	point1444	1444	568	30	153	30	127	30	0	0	0	0
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	point1462	1462	568	30	153	30	127	30	0	0	0	0
	point1463	1463	568	30	153	30	127	30	0	0	0	0
	point1464	1464	568	30	153	30	127	30	0	0	0	0

	point1465	1465	568	30	153	30	127	30	0	0	0	0
	point1466	1466	568	30	153	30	127	30	0	0	0	0
	point1467	1467	568	30	153	30	127	30	0	0	0	0
	point1468	1468	568	30	153	30	127	30	0	0	0	0
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	point1432	1432										
EB Outside 3	point1520	1520	568	45	153	45	127	45	0	0	0	0
	point1530	1530	568	45	153	45	127	45	0	0	0	0
	point1531	1531	568	45	153	45	127	45	0	0	0	0
	point1532	1532	568	45	153	45	127	45	0	0	0	0
	point1533	1533	568	45	153	45	127	45	0	0	0	0
	point1534	1534	568	45	153	45	127	45	0	0	0	0
	point1535	1535	568	45	153	45	127	45	0	0	0	0
	point1536	1536	568	45	153	45	127	45	0	0	0	0
	point1537	1537	568	45	153	45	127	45	0	0	0	0
	point1538	1538	568	45	153	45	127	45	0	0	0	0
	point1539	1539	568	45	153	45	127	45	0	0	0	0
	point1540	1540	568	45	153	45	127	45	0	0	0	0
	point1541	1541	568	45	153	45	127	45	0	0	0	0
	point1542	1542	568	45	153	45	127	45	0	0	0	0
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	point1522	1522	568	45	153	45	127	45	0	0	0	0
	point1554	1554	568	45	153	45	127	45	0	0	0	0
	point1555	1555	568	45	153	45	127	45	0	0	0	0

	point1556	1556	568	45	153	45	127	45	0	0	0	0
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	point1559	1559	568	45	153	45	127	45	0	0	0	0
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	point1588	1588	568	45	153	45	127	45	0	0	0	0
	point1589	1589	568	45	153	45	127	45	0	0	0	0
	point1590	1590	568	45	153	45	127	45	0	0	0	0

	point1591	1591	568	45	153	45	127	45	0	0	0	0
	point1592	1592	568	45	153	45	127	45	0	0	0	0
	point1593	1593	568	45	153	45	127	45	0	0	0	0
	point1524	1524	568	45	153	45	127	45	0	0	0	0
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	point1527	1527	568	45	153	45	127	45	0	0	0	0
	point1528	1528	568	45	153	45	127	45	0	0	0	0
	point2326	2326										
EB Outside 4	point1594	1594	568	45	153	45	127	45	0	0	0	0
	point2328	2328	568	45	153	45	127	45	0	0	0	0
	point1604	1604	568	45	153	45	127	45	0	0	0	0
	point1605	1605	568	45	153	45	127	45	0	0	0	0
	point1606	1606	568	45	153	45	127	45	0	0	0	0
	point1607	1607	568	45	153	45	127	45	0	0	0	0
	point1608	1608	568	45	153	45	127	45	0	0	0	0
	point1609	1609	568	45	153	45	127	45	0	0	0	0
	point1610	1610	568	45	153	45	127	45	0	0	0	0
	point1611	1611	568	45	153	45	127	45	0	0	0	0
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	point1613	1613	568	45	153	45	127	45	0	0	0	0
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	point1615	1615	568	45	153	45	127	45	0	0	0	0
	point1616	1616	568	45	153	45	127	45	0	0	0	0
	point1617	1617	568	45	153	45	127	45	0	0	0	0
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	point1619	1619	568	45	153	45	127	45	0	0	0	0
	point1620	1620	568	45	153	45	127	45	0	0	0	0
	point1621	1621	568	45	153	45	127	45	0	0	0	0
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	point1626	1626	568	45	153	45	127	45	0	0	0	0
	point1627	1627	568	45	153	45	127	45	0	0	0	0
	point1595	1595	568	45	153	45	127	45	0	0	0	0

	point1628	1628	568	45	153	45	127	45	0	0	0	0
	point1629	1629	568	45	153	45	127	45	0	0	0	0
	point1630	1630	568	45	153	45	127	45	0	0	0	0
	point1631	1631	568	45	153	45	127	45	0	0	0	0
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	point1599	1599	568	45	153	45	127	45	0	0	0	0
	point1600	1600	568	45	153	45	127	45	0	0	0	0
	point1601	1601	568	45	153	45	127	45	0	0	0	0
	point1602	1602	568	45	153	45	127	45	0	0	0	0
	point2317	2317	568	45	153	45	127	45	0	0	0	0
	point1603	1603										
EB Outside 5	point1638	1638	568	30	153	30	127	30	0	0	0	0
	point1639	1639	568	30	153	30	127	30	0	0	0	0
	point1648	1648	568	30	153	30	127	30	0	0	0	0
	point1649	1649	568	30	153	30	127	30	0	0	0	0
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	point1660	1660	568	30	153	30	127	30	0	0	0	0
	point1661	1661	568	30	153	30	127	30	0	0	0	0
	point1662	1662	568	30	153	30	127	30	0	0	0	0

	point1663	1663	568	30	153	30	127	30	0	0	0	0
	point1664	1664	568	30	153	30	127	30	0	0	0	0
	point1665	1665	568	30	153	30	127	30	0	0	0	0
	point1666	1666	568	30	153	30	127	30	0	0	0	0
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	point1643	1643	568	30	153	30	127	30	0	0	0	0
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	point1647	1647										
WB Inside 3	point1733	1733	568	45	153	45	127	45	0	0	0	0
	point1734	1734	568	45	153	45	127	45	0	0	0	0
	point1735	1735	568	45	153	45	127	45	0	0	0	0
	point1736	1736	568	45	153	45	127	45	0	0	0	0
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	point1738	1738	568	45	153	45	127	45	0	0	0	0
	point1739	1739	568	45	153	45	127	45	0	0	0	0
	point1740	1740	568	45	153	45	127	45	0	0	0	0

	point1741	1741	568	45	153	45	127	45	0	0	0	0
	point1742	1742	568	45	153	45	127	45	0	0	0	0
	point1743	1743	568	45	153	45	127	45	0	0	0	0
	point1744	1744	568	45	153	45	127	45	0	0	0	0
	point1745	1745	568	45	153	45	127	45	0	0	0	0
	point1746	1746	568	45	153	45	127	45	0	0	0	0
	point1747	1747	568	45	153	45	127	45	0	0	0	0
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	point1754	1754	568	45	153	45	127	45	0	0	0	0
	point1755	1755	568	45	153	45	127	45	0	0	0	0
	point1756	1756	568	45	153	45	127	45	0	0	0	0
	point1757	1757	568	45	153	45	127	45	0	0	0	0
	point1758	1758	568	45	153	45	127	45	0	0	0	0
	point1759	1759	568	45	153	45	127	45	0	0	0	0
	point1760	1760	568	45	153	45	127	45	0	0	0	0
	point1761	1761	568	45	153	45	127	45	0	0	0	0
	point2332	2332	568	45	153	45	127	45	0	0	0	0
	point1762	1762										
WB Inside 4	point1763	1763	568	45	153	45	127	45	0	0	0	0
	point2323	2323	568	45	153	45	127	45	0	0	0	0
	point1764	1764	568	45	153	45	127	45	0	0	0	0
	point1765	1765	568	45	153	45	127	45	0	0	0	0
	point1766	1766	568	45	153	45	127	45	0	0	0	0
	point1767	1767	568	45	153	45	127	45	0	0	0	0
	point1768	1768	568	45	153	45	127	45	0	0	0	0
	point1769	1769	568	45	153	45	127	45	0	0	0	0
	point1770	1770	568	45	153	45	127	45	0	0	0	0
	point1771	1771	568	45	153	45	127	45	0	0	0	0
	point1772	1772	568	45	153	45	127	45	0	0	0	0
	point1773	1773	568	45	153	45	127	45	0	0	0	0
	point1774	1774	568	45	153	45	127	45	0	0	0	0

	point1775	1775	568	45	153	45	127	45	0	0	0	0
	point1776	1776	568	45	153	45	127	45	0	0	0	0
	point1777	1777	568	45	153	45	127	45	0	0	0	0
	point1778	1778	568	45	153	45	127	45	0	0	0	0
	point1779	1779	568	45	153	45	127	45	0	0	0	0
	point1780	1780	568	45	153	45	127	45	0	0	0	0
	point1781	1781	568	45	153	45	127	45	0	0	0	0
	point1782	1782	568	45	153	45	127	45	0	0	0	0
	point1783	1783	568	45	153	45	127	45	0	0	0	0
	point1784	1784	568	45	153	45	127	45	0	0	0	0
	point1785	1785	568	45	153	45	127	45	0	0	0	0
	point1786	1786	568	45	153	45	127	45	0	0	0	0
	point1787	1787	568	45	153	45	127	45	0	0	0	0
	point1788	1788	568	45	153	45	127	45	0	0	0	0
	point1789	1789	568	45	153	45	127	45	0	0	0	0
	point1790	1790	568	45	153	45	127	45	0	0	0	0
	point1791	1791	568	45	153	45	127	45	0	0	0	0
	point1792	1792	568	45	153	45	127	45	0	0	0	0
	point1793	1793	568	45	153	45	127	45	0	0	0	0
	point1794	1794	568	45	153	45	127	45	0	0	0	0
	point1795	1795	568	45	153	45	127	45	0	0	0	0
	point1796	1796	568	45	153	45	127	45	0	0	0	0
	point1797	1797	568	45	153	45	127	45	0	0	0	0
	point1798	1798	568	45	153	45	127	45	0	0	0	0
	point1799	1799	568	45	153	45	127	45	0	0	0	0
	point1800	1800	568	45	153	45	127	45	0	0	0	0
	point1801	1801	568	45	153	45	127	45	0	0	0	0
	point1802	1802	568	45	153	45	127	45	0	0	0	0
	point1803	1803	568	45	153	45	127	45	0	0	0	0
	point1804	1804	568	45	153	45	127	45	0	0	0	0
	point1805	1805	568	45	153	45	127	45	0	0	0	0
	point2329	2329	568	45	153	45	127	45	0	0	0	0
	point1806	1806										
WB Outside 5	point1809	1809	568	45	153	45	127	45	0	0	0	0
	point1810	1810	568	45	153	45	127	45	0	0	0	0
	point1811	1811	568	45	153	45	127	45	0	0	0	0

	point1812	1812	568	45	153	45	127	45	0	0	0	0
	point1813	1813	568	45	153	45	127	45	0	0	0	0
	point1814	1814	568	45	153	45	127	45	0	0	0	0
	point1815	1815	568	45	153	45	127	45	0	0	0	0
	point1816	1816	568	45	153	45	127	45	0	0	0	0
	point1826	1826	568	45	153	45	127	45	0	0	0	0
	point1827	1827	568	45	153	45	127	45	0	0	0	0
	point1828	1828	568	45	153	45	127	45	0	0	0	0
	point1829	1829	568	45	153	45	127	45	0	0	0	0
	point1830	1830	568	45	153	45	127	45	0	0	0	0
	point1831	1831	568	45	153	45	127	45	0	0	0	0
	point1832	1832	568	45	153	45	127	45	0	0	0	0
	point1833	1833	568	45	153	45	127	45	0	0	0	0
	point1834	1834	568	45	153	45	127	45	0	0	0	0
	point1835	1835	568	45	153	45	127	45	0	0	0	0
	point1836	1836	568	45	153	45	127	45	0	0	0	0
	point1837	1837	568	45	153	45	127	45	0	0	0	0
	point1838	1838	568	45	153	45	127	45	0	0	0	0
	point1839	1839	568	45	153	45	127	45	0	0	0	0
	point1840	1840	568	45	153	45	127	45	0	0	0	0
	point1841	1841	568	45	153	45	127	45	0	0	0	0
	point1842	1842	568	45	153	45	127	45	0	0	0	0
	point1843	1843	568	45	153	45	127	45	0	0	0	0
	point1844	1844	568	45	153	45	127	45	0	0	0	0
	point1845	1845	568	45	153	45	127	45	0	0	0	0
	point1846	1846	568	45	153	45	127	45	0	0	0	0
	point1847	1847	568	45	153	45	127	45	0	0	0	0
	point1848	1848	568	45	153	45	127	45	0	0	0	0
	point1849	1849	568	45	153	45	127	45	0	0	0	0
	point1817	1817	568	45	153	45	127	45	0	0	0	0
	point1874	1874	568	45	153	45	127	45	0	0	0	0
	point1875	1875	568	45	153	45	127	45	0	0	0	0
	point1876	1876	568	45	153	45	127	45	0	0	0	0
	point1877	1877	568	45	153	45	127	45	0	0	0	0
	point1878	1878	568	45	153	45	127	45	0	0	0	0
	point1879	1879	568	45	153	45	127	45	0	0	0	0

	point1880	1880	568	45	153	45	127	45	0	0	0	0
	point1881	1881	568	45	153	45	127	45	0	0	0	0
	point1882	1882	568	45	153	45	127	45	0	0	0	0
	point1883	1883	568	45	153	45	127	45	0	0	0	0
	point1884	1884										
WB Inside 5	point1899	1899	568	45	153	45	127	45	0	0	0	0
	point1900	1900	568	45	153	45	127	45	0	0	0	0
	point1901	1901	568	45	153	45	127	45	0	0	0	0
	point1902	1902	568	45	153	45	127	45	0	0	0	0
	point1903	1903	568	45	153	45	127	45	0	0	0	0
	point1904	1904	568	45	153	45	127	45	0	0	0	0
	point1905	1905	568	45	153	45	127	45	0	0	0	0
	point1906	1906	568	45	153	45	127	45	0	0	0	0
	point1907	1907	568	45	153	45	127	45	0	0	0	0
	point1908	1908	568	45	153	45	127	45	0	0	0	0
	point1909	1909	568	45	153	45	127	45	0	0	0	0
	point1910	1910	568	45	153	45	127	45	0	0	0	0
	point1911	1911	568	45	153	45	127	45	0	0	0	0
	point1912	1912	568	45	153	45	127	45	0	0	0	0
	point1913	1913	568	45	153	45	127	45	0	0	0	0
	point1914	1914	568	45	153	45	127	45	0	0	0	0
	point1915	1915	568	45	153	45	127	45	0	0	0	0
	point1916	1916	568	45	153	45	127	45	0	0	0	0
	point1917	1917	568	45	153	45	127	45	0	0	0	0
	point1918	1918	568	45	153	45	127	45	0	0	0	0
	point1919	1919	568	45	153	45	127	45	0	0	0	0
	point1920	1920	568	45	153	45	127	45	0	0	0	0
	point1921	1921	568	45	153	45	127	45	0	0	0	0
	point1922	1922	568	45	153	45	127	45	0	0	0	0
	point1923	1923	568	45	153	45	127	45	0	0	0	0
	point1924	1924	568	45	153	45	127	45	0	0	0	0
	point1925	1925	568	45	153	45	127	45	0	0	0	0
	point1926	1926	568	45	153	45	127	45	0	0	0	0
	point1927	1927	568	45	153	45	127	45	0	0	0	0
	point1928	1928	568	45	153	45	127	45	0	0	0	0
	point1929	1929	568	45	153	45	127	45	0	0	0	0

	point1930	1930	568	45	153	45	127	45	0	0	0	0
	point1931	1931	568	45	153	45	127	45	0	0	0	0
	point1932	1932	568	45	153	45	127	45	0	0	0	0
	point1933	1933	568	45	153	45	127	45	0	0	0	0
	point1934	1934	568	45	153	45	127	45	0	0	0	0
	point1935	1935	568	45	153	45	127	45	0	0	0	0
	point1936	1936	568	45	153	45	127	45	0	0	0	0
	point1937	1937	568	45	153	45	127	45	0	0	0	0
	point1938	1938	568	45	153	45	127	45	0	0	0	0
	point1939	1939	568	45	153	45	127	45	0	0	0	0
	point1940	1940	568	45	153	45	127	45	0	0	0	0
	point1941	1941	568	45	153	45	127	45	0	0	0	0
	point1942	1942										
WB Inside 6	point1943	1943	568	30	153	30	127	30	0	0	0	0
	point1944	1944	568	30	153	30	127	30	0	0	0	0
	point1945	1945	568	30	153	30	127	30	0	0	0	0
	point1946	1946	568	30	153	30	127	30	0	0	0	0
	point1947	1947	568	30	153	30	127	30	0	0	0	0
	point1948	1948	568	30	153	30	127	30	0	0	0	0
	point1949	1949	568	30	153	30	127	30	0	0	0	0
	point1950	1950	568	30	153	30	127	30	0	0	0	0
	point1951	1951	568	30	153	30	127	30	0	0	0	0
	point1952	1952	568	30	153	30	127	30	0	0	0	0
	point1953	1953	568	30	153	30	127	30	0	0	0	0
	point1954	1954	568	30	153	30	127	30	0	0	0	0
	point1955	1955	568	30	153	30	127	30	0	0	0	0
	point1956	1956	568	30	153	30	127	30	0	0	0	0
	point1957	1957	568	30	153	30	127	30	0	0	0	0
	point1958	1958	568	30	153	30	127	30	0	0	0	0
	point1959	1959	568	30	153	30	127	30	0	0	0	0
	point1960	1960	568	30	153	30	127	30	0	0	0	0
	point1961	1961	568	30	153	30	127	30	0	0	0	0
	point1962	1962	568	30	153	30	127	30	0	0	0	0
	point1963	1963	568	30	153	30	127	30	0	0	0	0
	point1964	1964	568	30	153	30	127	30	0	0	0	0
	point1965	1965	568	30	153	30	127	30	0	0	0	0

	point1966	1966	568	30	153	30	127	30	0	0	0	0
	point1967	1967	568	30	153	30	127	30	0	0	0	0
	point1968	1968	568	30	153	30	127	30	0	0	0	0
	point1969	1969	568	30	153	30	127	30	0	0	0	0
	point1970	1970	568	30	153	30	127	30	0	0	0	0
	point1971	1971	568	30	153	30	127	30	0	0	0	0
	point1972	1972	568	30	153	30	127	30	0	0	0	0
	point1973	1973	568	30	153	30	127	30	0	0	0	0
	point1974	1974	568	30	153	30	127	30	0	0	0	0
	point1975	1975	568	30	153	30	127	30	0	0	0	0
	point1976	1976	568	30	153	30	127	30	0	0	0	0
	point1977	1977	568	30	153	30	127	30	0	0	0	0
	point1978	1978	568	30	153	30	127	30	0	0	0	0
	point1979	1979	568	30	153	30	127	30	0	0	0	0
	point1980	1980	568	30	153	30	127	30	0	0	0	0
	point1981	1981	568	30	0	30	127	30	0	0	0	0
	point1982	1982	568	30	153	30	127	30	0	0	0	0
	point1983	1983	568	30	153	30	127	30	0	0	0	0
	point1984	1984	568	30	153	30	127	30	0	0	0	0
	point1985	1985	568	30	153	30	127	30	0	0	0	0
	point1986	1986	568	30	153	30	127	30	0	0	0	0
	point1987	1987	568	30	153	30	127	30	0	0	0	0
	point2320	2320	568	30	153	30	127	30	0	0	0	0
	point1988	1988										
WB Outside 3	point2040	2040	568	45	153	45	127	45	0	0	0	0
	point2041	2041	568	45	153	45	127	45	0	0	0	0
	point2042	2042	568	45	153	45	127	45	0	0	0	0
	point2043	2043	568	45	153	45	127	45	0	0	0	0
	point2044	2044	568	45	153	45	127	45	0	0	0	0
	point2045	2045	568	45	153	45	127	45	0	0	0	0
	point2046	2046	568	45	153	45	127	45	0	0	0	0
	point2047	2047	568	45	153	45	127	45	0	0	0	0
	point2048	2048	568	45	153	45	127	45	0	0	0	0
	point2049	2049	568	45	153	45	127	45	0	0	0	0
	point2050	2050	568	45	153	45	127	45	0	0	0	0
	point2051	2051	568	45	153	45	127	45	0	0	0	0

	point2052	2052	568	45	153	45	127	45	0	0	0	0
	point2053	2053	568	45	153	45	127	45	0	0	0	0
	point2054	2054	568	45	153	45	127	45	0	0	0	0
	point2055	2055	568	45	153	45	127	45	0	0	0	0
	point2056	2056	568	45	153	45	127	45	0	0	0	0
	point2057	2057	568	45	153	45	127	45	0	0	0	0
	point2058	2058	568	45	153	45	127	45	0	0	0	0
	point2059	2059	568	45	153	45	127	45	0	0	0	0
	point2060	2060	568	45	153	45	127	45	0	0	0	0
	point2061	2061	568	45	153	45	127	45	0	0	0	0
	point2062	2062	568	45	153	45	127	45	0	0	0	0
	point2063	2063	568	45	153	45	127	45	0	0	0	0
	point2064	2064	568	45	153	45	127	45	0	0	0	0
	point2065	2065	568	45	153	45	127	45	0	0	0	0
	point2066	2066	568	45	153	45	127	45	0	0	0	0
	point2067	2067	568	45	153	45	127	45	0	0	0	0
	point2068	2068	568	45	153	45	127	45	0	0	0	0
	point2331	2331	568	45	153	45	127	45	0	0	0	0
	point2069	2069										
WB Outside 4	point2070	2070	568	45	153	45	127	45	0	0	0	0
	point2322	2322	568	45	153	45	127	45	0	0	0	0
	point2071	2071	568	45	153	45	127	45	0	0	0	0
	point2072	2072	568	45	153	45	127	45	0	0	0	0
	point2073	2073	568	45	153	45	127	45	0	0	0	0
	point2074	2074	568	45	153	45	127	45	0	0	0	0
	point2075	2075	568	45	153	45	127	45	0	0	0	0
	point2076	2076	568	45	153	45	127	45	0	0	0	0
	point2077	2077	568	45	153	45	127	45	0	0	0	0
	point2104	2104	568	45	153	45	127	45	0	0	0	0
	point2105	2105	568	45	153	45	127	45	0	0	0	0
	point2106	2106	568	45	153	45	127	45	0	0	0	0
	point2107	2107	568	45	153	45	127	45	0	0	0	0
	point2108	2108	568	45	153	45	127	45	0	0	0	0
	point2109	2109	568	45	153	45	127	45	0	0	0	0
	point2110	2110	568	45	153	45	127	45	0	0	0	0
	point2111	2111	568	45	153	45	127	45	0	0	0	0

	point2112	2112	568	45	153	45	127	45	0	0	0	0
	point2113	2113	568	45	153	45	127	45	0	0	0	0
	point2078	2078	568	45	153	45	127	45	0	0	0	0
	point2079	2079	568	45	153	45	127	45	0	0	0	0
	point2080	2080	568	45	153	45	127	45	0	0	0	0
	point2081	2081	568	45	153	45	127	45	0	0	0	0
	point2082	2082	568	45	153	45	127	45	0	0	0	0
	point2083	2083	568	45	153	45	127	45	0	0	0	0
	point2084	2084	568	45	153	45	127	45	0	0	0	0
	point2085	2085	568	45	153	45	127	45	0	0	0	0
	point2086	2086	568	45	153	45	127	45	0	0	0	0
	point2087	2087	568	45	153	45	127	45	0	0	0	0
	point2088	2088	568	45	153	45	127	45	0	0	0	0
	point2089	2089	568	45	153	45	127	45	0	0	0	0
	point2090	2090	568	45	153	45	127	45	0	0	0	0
	point2091	2091	568	45	153	45	127	45	0	0	0	0
	point2092	2092	568	45	153	45	127	45	0	0	0	0
	point2093	2093	568	45	153	45	127	45	0	0	0	0
	point2094	2094	568	45	153	45	127	45	0	0	0	0
	point2095	2095	568	45	153	45	127	45	0	0	0	0
	point2096	2096	568	45	153	45	127	45	0	0	0	0
	point2097	2097	568	45	153	45	127	45	0	0	0	0
	point2098	2098	568	45	153	45	127	45	0	0	0	0
	point2099	2099	568	45	153	45	127	45	0	0	0	0
	point2100	2100	568	45	153	45	127	45	0	0	0	0
	point2101	2101	568	45	153	45	127	45	0	0	0	0
	point2102	2102	568	45	153	45	127	45	0	0	0	0
	point2330	2330	568	45	153	45	127	45	0	0	0	0
	point2103	2103										
WB Outside 6	point2114	2114	568	30	153	30	127	30	0	0	0	0
	point2115	2115	568	30	153	30	127	30	0	0	0	0
	point2116	2116	568	30	153	30	127	30	0	0	0	0
	point2117	2117	568	30	153	30	127	30	0	0	0	0
	point2118	2118	568	30	153	30	127	30	0	0	0	0
	point2119	2119	568	30	153	30	127	30	0	0	0	0
	point2120	2120	568	30	153	30	127	30	0	0	0	0

	point2121	2121	568	30	153	30	127	30	0	0	0	0
	point2122	2122	568	30	153	30	127	30	0	0	0	0
	point2123	2123	568	30	153	30	127	30	0	0	0	0
	point2124	2124	568	30	153	30	127	30	0	0	0	0
	point2125	2125	568	30	153	30	127	30	0	0	0	0
	point2126	2126	568	30	153	30	127	30	0	0	0	0
	point2127	2127	568	30	153	30	127	30	0	0	0	0
	point2128	2128	568	30	153	30	127	30	0	0	0	0
	point2129	2129	568	30	153	30	127	30	0	0	0	0
	point2130	2130	568	30	153	30	127	30	0	0	0	0
	point2131	2131	568	30	153	30	127	30	0	0	0	0
	point2132	2132	568	30	153	30	127	30	0	0	0	0
	point2133	2133	568	30	153	30	127	30	0	0	0	0
	point2134	2134	568	30	153	30	127	30	0	0	0	0
	point2135	2135	568	30	153	30	127	30	0	0	0	0
	point2136	2136	568	30	153	30	127	30	0	0	0	0
	point2137	2137	568	30	153	30	127	30	0	0	0	0
	point2138	2138	568	30	153	30	127	30	0	0	0	0
	point2139	2139	568	30	153	30	127	30	0	0	0	0
	point2140	2140	568	30	153	30	127	30	0	0	0	0
	point2141	2141	568	30	153	30	127	30	0	0	0	0
	point2142	2142	568	30	153	30	127	30	0	0	0	0
	point2143	2143	568	30	153	30	127	30	0	0	0	0
	point2144	2144	568	30	153	30	127	30	0	0	0	0
	point2145	2145	568	30	153	30	127	30	0	0	0	0
	point2146	2146	568	30	153	30	127	30	0	0	0	0
	point2147	2147	568	30	153	30	127	30	0	0	0	0
	point2148	2148	568	30	153	30	127	30	0	0	0	0
	point2149	2149	568	30	153	30	127	30	0	0	0	0
	point2150	2150	568	30	153	30	127	30	0	0	0	0
	point2151	2151	568	30	153	30	127	30	0	0	0	0
	point2152	2152	568	30	153	30	127	30	0	0	0	0
	point2153	2153	568	30	153	30	127	30	0	0	0	0
	point2154	2154	568	30	153	30	127	30	0	0	0	0
	point2155	2155	568	30	153	30	127	30	0	0	0	0
	point2156	2156	568	30	153	30	127	30	0	0	0	0

	point2157	2157	568	30	153	30	127	30	0	0	0	0
	point2158	2158	568	30	153	30	127	30	0	0	0	0
	point2321	2321	568	30	153	30	127	30	0	0	0	0
	point2159	2159										
WB Right Turn 1	point2161	2161	0	0	0	0	0	0	0	0	0	0
	point2172	2172	0	0	0	0	0	0	0	0	0	0
	point2173	2173	0	0	0	0	0	0	0	0	0	0
	point2162	2162	0	0	0	0	0	0	0	0	0	0
	point2163	2163	0	0	0	0	0	0	0	0	0	0
	point2164	2164	0	0	0	0	0	0	0	0	0	0
	point2165	2165	0	0	0	0	0	0	0	0	0	0
	point2166	2166	0	0	0	0	0	0	0	0	0	0
	point2167	2167	0	0	0	0	0	0	0	0	0	0
	point2168	2168	0	0	0	0	0	0	0	0	0	0
	point2169	2169	0	0	0	0	0	0	0	0	0	0
	point2170	2170										
EB Right Turn 1	point2183	2183	0	0	0	0	0	0	0	0	0	0
	point2185	2185	0	0	0	0	0	0	0	0	0	0
	point2184	2184	0	0	0	0	0	0	0	0	0	0
	point2182	2182	0	0	0	0	0	0	0	0	0	0
	point2181	2181	0	0	0	0	0	0	0	0	0	0
	point2180	2180	0	0	0	0	0	0	0	0	0	0
	point2179	2179	0	0	0	0	0	0	0	0	0	0
	point2178	2178	0	0	0	0	0	0	0	0	0	0
	point2177	2177	0	0	0	0	0	0	0	0	0	0
	point2176	2176	0	0	0	0	0	0	0	0	0	0
	point2175	2175	0	0	0	0	0	0	0	0	0	0
	point2174	2174										
EB Outside 2	point1469	1469	568	45	153	45	127	45	0	0	0	0
	point1470	1470	568	45	153	45	127	45	0	0	0	0
	point1471	1471	568	45	153	45	127	45	0	0	0	0
	point1472	1472	568	45	153	45	127	45	0	0	0	0
	point1473	1473	568	45	153	45	127	45	0	0	0	0
	point1474	1474	568	45	153	45	127	45	0	0	0	0
	point1475	1475	568	45	153	45	127	45	0	0	0	0
	point1476	1476	568	45	153	45	127	45	0	0	0	0

	point1477	1477	568	45	153	45	127	45	0	0	0	0
	point1478	1478	568	45	153	45	127	45	0	0	0	0
	point1479	1479	568	45	153	45	127	45	0	0	0	0
	point1480	1480	568	45	153	45	127	45	0	0	0	0
	point1481	1481	568	45	153	45	127	45	0	0	0	0
	point1482	1482	568	45	153	45	127	45	0	0	0	0
	point2190	2190	568	45	153	45	127	45	0	0	0	0
	point1484	1484	568	45	153	45	127	45	0	0	0	0
	point1485	1485	568	45	153	45	127	45	0	0	0	0
	point1486	1486	568	45	153	45	127	45	0	0	0	0
	point1487	1487	568	45	153	45	127	45	0	0	0	0
	point1488	1488	568	45	153	45	127	45	0	0	0	0
	point1489	1489	568	45	153	45	127	45	0	0	0	0
	point1490	1490	568	45	153	45	127	45	0	0	0	0
	point1491	1491	568	45	153	45	127	45	0	0	0	0
	point1492	1492	568	45	153	45	127	45	0	0	0	0
	point1493	1493	568	45	153	45	127	45	0	0	0	0
	point1494	1494	568	45	153	45	127	45	0	0	0	0
	point1495	1495	568	45	153	45	127	45	0	0	0	0
	point1496	1496	568	45	153	45	127	45	0	0	0	0
	point1497	1497	568	45	153	45	127	45	0	0	0	0
	point1498	1498	568	45	153	45	127	45	0	0	0	0
	point1499	1499	568	45	153	45	127	45	0	0	0	0
	point1500	1500	568	45	153	45	127	45	0	0	0	0
	point1501	1501	568	45	153	45	127	45	0	0	0	0
	point1502	1502	568	45	153	45	127	45	0	0	0	0
	point1503	1503	568	45	153	45	127	45	0	0	0	0
	point1504	1504	568	45	153	45	127	45	0	0	0	0
	point1505	1505	568	45	153	45	127	45	0	0	0	0
	point1506	1506	568	45	153	45	127	45	0	0	0	0
	point1507	1507	568	45	153	45	127	45	0	0	0	0
	point1508	1508	568	45	153	45	127	45	0	0	0	0
	point1509	1509	568	45	153	45	127	45	0	0	0	0
	point1510	1510	568	45	153	45	127	45	0	0	0	0
	point1511	1511	568	45	153	45	127	45	0	0	0	0
	point1512	1512	568	45	153	45	127	45	0	0	0	0

	point1513	1513	568	45	153	45	127	45	0	0	0	0
	point1514	1514	568	45	153	45	127	45	0	0	0	0
	point1515	1515	568	45	153	45	127	45	0	0	0	0
	point1516	1516	568	45	153	45	127	45	0	0	0	0
	point1517	1517	568	45	153	45	127	45	0	0	0	0
	point2334	2334	568	45	153	45	127	45	0	0	0	0
	point1518	1518										
EB Inside 2	point1255	1255	568	45	153	45	127	45	0	0	0	0
	point1256	1256	568	45	153	45	127	45	0	0	0	0
	point1257	1257	568	45	153	45	127	45	0	0	0	0
	point1258	1258	568	45	153	45	127	45	0	0	0	0
	point1259	1259	568	45	153	45	127	45	0	0	0	0
	point1260	1260	568	45	153	45	127	45	0	0	0	0
	point1261	1261	568	45	153	45	127	45	0	0	0	0
	point1262	1262	568	45	153	45	127	45	0	0	0	0
	point1263	1263	568	45	153	45	127	45	0	0	0	0
	point1264	1264	568	45	153	45	127	45	0	0	0	0
	point1265	1265	568	45	153	45	127	45	0	0	0	0
	point1266	1266	568	45	153	45	127	45	0	0	0	0
	point1267	1267	568	45	153	45	127	45	0	0	0	0
	point1268	1268	568	45	153	45	127	45	0	0	0	0
	point2188	2188	568	45	153	45	127	45	0	0	0	0
	point1270	1270	568	45	153	45	127	45	0	0	0	0
	point1299	1299	568	45	153	45	127	45	0	0	0	0
	point1300	1300	568	45	153	45	127	45	0	0	0	0
	point1301	1301	568	45	153	45	127	45	0	0	0	0
	point1302	1302	568	45	153	45	127	45	0	0	0	0
	point1303	1303	568	45	153	45	127	45	0	0	0	0
	point1304	1304	568	45	153	45	127	45	0	0	0	0
	point1271	1271	568	45	153	45	127	45	0	0	0	0
	point1272	1272	0	45	153	45	127	45	0	0	0	0
	point1273	1273	568	45	153	45	127	45	0	0	0	0
	point1274	1274	568	45	153	45	127	45	0	0	0	0
	point1275	1275	568	45	153	45	127	45	0	0	0	0
	point1276	1276	568	45	153	45	127	45	0	0	0	0
	point1277	1277	568	45	153	45	127	45	0	0	0	0

	point1280	1280	568	45	153	45	127	45	0	0	0	0
	point1281	1281	568	45	153	45	127	45	0	0	0	0
	point1282	1282	568	45	153	45	127	45	0	0	0	0
	point1283	1283	568	45	153	45	127	45	0	0	0	0
	point1284	1284	568	45	153	45	127	45	0	0	0	0
	point1285	1285	568	45	153	45	127	45	0	0	0	0
	point1286	1286	568	45	153	45	127	45	0	0	0	0
	point1287	1287	568	45	153	45	127	45	0	0	0	0
	point1288	1288	568	45	153	45	127	45	0	0	0	0
	point1289	1289	568	45	153	45	127	45	0	0	0	0
	point1290	1290	568	45	153	45	127	45	0	0	0	0
	point1291	1291	568	45	153	45	127	45	0	0	0	0
	point1292	1292	568	45	153	45	127	45	0	0	0	0
	point1293	1293	568	45	153	45	127	45	0	0	0	0
	point1294	1294	568	45	153	45	127	45	0	0	0	0
	point1295	1295	568	45	153	45	127	45	0	0	0	0
	point1296	1296	568	45	153	45	127	45	0	0	0	0
	point1297	1297	568	45	153	45	127	45	0	0	0	0
	point1298	1298	568	45	153	45	127	45	0	0	0	0
	point1278	1278	568	45	153	45	127	45	0	0	0	0
	point2335	2335	568	45	153	45	127	45	0	0	0	0
	point1279	1279										
Center Turn 2	point1055	1055	0	0	0	0	0	0	0	0	0	0
	point1056	1056	0	0	0	0	0	0	0	0	0	0
	point1057	1057	0	0	0	0	0	0	0	0	0	0
	point1058	1058	0	0	0	0	0	0	0	0	0	0
	point1059	1059	0	0	0	0	0	0	0	0	0	0
	point1060	1060	0	0	0	0	0	0	0	0	0	0
	point1061	1061	0	0	0	0	0	0	0	0	0	0
	point1062	1062	0	0	0	0	0	0	0	0	0	0
	point1063	1063	0	0	0	0	0	0	0	0	0	0
	point1064	1064	0	0	0	0	0	0	0	0	0	0
	point1065	1065	0	0	0	0	0	0	0	0	0	0
	point1066	1066	0	0	0	0	0	0	0	0	0	0
	point1067	1067	0	0	0	0	0	0	0	0	0	0
	point1068	1068	0	0	0	0	0	0	0	0	0	0

	point1069	1069	0	0	0	0	0	0	0	0	0	0
	point1070	1070	0	0	0	0	0	0	0	0	0	0
	point1071	1071	0	0	0	0	0	0	0	0	0	0
	point1072	1072	0	0	0	0	0	0	0	0	0	0
	point1073	1073	0	0	0	0	0	0	0	0	0	0
	point1074	1074	0	0	0	0	0	0	0	0	0	0
	point1075	1075	0	0	0	0	0	0	0	0	0	0
	point1076	1076	0	0	0	0	0	0	0	0	0	0
	point1077	1077	0	0	0	0	0	0	0	0	0	0
	point1078	1078	0	0	0	0	0	0	0	0	0	0
	point1079	1079	0	0	0	0	0	0	0	0	0	0
	point1080	1080	0	0	0	0	0	0	0	0	0	0
	point1081	1081	0	0	0	0	0	0	0	0	0	0
	point1082	1082	0	0	0	0	0	0	0	0	0	0
	point1083	1083	0	0	0	0	0	0	0	0	0	0
	point1084	1084	0	0	0	0	0	0	0	0	0	0
	point1085	1085	0	0	0	0	0	0	0	0	0	0
	point1086	1086	0	0	0	0	0	0	0	0	0	0
	point1087	1087	0	0	0	0	0	0	0	0	0	0
	point1088	1088	0	0	0	0	0	0	0	0	0	0
	point1040	1040	0	0	0	0	0	0	0	0	0	0
	point1041	1041	0	0	0	0	0	0	0	0	0	0
	point1042	1042	0	0	0	0	0	0	0	0	0	0
	point1043	1043	0	0	0	0	0	0	0	0	0	0
	point1044	1044	0	0	0	0	0	0	0	0	0	0
	point1045	1045	0	0	0	0	0	0	0	0	0	0
	point1046	1046	0	0	0	0	0	0	0	0	0	0
	point1047	1047	0	0	0	0	0	0	0	0	0	0
	point1048	1048	0	0	0	0	0	0	0	0	0	0
	point1049	1049	0	0	0	0	0	0	0	0	0	0
	point1050	1050	0	0	0	0	0	0	0	0	0	0
	point1051	1051	0	0	0	0	0	0	0	0	0	0
	point1052	1052	0	0	0	0	0	0	0	0	0	0
	point1053	1053	0	0	0	0	0	0	0	0	0	0
	point1054	1054										
WB Inside 2	point1699	1699	568	45	153	45	127	45	0	0	0	0

	point1700	1700	568	45	153	45	127	45	0	0	0	0
	point1701	1701	568	45	153	45	127	45	0	0	0	0
	point1702	1702	568	45	153	45	127	45	0	0	0	0
	point1703	1703	568	45	153	45	127	45	0	0	0	0
	point1704	1704	568	45	153	45	127	45	0	0	0	0
	point1705	1705	568	45	153	45	127	45	0	0	0	0
	point1706	1706	568	45	153	45	127	45	0	0	0	0
	point1710	1710	568	45	153	45	127	45	0	0	0	0
	point1711	1711	568	45	153	45	127	45	0	0	0	0
	point1712	1712	568	45	153	45	127	45	0	0	0	0
	point1713	1713	568	45	153	45	127	45	0	0	0	0
	point1714	1714	568	45	153	45	127	45	0	0	0	0
	point1715	1715	568	45	153	45	127	45	0	0	0	0
	point1716	1716	568	45	153	45	127	45	0	0	0	0
	point1717	1717	568	45	153	45	127	45	0	0	0	0
	point1718	1718	568	45	153	45	127	45	0	0	0	0
	point1719	1719	568	45	153	45	127	45	0	0	0	0
	point1720	1720	568	45	153	45	127	45	0	0	0	0
	point1721	1721	568	45	153	45	127	45	0	0	0	0
	point1722	1722	568	45	153	45	127	45	0	0	0	0
	point1723	1723	568	45	153	45	127	45	0	0	0	0
	point1724	1724	568	45	153	45	127	45	0	0	0	0
	point1725	1725	568	45	153	45	127	45	0	0	0	0
	point1726	1726	568	45	153	45	127	45	0	0	0	0
	point1727	1727	568	45	153	45	127	45	0	0	0	0
	point1728	1728	568	45	153	45	127	45	0	0	0	0
	point1729	1729	568	45	153	45	127	45	0	0	0	0
	point1730	1730	568	45	153	45	127	45	0	0	0	0
	point1731	1731	568	45	153	45	127	45	0	0	0	0
	point1732	1732	568	45	153	45	127	45	0	0	0	0
	point1707	1707	568	45	153	45	127	45	0	0	0	0
	point1708	1708	568	45	153	45	127	45	0	0	0	0
	point2187	2187	568	45	153	45	127	45	0	0	0	0
	point1684	1684	568	45	153	45	127	45	0	0	0	0
	point1685	1685	568	45	153	45	127	45	0	0	0	0
	point1686	1686	568	45	153	45	127	45	0	0	0	0

	point1687	1687	568	45	153	45	127	45	0	0	0	0
	point1688	1688	568	45	153	45	127	45	0	0	0	0
	point1689	1689	568	45	153	45	127	45	0	0	0	0
	point1690	1690	568	45	153	45	127	45	0	0	0	0
	point1691	1691	568	45	153	45	127	45	0	0	0	0
	point1692	1692	568	45	153	45	127	45	0	0	0	0
	point1693	1693	568	45	153	45	127	45	0	0	0	0
	point1694	1694	568	45	153	45	127	45	0	0	0	0
	point1695	1695	568	45	153	45	127	45	0	0	0	0
	point1696	1696	568	45	153	45	127	45	0	0	0	0
	point1697	1697	568	45	153	45	127	45	0	0	0	0
	point1698	1698										
WB Outside 2	point2005	2005	568	45	153	45	127	45	0	0	0	0
	point2006	2006	568	45	153	45	127	45	0	0	0	0
	point2007	2007	568	45	153	45	127	45	0	0	0	0
	point2008	2008	568	45	153	45	127	45	0	0	0	0
	point2009	2009	568	45	153	45	127	45	0	0	0	0
	point2010	2010	568	45	153	45	127	45	0	0	0	0
	point2011	2011	568	45	153	45	127	45	0	0	0	0
	point2012	2012	568	45	153	45	127	45	0	0	0	0
	point2013	2013	568	45	153	45	127	45	0	0	0	0
	point2014	2014	568	45	153	45	127	45	0	0	0	0
	point2015	2015	568	45	153	45	127	45	0	0	0	0
	point2016	2016	568	45	153	45	127	45	0	0	0	0
	point2017	2017	568	45	153	45	127	45	0	0	0	0
	point2018	2018	568	45	153	45	127	45	0	0	0	0
	point2019	2019	568	45	153	45	127	45	0	0	0	0
	point2020	2020	568	45	153	45	127	45	0	0	0	0
	point2021	2021	568	45	153	45	127	45	0	0	0	0
	point2022	2022	568	45	153	45	127	45	0	0	0	0
	point2023	2023	568	45	153	45	127	45	0	0	0	0
	point2024	2024	568	45	153	45	127	45	0	0	0	0
	point2025	2025	568	45	153	45	127	45	0	0	0	0
	point2026	2026	568	45	153	45	127	45	0	0	0	0
	point2027	2027	568	45	153	45	127	45	0	0	0	0
	point2028	2028	568	45	153	45	127	45	0	0	0	0

	point2029	2029	568	45	153	45	127	45	0	0	0	0
	point2030	2030	568	45	153	45	127	45	0	0	0	0
	point2031	2031	568	45	153	45	127	45	0	0	0	0
	point2032	2032	568	45	153	45	127	45	0	0	0	0
	point2033	2033	568	45	153	45	127	45	0	0	0	0
	point2034	2034	568	45	153	45	127	45	0	0	0	0
	point2035	2035	568	45	153	45	127	45	0	0	0	0
	point2036	2036	568	45	153	45	127	45	0	0	0	0
	point2037	2037	568	45	153	45	127	45	0	0	0	0
	point2186	2186	568	45	153	45	127	45	0	0	0	0
	point1989	1989	568	45	153	45	127	45	0	0	0	0
	point1991	1991	568	45	153	45	127	45	0	0	0	0
	point1992	1992	568	45	153	45	127	45	0	0	0	0
	point1993	1993	568	45	153	45	127	45	0	0	0	0
	point1994	1994	568	45	153	45	127	45	0	0	0	0
	point1995	1995	568	45	153	45	127	45	0	0	0	0
	point1996	1996	568	45	153	45	127	45	0	0	0	0
	point1997	1997	568	45	153	45	127	45	0	0	0	0
	point1998	1998	568	45	153	45	127	45	0	0	0	0
	point1999	1999	568	45	153	45	127	45	0	0	0	0
	point2000	2000	568	45	153	45	127	45	0	0	0	0
	point2001	2001	568	45	153	45	127	45	0	0	0	0
	point2002	2002	568	45	153	45	127	45	0	0	0	0
	point2003	2003	568	45	153	45	127	45	0	0	0	0
	point2004	2004										
EB Outside 6	point2191	2191	568	30	153	30	127	30	0	0	0	0
	point2192	2192	568	30	153	30	127	30	0	0	0	0
	point2193	2193	568	30	153	30	127	30	0	0	0	0
	point2194	2194	568	30	153	30	127	30	0	0	0	0
	point2195	2195	568	30	153	30	127	30	0	0	0	0
	point2196	2196	568	30	153	30	127	30	0	0	0	0
	point2197	2197	568	30	153	30	127	30	0	0	0	0
	point2198	2198	568	30	153	30	127	30	0	0	0	0
	point2200	2200	568	30	153	30	127	30	0	0	0	0
	point2201	2201	568	30	153	30	127	30	0	0	0	0
	point2202	2202	568	30	153	30	127	30	0	0	0	0

	point2203	2203	568	30	153	30	127	30	0	0	0	0
	point2204	2204	568	30	153	30	127	30	0	0	0	0
	point2205	2205	568	30	153	30	127	30	0	0	0	0
	point2206	2206	568	30	153	30	127	30	0	0	0	0
	point2207	2207	568	30	153	30	127	30	0	0	0	0
	point2208	2208	568	30	153	30	127	30	0	0	0	0
	point2209	2209	568	30	153	30	127	30	0	0	0	0
	point2210	2210	568	30	153	30	127	30	0	0	0	0
	point2211	2211	568	30	153	30	127	30	0	0	0	0
	point2212	2212	568	30	153	30	127	30	0	0	0	0
	point2213	2213										
EB Inside 6	point2240	2240	568	30	153	30	127	30	0	0	0	0
	point2241	2241	568	30	153	30	127	30	0	0	0	0
	point2242	2242	568	30	153	30	127	30	0	0	0	0
	point2243	2243	568	30	153	30	127	30	0	0	0	0
	point2244	2244	568	30	153	30	127	30	0	0	0	0
	point2217	2217	568	30	153	30	127	30	0	0	0	0
	point2218	2218	568	30	153	30	127	30	0	0	0	0
	point2219	2219	568	30	153	30	127	30	0	0	0	0
	point2220	2220	568	30	153	30	127	30	0	0	0	0
	point2221	2221	568	30	153	30	127	30	0	0	0	0
	point2222	2222	568	30	153	30	127	30	0	0	0	0
	point2223	2223	568	30	153	30	127	30	0	0	0	0
	point2224	2224	568	30	153	30	127	30	0	0	0	0
	point2225	2225	568	30	153	30	127	30	0	0	0	0
	point2226	2226	568	30	153	30	127	30	0	0	0	0
	point2227	2227	568	30	153	30	127	30	0	0	0	0
	point2228	2228	568	30	153	30	127	30	0	0	0	0
	point2229	2229	568	30	153	30	127	30	0	0	0	0
	point2230	2230	568	30	153	30	127	30	0	0	0	0
	point2231	2231	568	30	153	30	127	30	0	0	0	0
	point2232	2232	568	30	153	30	127	30	0	0	0	0
	point2233	2233	568	30	153	30	127	30	0	0	0	0
	point2234	2234	568	30	153	30	127	30	0	0	0	0
	point2235	2235										
Center Turn 7	point2245	2245	0	0	0	0	0	0	0	0	0	0

	point2246	2246	0	0	0	0	0	0	0	0	0	0
	point2247	2247	0	0	0	0	0	0	0	0	0	0
	point2248	2248	0	0	0	0	0	0	0	0	0	0
	point2249	2249	0	0	0	0	0	0	0	0	0	0
	point2250	2250	0	0	0	0	0	0	0	0	0	0
	point2251	2251	0	0	0	0	0	0	0	0	0	0
	point2252	2252	0	0	0	0	0	0	0	0	0	0
	point2253	2253	0	0	0	0	0	0	0	0	0	0
	point2254	2254	0	0	0	0	0	0	0	0	0	0
	point2255	2255	0	0	0	0	0	0	0	0	0	0
	point2256	2256	0	0	0	0	0	0	0	0	0	0
	point2257	2257	0	0	0	0	0	0	0	0	0	0
	point2258	2258	0	0	0	0	0	0	0	0	0	0
	point2259	2259	0	0	0	0	0	0	0	0	0	0
	point2260	2260	0	0	0	0	0	0	0	0	0	0
	point2261	2261	0	0	0	0	0	0	0	0	0	0
	point2262	2262	0	0	0	0	0	0	0	0	0	0
	point2263	2263	0	0	0	0	0	0	0	0	0	0
	point2264	2264	0	0	0	0	0	0	0	0	0	0
	point2265	2265	0	0	0	0	0	0	0	0	0	0
	point2266	2266	0	0	0	0	0	0	0	0	0	0
	point2267	2267	0	0	0	0	0	0	0	0	0	0
	point2268	2268										
WB Inside 7	point2269	2269	568	30	153	30	127	30	0	0	0	0
	point2270	2270	568	30	153	30	127	30	0	0	0	0
	point2271	2271	568	30	153	30	127	30	0	0	0	0
	point2272	2272	568	30	153	30	127	30	0	0	0	0
	point2273	2273	568	30	153	30	127	30	0	0	0	0
	point2274	2274	568	30	153	30	127	30	0	0	0	0
	point2275	2275	568	30	153	30	127	30	0	0	0	0
	point2276	2276	568	30	153	30	127	30	0	0	0	0
	point2277	2277	568	30	153	30	127	30	0	0	0	0
	point2278	2278	568	30	153	30	127	30	0	0	0	0
	point2279	2279	568	30	153	30	127	30	0	0	0	0
	point2280	2280	568	30	153	30	127	30	0	0	0	0
	point2281	2281	568	30	153	30	127	30	0	0	0	0

	point2282	2282	568	30	153	30	127	30	0	0	0	0
	point2283	2283	568	30	153	30	127	30	0	0	0	0
	point2284	2284	568	30	153	30	127	30	0	0	0	0
	point2285	2285	568	30	153	30	127	30	0	0	0	0
	point2286	2286	568	30	153	30	127	30	0	0	0	0
	point2287	2287	568	30	153	30	127	30	0	0	0	0
	point2288	2288	568	30	153	30	127	30	0	0	0	0
	point2289	2289	568	30	153	30	127	30	0	0	0	0
	point2290	2290	568	30	153	30	127	30	0	0	0	0
	point2291	2291	568	30	153	30	127	30	0	0	0	0
	point2292	2292										
WB Outside 7	point2293	2293	568	30	153	30	127	30	0	0	0	0
	point2294	2294	568	30	153	30	127	30	0	0	0	0
	point2295	2295	568	30	153	30	127	30	0	0	0	0
	point2296	2296	568	30	153	30	127	30	0	0	0	0
	point2297	2297	568	30	153	30	127	30	0	0	0	0
	point2298	2298	568	30	153	30	127	30	0	0	0	0
	point2299	2299	568	30	153	30	127	30	0	0	0	0
	point2300	2300	568	30	153	30	127	30	0	0	0	0
	point2301	2301	568	30	153	30	127	30	0	0	0	0
	point2302	2302	568	30	153	30	127	30	0	0	0	0
	point2303	2303	568	30	153	30	127	30	0	0	0	0
	point2304	2304	568	30	153	30	127	30	0	0	0	0
	point2305	2305	568	30	153	30	127	30	0	0	0	0
	point2306	2306	568	30	153	30	127	30	0	0	0	0
	point2307	2307	568	30	153	30	127	30	0	0	0	0
	point2308	2308	568	30	153	30	127	30	0	0	0	0
	point2309	2309	568	30	153	30	127	30	0	0	0	0
	point2310	2310	568	30	153	30	127	30	0	0	0	0
	point2311	2311	568	30	153	30	127	30	0	0	0	0
	point2312	2312	568	30	153	30	127	30	0	0	0	0
	point2313	2313	568	30	153	30	127	30	0	0	0	0
	point2314	2314	568	30	153	30	127	30	0	0	0	0
	point2315	2315	568	30	153	30	127	30	0	0	0	0
	point2316	2316										
EB Outside 1	point2336	2336	568	45	153	45	127	45	0	0	0	0

	point2337	2337	568	45	153	45	127	45	0	0	0	0
	point2338	2338	568	45	153	45	127	45	0	0	0	0
	point2339	2339	568	45	153	45	127	45	0	0	0	0
	point2340	2340	568	45	153	45	127	45	0	0	0	0
	point2341	2341	568	45	153	45	127	45	0	0	0	0
	point2342	2342	568	45	153	45	127	45	0	0	0	0
	point2343	2343	568	45	153	45	127	45	0	0	0	0
	point2344	2344	568	45	153	45	127	45	0	0	0	0
	point2345	2345	568	45	153	45	127	45	0	0	0	0
	point2346	2346	568	45	153	45	127	45	0	0	0	0
	point2347	2347	568	45	153	45	127	45	0	0	0	0
	point2348	2348	568	45	153	45	127	45	0	0	0	0
	point2349	2349	568	45	153	45	127	45	0	0	0	0
	point2350	2350	568	45	153	45	127	45	0	0	0	0
	point2351	2351	568	45	153	45	127	45	0	0	0	0
	point2352	2352	568	45	153	45	127	45	0	0	0	0
	point2353	2353	568	45	153	45	127	45	0	0	0	0
	point2354	2354	568	45	153	45	127	45	0	0	0	0
	point2355	2355	568	45	153	45	127	45	0	0	0	0
	point2356	2356	568	45	153	45	127	45	0	0	0	0
	point2357	2357	568	45	153	45	127	45	0	0	0	0
	point2358	2358	568	45	153	45	127	45	0	0	0	0
	point2359	2359	568	45	153	45	127	45	0	0	0	0
	point2360	2360	568	45	153	45	127	45	0	0	0	0
	point2361	2361	568	45	153	45	127	45	0	0	0	0
	point2362	2362	568	45	153	45	127	45	0	0	0	0
	point2363	2363	568	45	153	45	127	45	0	0	0	0
	point2364	2364	568	45	153	45	127	45	0	0	0	0
	point2365	2365	568	45	153	45	127	45	0	0	0	0
	point2366	2366	568	45	153	45	127	45	0	0	0	0
	point2367	2367	568	45	153	45	127	45	0	0	0	0
	point2368	2368										
EB Inside 1	point2397	2397	568	45	153	45	127	45	0	0	0	0
	point2398	2398	568	45	153	45	127	45	0	0	0	0
	point2399	2399	568	45	153	45	127	45	0	0	0	0
	point2400	2400	568	45	153	45	127	45	0	0	0	0

	point2401	2401	568	45	153	45	127	45	0	0	0	0
	point2402	2402	568	45	153	45	127	45	0	0	0	0
	point2403	2403	568	45	153	45	127	45	0	0	0	0
	point2404	2404	568	45	153	45	127	45	0	0	0	0
	point2405	2405	568	45	153	45	127	45	0	0	0	0
	point2406	2406	568	45	153	45	127	45	0	0	0	0
	point2407	2407	568	45	153	45	127	45	0	0	0	0
	point2408	2408	568	45	153	45	127	45	0	0	0	0
	point2409	2409	568	45	153	45	127	45	0	0	0	0
	point2410	2410	568	45	153	45	127	45	0	0	0	0
	point2411	2411	568	45	153	45	127	45	0	0	0	0
	point2412	2412	568	45	153	45	127	45	0	0	0	0
	point2413	2413	568	45	153	45	127	45	0	0	0	0
	point2414	2414	568	45	153	45	127	45	0	0	0	0
	point2415	2415	568	45	153	45	127	45	0	0	0	0
	point2416	2416	568	45	153	45	127	45	0	0	0	0
	point2417	2417	568	45	153	45	127	45	0	0	0	0
	point2418	2418	568	45	153	45	127	45	0	0	0	0
	point2419	2419	568	45	153	45	127	45	0	0	0	0
	point2420	2420	568	45	153	45	127	45	0	0	0	0
	point2421	2421	568	45	153	45	127	45	0	0	0	0
	point2422	2422	568	45	153	45	127	45	0	0	0	0
	point2423	2423	568	45	153	45	127	45	0	0	0	0
	point2424	2424	568	45	153	45	127	45	0	0	0	0
	point2425	2425	568	45	153	45	127	45	0	0	0	0
	point2426	2426	568	45	153	45	127	45	0	0	0	0
	point2427	2427	568	45	153	45	127	45	0	0	0	0
	point2429	2429	568	45	153	45	127	45	0	0	0	0
	point2428	2428										
Center Turn 1	point2439	2439	0	0	0	0	0	0	0	0	0	0
	point2440	2440	0	0	0	0	0	0	0	0	0	0
	point2438	2438	0	0	0	0	0	0	0	0	0	0
	point2437	2437	0	0	0	0	0	0	0	0	0	0
	point2436	2436	0	0	0	0	0	0	0	0	0	0
	point2435	2435	0	0	0	0	0	0	0	0	0	0
	point2434	2434	0	0	0	0	0	0	0	0	0	0

	point2433	2433	0	0	0	0	0	0	0	0	0	0
	point2432	2432	0	0	0	0	0	0	0	0	0	0
	point2431	2431	0	0	0	0	0	0	0	0	0	0
	point2430	2430										
WB Inside 1	point2441	2441	568	45	153	45	127	45	0	0	0	0
	point2474	2474	568	45	153	45	127	45	0	0	0	0
	point2442	2442	568	45	153	45	127	45	0	0	0	0
	point2443	2443	568	45	153	45	127	45	0	0	0	0
	point2444	2444	568	45	153	45	127	45	0	0	0	0
	point2445	2445	568	45	153	45	127	45	0	0	0	0
	point2446	2446	568	45	153	45	127	45	0	0	0	0
	point2447	2447	568	45	153	45	127	45	0	0	0	0
	point2448	2448	568	45	153	45	127	45	0	0	0	0
	point2449	2449	568	45	153	45	127	45	0	0	0	0
	point2450	2450	568	45	153	45	127	45	0	0	0	0
	point2451	2451	568	45	153	45	127	45	0	0	0	0
	point2452	2452	568	45	153	45	127	45	0	0	0	0
	point2453	2453	568	45	153	45	127	45	0	0	0	0
	point2454	2454	568	45	153	45	127	45	0	0	0	0
	point2455	2455	568	45	153	45	127	45	0	0	0	0
	point2456	2456	568	45	153	45	127	45	0	0	0	0
	point2457	2457	568	45	153	45	127	45	0	0	0	0
	point2458	2458	568	45	153	45	127	45	0	0	0	0
	point2459	2459	568	45	153	45	127	45	0	0	0	0
	point2460	2460	568	45	153	45	127	45	0	0	0	0
	point2461	2461	568	45	153	45	127	45	0	0	0	0
	point2462	2462	568	45	153	45	127	45	0	0	0	0
	point2463	2463	568	45	153	45	127	45	0	0	0	0
	point2464	2464	568	45	153	45	127	45	0	0	0	0
	point2465	2465	568	45	153	45	127	45	0	0	0	0
	point2466	2466	568	45	153	45	127	45	0	0	0	0
	point2467	2467	568	45	153	45	127	45	0	0	0	0
	point2468	2468	568	45	153	45	127	45	0	0	0	0
	point2469	2469	568	45	153	45	127	45	0	0	0	0
	point2470	2470	568	45	153	45	127	45	0	0	0	0
	point2471	2471	568	45	153	45	127	45	0	0	0	0

	point2472	2472										
WB Outside 1	point2475	2475	568	45	153	45	127	45	0	0	0	0
	point2477	2477	568	45	153	45	127	45	0	0	0	0
	point2478	2478	568	45	153	45	127	45	0	0	0	0
	point2479	2479	568	45	153	45	127	45	0	0	0	0
	point2480	2480	568	45	153	45	127	45	0	0	0	0
	point2481	2481	568	45	153	45	127	45	0	0	0	0
	point2482	2482	568	45	153	45	127	45	0	0	0	0
	point2483	2483	568	45	153	45	127	45	0	0	0	0
	point2484	2484	568	45	153	45	127	45	0	0	0	0
	point2485	2485	568	45	153	45	127	45	0	0	0	0
	point2486	2486	568	45	153	45	127	45	0	0	0	0
	point2487	2487	568	45	153	45	127	45	0	0	0	0
	point2488	2488	568	45	153	45	127	45	0	0	0	0
	point2489	2489	568	45	153	45	127	45	0	0	0	0
	point2490	2490	568	45	153	45	127	45	0	0	0	0
	point2491	2491	568	45	153	45	127	45	0	0	0	0
	point2492	2492	568	45	153	45	127	45	0	0	0	0
	point2493	2493	568	45	153	45	127	45	0	0	0	0
	point2494	2494	568	45	153	45	127	45	0	0	0	0
	point2495	2495	568	45	153	45	127	45	0	0	0	0
	point2496	2496	568	45	153	45	127	45	0	0	0	0
	point2497	2497	568	45	153	45	127	45	0	0	0	0
	point2498	2498	568	45	153	45	127	45	0	0	0	0
	point2499	2499	568	45	153	45	127	45	0	0	0	0
	point2500	2500	568	45	153	45	127	45	0	0	0	0
	point2501	2501	568	45	153	45	127	45	0	0	0	0
	point2502	2502	568	45	153	45	127	45	0	0	0	0
	point2503	2503	568	45	153	45	127	45	0	0	0	0
	point2504	2504	568	45	153	45	127	45	0	0	0	0
	point2505	2505	568	45	153	45	127	45	0	0	0	0
	point2506	2506	568	45	153	45	127	45	0	0	0	0
	point2507	2507	568	45	153	45	127	45	0	0	0	0
	point2508	2508										

NSA5 Noise Wall Design Summary

No. of Front Row Impacted Receivers	No. Receiving 5.0 dBA Reduction	Length (ft)	Segment Height (ft)			Total Estimated Cost	Cost per Benefited Receiver	Reasonable and Feasible?
			Min	Avg	Max			
2	1	620	10.0	10.0	10.0	$124,000	$124,000	No

NSA9 Noise Wall Design Summary Table

No. of Front Row Impacted Receivers	No. Receiving 5.0 dBA Reduction	Length (ft)	Segment Height (ft)			Total Estimated Cost	Cost per Benefited Receiver	Reasonable and Feasible?
			Min	Avg	Max			
1	1	560	14	19.6	20	$220,036	$220,036	No

Appendix B

Noise Measurement Sheets

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

ST01

Project Name: US-191 North Moab Project #: 60565564 Date: 4/3/18 Page 1 of 5
Monitoring Location: Day's Inn Patio (426 N Main) Analyst: Seth Anderson

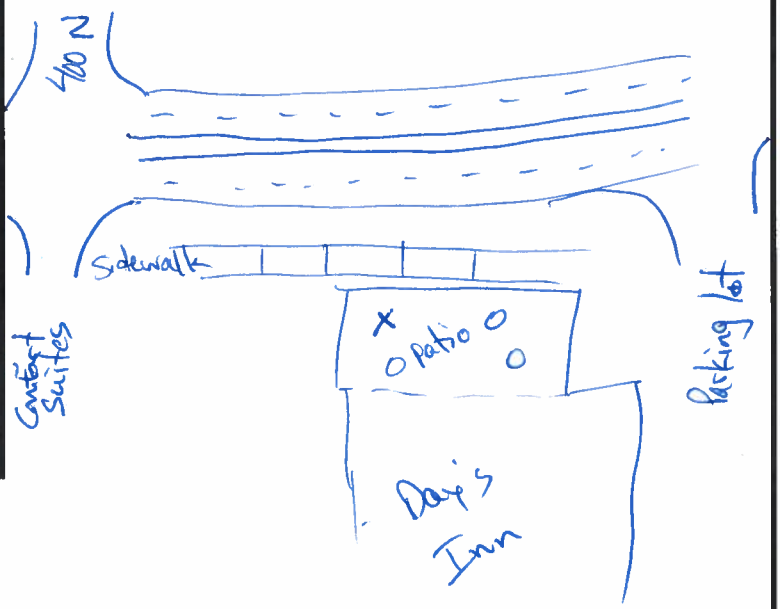
Sound Level Meter	Field Calibration	Weather Data
Model #: LD SLM 820	Model #: CAL200	Model #: Kestrel 3000
Serial #: 1671	Serial #: 12226	Serial #: 1711928
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 114.2 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test 112.9 dBA	Avg Wind Speed/Direction: 3 mph N
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 49 RH (%): 20%
Terrain: Hard/Soft/Mixed/Snow		Bar Psr (Hg): Cloud Cover (%): 0

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	8:34	8:35	72.5						
		8:36	67.9						
		8:37	67.0						
		8:38	63.6						
		8:39	65.7						
		8:40	64.7						
		8:41	69.0						
		8:42	65.1						
		8:43	66.9						
		8:44	67.3						
		8:45	65.9						
		Continued on back of sheet							

Roadway Name/Dir	Main St NB	Main St SB
Speed (post/obs)*	30/30	30/30
Number of Lanes	2	2
Width (pave/row)		
1- or 2- way		
Grade	level	
Bus Stops	-	-
Stoplights	-	-
Motorcycles	-	-
Automobiles	204	109
Medium Trucks	7	6
Heavy Trucks	12	12
Buses	-	-
Count duration	15 min	15 min

compass (N)

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects
Additional Notes and Sketches on Reverse

ST01
(Cont.)

Start	End	LEq
	8:46	66.2
	8:47	67.9
	8:48	69.1
	8:49	63.8
	8:50	68.1
	8:51	67.6
	8:52	66.6
	8:53	67.8
8:53	8:54	67.4

AECOM Acoustics and Noise Control Practice

ST02

FIELD NOISE MEASUREMENT DATA FORM

Project Name: US-191 North Moab Project #: 60565564 Date: 4/3/18 Page 2 of 5

Monitoring Location: Moab Springs Analyst: Seth Anderson

Sound Level Meter
Model #: LDSLM 820
Serial #: 1671
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen : Yes / No (explain)

Field Calibration
Model #: CAL 200
Serial #: 12226
Calibration Level (dBA): 94 / 114
Pre-Test 112.9 dBA
Post-Test 112.6 dBA

Weather Data
Model #: Kestrel 3000
Serial #: 1711928
Wind: Steady/Gusty/Calm
Precipitation: Yes (explain) / No
Avg Wind Speed/Direction: 1 mph
Temp (°F): 43 RH (%): 24
Bar Psr (Hg): Cloud Cover (%): 0

Topo: Flat / Hilly
Terrain: Hard/Soft/Mixed/Snow

GPS Coordinates (at SLM location)#

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	9:18	9:19	60.2						
		9:20	58.8						
		9:21	62.1						
		9:22	58.7						
		9:23	58.7						
		9:24	58.8						
		9:25	60.6						
		9:26	60.2						
		9:27	57.1						
		9:28	59.2						
		9:29	58.7						
		Continued on back							

Roadway Name/Dir	US-191	
Speed (post/obs)*	45/45	
Number of Lanes	2	
Width (pave/row)		
1- or 2- way		
Grade	level	
Bus Stops	-	
Stoplights		
Motorcycles		
Automobiles	283	
Medium Trucks	12	
Heavy Trucks	25	
Buses	1	
Count duration	15 min	

compass: N

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Heavy trucks moving moreb slowly: ~40 mph

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

STO2 (cnt.)

Start	End	Leq
	9:30	59.4
	9:31	56.9
	9:32	59.2
	9:33	62.9
	9:34	61.4
	9:35	59.3
	9:36	59.4
	9:37	60.8
	9:38	58.1
9:38	9:39	57.9

AECOM Acoustics and Noise Control Practice

ST03

FIELD NOISE MEASUREMENT DATA FORM

Project Name: US-191 North Moab Project #: 605655564 Date: 4/3/18 Page 3 of 5

Monitoring Location: Moab Valley RV Resort Analyst: Seth Andersen

Sound Level Meter

Model #: LD SLM 820

Serial #: 1671

Weighting: A / C / Flat

Response: Slow / Fast / Impl

Windscreen : Yes / No (explain)

Field Calibration

Model #: CAL 200

Serial #: 12226

Calibration Level (dBA): 94 / 114

Pre-Test 112.9 dBA

Post-Test 112.8 dBA

Weather Data

Model #: Kestrel 3000

Serial #: 1711928

Wind: Steady/Gusty/Calm

Precipitation: Yes (explain) / No

Avg Wind Speed/Direction: 3 mph NW

Temp (°F): 49 RH (%): 16

Bar Psr (Hg): Cloud Cover (%): 0

Topo: Flat / Hilly

Terrain: Hard/Soft/Mixed/Snow

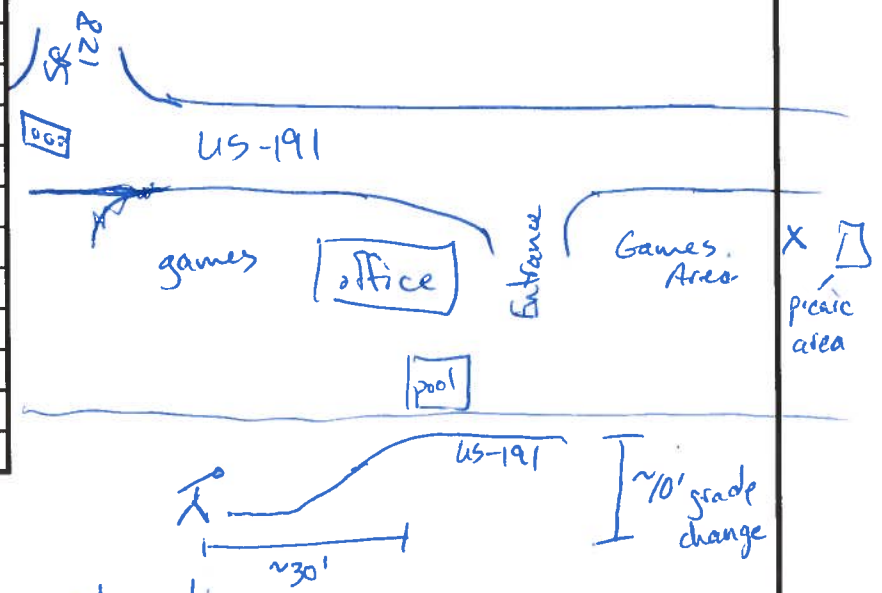
GPS Coordinates (at SLM location)#

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	10:06	10:07	64.0						
		10:08	60.9						
		10:09	59.2						
		10:10	62.4						
		10:11	61.4						
		10:12	63.8						
		10:13	58.6						
		10:14	64.5						
		10:15	60.1						
		10:16	65.2						
		10:17	64.5						
		Continued on back							

Roadway Name/Dir	US-191	
Speed (post/obs)*	45/~40*	
Number of Lanes	2	
Width (pave/row)		
1- or 2- way	2	
Grade	level/downward below	
Bus Stops	-	
Stoplights	1	
Motorcycles		
Automobiles	387	
Medium Trucks	10	
Heavy Trucks	29	
Buses	2	
Count duration	15 min	

compass: N

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

*possibly slower at times due to intersection

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

ST03
(cont.)

Start	End	Leq
	10:18	61.6
	10:19	61.4
	10:20	58.9
	10:21	59.8
	10:22	60.2
	10:23	56.3
	10:24	57.1
	10:25	60.4
	10:26	58.3
	10:27	64.5
	10:28	60.7
	[illegible]	

AECOM Acoustics and Noise Control Practice

ST04

FIELD NOISE MEASUREMENT DATA FORM

Project Name: US-191 North Moab Project #: 60565564 Date: 4/3/18 Page 4 of 5

Monitoring Location: 3 Rosalie Ct (vacant?) Analyst: Seth Anderson

Sound Level Meter
Model #: LD SLM 820
Serial #: 1671
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen : Yes / No (explain)

Field Calibration
Model #: CAL 200
Serial #: 12226
Calibration Level (dBA): 94 / 114
Pre-Test 113.1 dBA
Post-Test 113.0 dBA

Weather Data
Model #: Kestrel 3000
Serial #: 1711928
Wind: Steady/Gusty/Calm
Precipitation: Yes (explain) / No
Avg Wind Speed/Direction: 2 mph NW
Temp (°F): 47 RH (%): 18.6
Bar Psr (Hg): Cloud Cover (%): 0

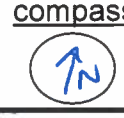
Topo: Flat / Hilly
Terrain: Hard/Soft/Mixed/Snow

GPS Coordinates (at SLM location)#

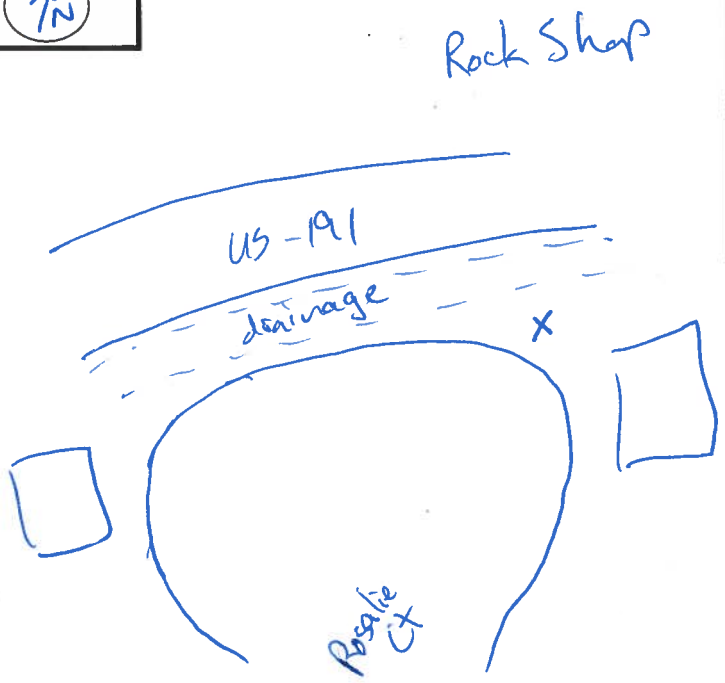
ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	10:50	10:51	57.9						
		10:52	57.6						
		10:53	57.3						
		10:54	56.3						
		10:55	63.6						
		10:56	59.4						
		10:57	61.0						
		10:58	57.2						
		10:59	57.0						
		11:00	61.8						
		11:01	62.2						
		(Continued on back							

Roadway Name/Dir	US-191	
Speed (post/obs)*	30/30	
Number of Lanes	2	
Width (pave/row)		
1- or 2- way	2	
Grade		
Bus Stops	-	
Stoplights	-	
Motorcycles		
Automobiles	335	
Medium Trucks	16	
Heavy Trucks	29	
Buses	-	
Count duration	15 min	

compass



Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects
Additional Notes and Sketches on Reverse

ST04 (cont.)

Start	End	Leg
	11:02	58.7
	11:03	63.3
	11:04	58.4
	11:05	60.4
	11:06	62.1
	11:07	58.5
	11:08	55.5
	11:09	60.3
	11:10	60.6
	11:11	59.4
11:11	11:12	59.3

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

ST05

Project Name: US-191 North Moab Project #: 60565564 Date: 4/3/18 Page 5 of 5
Monitoring Location: 326 Marcus Ct Analyst: Seth Anderson

Sound Level Meter
Model #: LD SLM 820
Serial #: 1671
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen : Yes / No (explain)

Field Calibration
Model #: CAL 200
Serial #: 12226
Calibration Level (dBA): 94 / 114
Pre-Test 113.1 dBA
Post-Test 113.2 dBA

Weather Data
Model #: Kestrel 3000
Serial #: 1711928
Wind: Steady/Gusty/Calm
Precipitation: Yes (explain) / No
Avg Wind Speed/Direction: 1 mph NW
Temp (°F): 55 RH (%): 14
Bar Psr (Hg): Cloud Cover (%): 0

Topo: Flat / Hilly
Terrain: Hard/Soft/Mixed/Snow

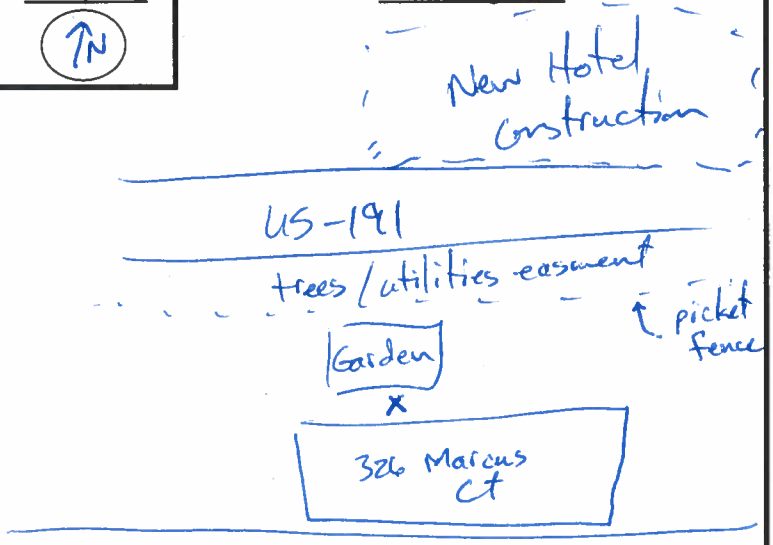
GPS Coordinates (at SLM location)#

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	11:27	11:28	54.8						
		11:29	53.6						
		11:30	53.7						
		11:31	54.0						
		11:32	53.3						
		11:33	53.9						
		11:34	49.3						
		11:35	53.2						
		11:36	53.7						
		11:37	52.8						
		11:38	56.0						
			Continued on back						

Roadway Name/Dir	US-191	
Speed (post/obs)*	30/30	
Number of Lanes	2	
Width (pave/row)		
1- or 2- way	2	
Grade	below	
Bus Stops		
Stoplights		
Motorcycles		
Automobiles	259	
Medium Trucks	11	
Heavy Trucks	15	
Buses	-	
Count duration	15 min	

compass: N

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation
Photos Taken? Yes/No
Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects
Additional Notes and Sketches on Reverse

STOS (cont.)

Start	End	Leg
	11:39	55.5
	11:40	53.4
	11:41	55.5
	11:42	54.5
	11:43	56.3
	11:44	54.8
	11:45	55.4
	11:46	56.3
	11:47	54.5
	11:48	52.8
	11:49	53.5
11:49	11:50	50.9

Photograph 1

Date: 04/3/18

Comments:

Site ST01 Looking east toward Day's Inn

Photograph 2

Date: 04/3/18

Comments:

Site ST01 Looking north

Photograph 3

Date: 04/3/18

Comments:

Site ST01 Looking South

Photograph 4

Date: 04/3/18

Comments:

Site ST01 looking west toward US-191

Photograph 5

Date: 04/3/18

Comments:

Site ST02 looking east

Photograph 6

Date: 04/3/18

Comments:

Site ST02 looking north at receiver

Photograph 7

Date: 04/3/18

Comments:

Site ST02 looking south at US-191

Photograph 8

Date: 04/3/18

Comments:

Site ST02 looking west

Photograph 9

Date: 04/3/18

Comments:

Site ST03 looking south

Photograph 10

Date: 04/10/17

Comments:

Site ST03 looking north toward US-191

Photograph 11

Date: 04/3/18

Comments:

Site ST03 looking south toward receiver

Photograph 12

Date: 04/3/18

Comments:

Site ST03 looking west

Photograph 13

Date: 04/3/18

Comments:

Site ST04 looking east

Photograph 14

Date: 04/3/18

Comments:

Site ST04 looking north toward US-191

Photograph 15

Date: 04/3/18

Comments:

Site ST04 looking south toward receiver

Photograph 16

Date: 04/3/18

Comments:

Site ST04 looking northwest

Photograph 17

Date: 04/3/18

Comments:

Site ST05 looking east

Photograph 18

Date: 04/3/18

Comments:

Site ST05 looking north toward US-191

Photograph 19

Date: 04/3/18

Comments:

Site ST05 looking south toward receiver

Photograph 20

Date: 04/3/18

Comments:

Site ST05 looking west

CERTIFICATE OF CALIBRATION
23260-4
FOR LARSON DAVIS
PRECISION INTEGRATING AND LOGGING SOUND LEVEL METER

Model **820** Serial No. **1671**
ID No. **N/A**
With Microphone Model **377B02** Serial No. **152758**
With Preamplifier Model **PRM828** Serial No. **1957**

Customer: **AECOM**
San Diego, CA 92101 P.O. No. **04115939 MISC17**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 651-1979 Type 1

on **26 MAY 2017** **BY HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **26 MAY 2018**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1049	1314996	10 JUN 2016	10 JUN 2017
B&K	2636	1423390	03 JAN 2017	03 JAN 2018
B&K	4226	2141942	02 DEC 2016	02 DEC 2017
B&K	4231	1770857	15 SEP 2016	15 SEP 2017
HP	34401A	MY45023668	10 FEB 2017	10 FEB 2018
HP	3458A	2823A07179	30 JUL 2016	30 JUL 2017

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2008 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both “as found” and “as left” condition.

Reference Test Procedure: **ACCT Procedure 812-820 Version 3.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	**37** %	**987.54** hPa

Signed:

Harold Lynch

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

Odin Metrology, Inc.

3533 Old Conejo Road, Suite 125
Thousand Oaks, CA 91320
Phone: (805) 375-0830, Fax: (805) 375-0405
www.OdinMetrology.com

Calibration data for

Larson Davis Precision Integrating and Logging Sound Level Meter

Type 820# 1671, ID# N/A

With Microphone 377B02# 152758 and Preamplifier PRM828# 1957

Performed on May 26, 2017

for

AECOM

PO#: 04115939 MISC17
Certificate#: 23260-4
Calibration performed by: HL

Environmental Conditions
Relative humidity: 37%
Ambient temperature: 23°C
Ambient pressure: 987.54 hPa

The following calibration was performed per ACCT Procedure 812-820 version 3.5.1.
The data represent both the **"As Found"** and the **"As Left"** conditions.

Page No.	Test	Standard Section (Type 1) ANSI S1.4	Standard Section (Type 1) IEC 651	Result
3	Internal Clock	Reference Only		**See Data**
3	Sensitivity Verification with Acoustic Calibrator	Reference Only		**See Data**
3	Acoustic Frequency Response with Microphone	5.1, 5.2	6.1, 6.2	**Pass**
3	Self-Generated Noise	5.6	6.6	**Pass**
4	Output Impedance	9.2	10.2	**Pass**
4	AC Full Scale Output Voltage	Reference Only		**See Data**
4	DC Full Scale Output Voltage	Reference Only		**See Data**
4	DC Linearity	Reference Only		**See Data**
5	Overload Indication	8.3.1	9.3.1	**Pass**
5	Peak Characteristic	6.5	7.5	**Pass**
5	Decay Time Constants	6.2, 6.3	7.2, 7.3	**Pass**
6	Steady-State Response	6.4	7.4	**Pass**
	Frequency Response	5.1, 5.2	6.1, 6.2	————
6	A-Weighted			**Pass**
7	C-Weighted			**Pass**
	Toneburst Response			————
8	Fast time weighting	6.2	7.2	**Pass**
8	Slow time weighting	6.2	7.2	**Pass**
8	Impulse time weighting (single)	6.3	7.3	**Pass**
8	Impulse time weighting (continuous)	6.3	7.3	**Pass**
	Differential Level Linearity	6.9, 6.10	7.9, 7.10	————
9	A-Weighted			**Pass**
9	C-Weighted			**Pass**

Internal Clock

Date and time are transferred from SLM, then the SLM date and time are set according to Odin Metrology's clock and the date and time are transferred from the SLM a second time. Time zones (with minor simplifications) and DST are obeyed.

Local Date/Time: Date and time according to Odin Metrology's clock (Pacific Daylight Time) at the time of the clock setting
Location: US state or other location for which the SLM clock is set (some time zone simplifications are made)
UTC Offset: UTC offset for the given location
Daylight Saving Time: whether DST is currently observed for the given location
SLM Clock Before Set: readouts of the SLM's system date and time before any changes are made
SLM Clock After Set: readouts of the SLM's system date and time after setting

Local Date/Time	Location	UTC Offset (Hr:Min)	Daylight Saving Time	SLM Clock Before Set	SLM Clock After Set
Fri 26May2017 09:53:55	California	-7:00	Yes	Fri 26May2017 09:55:36	Fri 26May2017 09:53:57

Sensitivity Verification with Acoustic Calibrator

A sound level calibrator is mounted on the sound level meter and the internal calibration is started. The SLM indication is recorded before and after calibration.

Calibrator Freq.: the frequency of the signal generated by the sound level calibrator
Calibrator SPL: the SPL of the signal generated by the sound level calibrator
SLM SPL Before: SLM indication before internal calibration sequence
SLM SPL After: SLM indication after internal calibration sequence
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Performed with microphone 377B02# 152758, preamplifier PRM828# 1957, and calibrator 4231# 1770857.

Calibrator Freq. (Hz)	Calibrator SPL (dB)	SLM SPL Before (dB)	SLM SPL After (dB)	Uncertainty (dB)
1,000.0	114.0	114.12	114.00	0.40

Acoustic Frequency Response with Microphone (S1.4 § 5.1, 5.2, 651 § 6.1, 6.2)

The acoustic frequency response is tested using a multifunction acoustical calibrator type 4226 in C frequency weighting. If a windscreen is used, these data are to be corrected.

Frequency: the frequency of the signal to the sound level meter (frequency of 4226 multifunction acoustic calibrator)
Data Found: the value the sound level meter actually indicates (this is a pressure measurement)
FF Corr.: free field correction for microphone to be added to displayed SLM (pressure) value
Corrected Resp.: SLM's reading plus the correction indicated
Nominal Value: what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Uncertainty: maximum expanded uncertainty of measurement according to IEC with approximately 95% confidence level (coverage factor ***k***=2)
Deviation: the difference between the nominal value and the data found

Performed with microphone 377B02# 152758, preamplifier PRM828# 1957, and calibrator 4226# 2141942.

Frequency (Hz)	Data Found (dB)	FF Corr. (dB)	Corrected Resp. (dB)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Uncertainty (dB)	Deviation (dB)	Pass/Fail
31.5	110.96	0.00	110.96	110.99	109.49	112.49		-0.03	**Pass**
63.0	113.22	0.00	113.22	113.18	112.18	114.18		0.03	**Pass**
125.0	113.89	0.00	113.89	113.83	112.83	114.83	0.15	0.06	**Pass**
250.0	114.01	0.00	114.01	114.00	113.00	115.00		0.01	**Pass**
500.0	114.01	0.04	114.05	114.03	113.03	115.03		0.02	**Pass**
1,000.0	**Reference**								
2,000.0	113.52	0.31	113.83	113.83	112.83	114.83	0.15	0.00	**Pass**
4,000.0	112.14	1.00	113.14	113.18	112.18	114.18		-0.04	**Pass**
8,000.0	107.39	3.39	110.78	110.99	107.99	112.49	0.25	-0.21	**Pass**
12,500.0	100.64	6.77	107.41	107.76	101.76	110.76	0.50	-0.35	**Pass**

Self-Generated Noise (S1.4 § 5.6, 651 § 6.6)

To measure inherent noise, the input to the SLM is terminated with a shorted dummy microphone of equal capacitance.

Frequency Weighting: the frequency weighting setting on the sound level meter
Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Data Found: the 30-second L_{eq} value the sound level meter indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Frequency Weighting	Tolerance (< dB)	Data Found (dB)	Uncertainty (dB)	Pass/Fail
A	30.00	15.50	0.003	**Pass**
C		14.34		**Pass**

Output Impedance (S1.4 § 9.2, 651 § 10.2)

A reference signal is applied to the sound level meter and the output is shorted. The indicated level may not be affected by more than the specified tolerance.

Frequency: the frequency of the signal to the sound level meter
Input Level: the level (amplitude) of the signal to the sound level meter
Nominal Value: the value the sound level meter should indicate
Tolerance: the acceptable difference from nominal, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Data Found: the value the sound level meter actually indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)
Deviation: the difference between the nominal value and the data found

Frequency (kHz)	Input Level (dB)	Nominal Value (dB)	Tolerance (± dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
1.0	114.0	114.0	0.20	113.96	0.10	-0.04	**Pass**

AC Full Scale Output Voltage

The sound level meter is set up to indicate full-scale on the display and the AC output is measured. Input frequency is 1,000 Hz.

SPL Rdg.: the input to the sound level meter is adjusted so that it indicates this full-scale value
Data Found: the value the sound level meter actually indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

SPL Rdg. (dB)	Data Found (mV)	Uncertainty (mV)
129.89	2404.21	0.10

DC Full Scale Output Voltage

The sound level meter is set up to indicate full-scale on the display and the DC output is measured. Input frequency is 1,000 Hz.

SPL Rdg.: the input to the sound level meter is adjusted so that it indicates this full-scale value
Data Found: the value the sound level meter actually indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

SPL Rdg. (dB)	Data Found (mV)	Uncertainty (mV)
129.89	2395.64	0.10

DC Linearity

The sound level meter is set up to indicate full-scale on the display and the DC-output voltage is recorded in decreasing 10-dB steps.

Rel. Input Level: the level (amplitude) of the signal to the sound level meter, relative to the reference of full-scale
Data Found: the measured DC-output from the SLM
Sensitivity: the calculated sensitivity based on the DC-outputs at the levels of FSD and FSD-80 dB.

Rel. Input Level (dB)	Data Found (mV)	Uncertainty (mV)	Sensitivity (mV/dB)
0.0	2395.67		
-10.0	2,197.27		
-20.0	1,997.18		
-30.0	1,794.43	0.40	
-40.0	1,589.06		
-50.0	1,387.60		19.98
-60.0	1,189.32		
-70.0	983.66		
-80.0	780.73	0.05	
-90.0	582.00		
-100.0	397.77		

Overload Indication (S1.4 § 8.3.1, 651 § 9.3.1)

SLM overload is expected when the display value exceeds the tolerance of the inverse A-weighted test (an overload indication when overload is not expected is not a failure condition). This test will not continue past 63.1 Hz as a precautionary measure.

Frequency: the frequency of the signal to the sound level meter
Rel. Input Level: input level to SLM relative to reference level (FSD-5 dB) at 1,000 Hz; equal to the A-weighted frequency curve
Tolerance: tolerance of the A-weighted test at the stated frequency, according to ANSI S1.4 and IEC 651
Data Found: the value the SLM indicates at the stated frequency and input level
Overload Expected: yes or no depending on if the SLM indication has exceed the stated tolerance
Overload Occurred: whether or not the SLM indicated an overload condition

Frequency (Hz)	Rel. Input Level (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Overload Expected	Overload Occurred	Pass/Fail
1,000.0				**Reference**			
794.3	0.8	124.0	126.0	125.03	No	No	**N/A**
631.0	1.9	124.0	126.0	125.03	No	No	**N/A**
501.2	3.2	124.0	126.0	124.91	No	No	**N/A**
398.1	4.8	124.0	126.0	124.78	No	Yes	**N/A**
316.2	6.6	124.0	126.0	124.16	No	Yes	**N/A**
251.2	8.6	124.0	126.0	123.03	Yes	Yes	**Pass**
199.5	10.9	124.0	126.0				
158.5	13.4	124.0	126.0				
125.9	16.1	124.0	126.0				
100.0	19.1	124.0	126.0				
79.4	22.5	124.0	126.0				
63.1	26.2	124.0	126.0				
50.1	30.2	124.0	126.0				
39.8	34.6	123.5	126.5				
31.6	39.4	123.5	126.5				
25.1	44.7	123.0	127.0				
20.0	50.5	122.5	127.5				

Peak Characteristic (S1.4 § 6.5, 651 § 7.5)

The rise time of the peak detector must be such that the response of a short duration (100 µs) rectangular pulse is similar to that of a reference pulse of 10 ms.

Polarity: indicates the bursts are the half-period above (positive) or below (negative) the zero level of the rectangular pulse
Input Level: the maximum peak indication on the SLM after a single reference burst is triggered
Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Data Found: the value the sound level meter actually indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)
Deviation: the difference between the nominal value and the data found

Polarity	Input Level (dB)	Tolerance (≥ dB)	Data Found (dB)	Uncertainty (dB)	Pass/Fail
Positive	129.00	127.00	129.85	0.4	**Pass**
	109.00	107.00	109.35		**Pass**
Negative	129.00	127.00	129.35		**Pass**
	109.00	107.00	109.22		**Pass**

Decay Time Constants for Time Weightings Fast and Slow (S1.4 § 6.2, 6.3, 651 § 7.2, 7.3)

The decay rate of the display value on the sound level meter is measured after a steady 4.0 kHz signal is removed.

Time Weighting: the time weighting setting on the sound level meter
Nominal Rate: the decay rate the sound level meter should exhibit according to ANSI S1.4 and IEC 651
Tolerance: the acceptable range, including the stated uncertainty, for the decay rate for this time weighting
Measured Rate: the actual decay rate measured on the sound level meter
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Time Weighting	Tolerance (dB/s) Minimum	Tolerance (dB/s) Maximum	Measured Rate (dB/s)	Uncertainty (dB/s)	Pass/Fail
Fast	20.0	N/A	33.86	2.00	**Pass**
Slow	3.3	N/A	4.55	0.40	**Pass**
Impulse	2.4	3.4	2.89	N/A	**Pass**

Steady-State Response (S1.4 § 6.4, 651 § 7.4)

With reference to L_{AF} at the SLM reference level indicated, the measurements of the other time weighting parameters may not differ by more than the specified tolerance. Test frequency is 1.0 kHz.

Time Weighting: time weighting setting on the SLM

Frequency Weighting: frequency weighting setting on the SLM

Input Level: the level (amplitude) of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to ANSI S1.4 and IEC 651

Tolerance: the acceptable difference from nominal, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Deviation: the difference between the nominal value and the data found

Time Weighting	Input Level (dB)	Nominal Value (dB)	Tolerance (± dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
Fast		**Reference**				**Reference**	
Slow	114.0	114.0	0.1	114.00	0.003	0.00	**Pass**
Impulse				114.00		0.00	**Pass**

A-Frequency-Weighted Frequency Response (S1.4 § 5.1, 5.2, 651 § 6.1, 6.2)

The sound level meter's frequency response relative to the meter's reference level at 1,000 Hz is recorded by varying the frequency as specified.

Frequency: the frequency of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to ANSI S1.4 and IEC 651 (this is relative to the reference value at 1.0 kHz)

Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Deviation: the difference between the nominal value and the data found

Frequency (Hz)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
20.0	-50.5	-53.0	-48.0	-50.69		-0.23	**Pass**
25.1	-44.7	-46.7	-42.7	-44.78		-0.08	**Pass**
31.6	-39.4	-40.9	-37.9	-39.71		-0.27	**Pass**
39.8	-34.6	-36.1	-33.1	-34.83		-0.20	**Pass**
50.1	-30.2	-31.2	-29.2	-30.30		-0.07	**Pass**
63.1	-26.2	-27.2	-25.2	-26.36	0.50	-0.17	**Pass**
79.4	-22.5	-23.5	-21.5	-22.79		-0.29	**Pass**
100.0	-19.1	-20.1	-18.1	-19.31		-0.17	**Pass**
125.9	-16.1	-17.1	-15.1	-16.08		0.02	**Pass**
158.5	-13.4	-14.4	-12.4	-13.33		0.02	**Pass**
199.5	-10.9	-11.9	-9.9	-10.96		-0.09	**Pass**
251.2	-8.6	-9.6	-7.6	-8.83		-0.20	**Pass**
316.2	-6.6	-7.6	-5.6	-6.71		-0.10	**Pass**
398.1	-4.8	-5.8	-3.8	-4.83	0.40	-0.02	**Pass**
501.2	-3.2	-4.2	-2.2	-3.21		0.02	**Pass**
631.0	-1.9	-2.9	-0.9	-1.83		0.07	**Pass**
794.3	-0.8	-1.8	0.2	-0.71		0.11	**Pass**
1,000.0	0.0	**Reference**					
1,258.9	0.6	-0.4	1.6	0.54	0.40	-0.05	**Pass**
1,584.9	1.0	0.0	2.0	0.92		-0.06	**Pass**
1,995.3	1.2	0.2	2.2	1.17		-0.03	**Pass**
2,511.9	1.3	0.3	2.3	1.17		-0.10	**Pass**
3,162.3	1.2	0.2	2.2	1.17		-0.03	**Pass**
3,981.1	1.0	0.0	2.0	0.92	0.60	-0.05	**Pass**
5,011.9	0.5	-1.0	2.0	0.55		0.00	**Pass**
6,309.6	-0.1	-2.1	1.4	-0.08		0.04	**Pass**
7,943.3	-1.1	-4.1	0.4	-1.08		0.03	**Pass**
10,000.0	-2.5	-6.5	-0.5	-2.46		0.03	**Pass**
12,589.3	-4.3	-10.3	-1.3	-4.45		-0.13	**Pass**
15,848.9	-6.6	N/A	-3.6	-6.83	1.00	-0.23	**Pass**
19,952.6	-9.3	N/A	-6.3	-9.58		-0.26	**Pass**

C-Frequency-Weighted Frequency Response (S1.4 § 5.1, 5.2, 651 § 6.1, 6.2)

The sound level meter's frequency response relative to the meter's reference level at 1,000 Hz is recorded by varying the frequency as specified.

Frequency: the frequency of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to ANSI S1.4 and IEC 651 (this is relative to the reference value at 1.0 kHz)

Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

Deviation: the difference between the nominal value and the data found

Frequency (Hz)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
20.0	-6.2	-8.7	-3.7	-6.61		-0.37	**Pass**
25.1	-4.4	-6.4	-2.4	-4.66		-0.26	**Pass**
31.6	-3.0	-4.5	-1.5	-3.27		-0.26	**Pass**
39.8	-2.0	-3.5	-0.5	-2.16		-0.16	**Pass**
50.1	-1.3	-2.3	-0.3	-1.43		-0.14	**Pass**
63.1	-0.8	-1.8	0.2	-0.92	0.50	-0.10	**Pass**
79.4	-0.5	-1.5	0.5	-0.55		-0.05	**Pass**
100.0	-0.3	-1.3	0.7	-0.37		-0.07	**Pass**
125.9	-0.2	-1.2	0.8	-0.16		0.01	**Pass**
158.5	-0.1	-1.1	0.9	-0.05		0.04	**Pass**
199.5	0.0	-1.0	1.0	-0.04		-0.01	**Pass**
251.2	0.0	-1.0	1.0	-0.04		-0.04	**Pass**
316.2	0.0	-1.0	1.0	0.09		0.07	**Pass**
398.1	0.0	-1.0	1.0	0.04	0.40	0.01	**Pass**
501.2	0.0	-1.0	1.0	0.09		0.06	**Pass**
631.0	0.0	-1.0	1.0	0.09		0.06	**Pass**
794.3	0.0	-1.0	1.0	0.09		0.07	**Pass**
1,000.0	0.0	**Reference**					
1,258.9	0.0	-1.0	1.0	-0.04	0.40	-0.01	**Pass**
1,584.9	-0.1	-1.1	0.9	-0.04		0.05	**Pass**
1,995.3	-0.2	-1.2	0.8	-0.16		0.01	**Pass**
2,511.9	-0.3	-1.3	0.7	-0.29		0.01	**Pass**
3,162.3	-0.5	-1.5	0.5	-0.41		0.09	**Pass**
3,981.1	-0.8	-1.8	0.2	-0.79	0.60	0.03	**Pass**
5,011.9	-1.3	-2.8	0.2	-1.16		0.13	**Pass**
6,309.6	-2.0	-4.0	-0.5	-1.91		0.09	**Pass**
7,943.3	-3.0	-6.0	-1.5	-2.91		0.10	**Pass**
10,000.0	-4.4	-8.4	-2.4	-4.29		0.12	**Pass**
12,589.3	-6.2	-12.2	-3.2	-6.20		0.04	**Pass**
15,848.9	-8.5	N/A	-5.5	-8.65	1.00	-0.12	**Pass**
19,952.6	-11.2	N/A	-8.2	-11.41		-0.16	**Pass**

Toneburst Response (S1.4 § 6.2, 6.3, 651 § 7.2, 7.3)

The sound level meter's A-weighted response to tonebursts at 2.0 kHz is measured.

Burst Dur.: the duration of the toneburst
Burst Rep.: repeat rate of the toneburst (continuous tests only)
Input Level: the level of the steady-state sinusoidal signal as indicated on the SLM display
Nominal Value: the value sound level meter should indicate according to ANSI S1.4 and IEC 651
Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to ANSI S1.4 and IEC 651
Data Found: the value the sound level meter actually indicates
Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)
Deviation: the difference between the nominal value and the data found

Fast time weighting, single toneburst

Burst Dur. (ms)	Input Level (dB)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
200	126.0	125.0	124.0	126.0	124.62	0.2	-0.4	**Pass**
	116.0	115.0	114.0	116.0	114.63		-0.4	**Pass**
	106.0	105.0	104.0	106.0	104.62		-0.4	**Pass**
	96.0	95.0	94.0	96.0	94.63		-0.4	**Pass**
	86.0	85.0	84.0	86.0	84.62		-0.4	**Pass**
	56.0	55.0	54.0	56.0	54.75		-0.3	**Pass**

Slow time weighting, single toneburst

Burst Dur. (ms)	Input Level (dB)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
500	126.0	121.9	120.9	122.9	121.87	0.2	-0.1	**Pass**
	116.0	111.9	110.9	112.9	111.88		-0.1	**Pass**
	106.0	101.9	100.9	102.9	101.87		-0.1	**Pass**
	96.0	91.9	90.9	92.9	92.00		0.1	**Pass**
	86.0	81.9	80.9	82.9	81.88		-0.1	**Pass**
	56.0	51.9	50.9	52.9	52.00		0.1	**Pass**

Impulse time weighting, single toneburst

Burst Dur. (ms)	Input Level (dB)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
2	126.0	113.4	111.45	115.4	113.88	0.2	0.4	**Pass**
	116.0	103.4	101.45	105.4	103.50		0.1	**Pass**
	106.0	93.4	91.45	95.4	93.50		0.1	**Pass**
	96.0	83.4	81.45	85.4	83.50		0.1	**Pass**
	86.0	73.4	71.45	75.4	73.12		-0.3	**Pass**
	56.0	43.4	41.45	45.4	43.31		-0.1	**Pass**
5	126.0	117.2	115.2	119.2	117.13		-0.1	**Pass**
	116.0	107.2	105.2	109.2	106.87		-0.4	**Pass**
	106.0	97.2	95.2	99.2	97.00		-0.2	**Pass**
	96.0	87.2	85.2	89.2	87.00		-0.2	**Pass**
	86.0	77.2	75.2	79.2	77.00		-0.2	**Pass**
	56.0	47.2	45.2	49.2	47.13		-0.1	**Pass**
20	126.0	122.4	120.9	123.9	122.12		-0.3	**Pass**
	116.0	112.4	110.9	113.9	112.13		-0.3	**Pass**
	106.0	102.4	100.9	103.9	102.25		-0.1	**Pass**
	96.0	92.4	90.9	93.9	92.12		-0.3	**Pass**
	86.0	82.4	80.9	83.9	82.05		-0.3	**Pass**
	56.0	52.4	50.9	53.9	52.36		0.0	**Pass**

Impulse time weighting, continuous tonebursts

Burst Dur. (ms)	Burst Rep. (Hz)	Input Level (dB)	Nominal Value (dB)	Tolerance (dB) Minimum	Tolerance (dB) Maximum	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
5	2	126.0	117.2	115.2	119.2	116.71	0.2	-0.5	**Pass**
		116.0	107.2	105.2	109.2	106.77		-0.5	**Pass**
		106.0	97.2	95.2	99.2	96.71		-0.5	**Pass**
		96.0	87.2	85.2	89.2	86.70		-0.5	**Pass**
		86.0	77.2	75.2	79.2	76.69		-0.6	**Pass**
		56.0	47.2	45.2	49.2	46.79		-0.5	**Pass**
	20	126.0	118.4	116.4	120.4	119.62		1.2	**Pass**
		116.0	108.4	106.4	110.4	109.75		1.3	**Pass**
		106.0	98.4	96.4	100.4	99.75		1.3	**Pass**
		96.0	88.4	86.4	90.4	89.63		1.2	**Pass**
		86.0	78.4	76.4	80.4	79.62		1.2	**Pass**
		56.0	48.4	46.4	50.4	49.70		1.3	**Pass**
	100	126.0	123.3	122.3	124.3	123.25		0.0	**Pass**
		116.0	113.3	112.3	114.3	113.25		0.0	**Pass**
		106.0	103.3	102.3	104.3	103.25		0.0	**Pass**
		96.0	93.3	92.3	94.3	93.25		0.0	**Pass**
		86.0	83.3	82.3	84.3	83.25		0.0	**Pass**
		56.0	53.3	52.3	54.3	53.25		0.0	**Pass**

Differential Level Linearity (S1.4 § 6.9, 6.10, 651 § 7.9, 7.10)

Level linearity is tested at 1.0 kHz. The input level is varied precisely and the indicated level on the display must correspond with the change of input level. Test is performed at A- and C-frequency weighting.

Input Level: the level (amplitude) of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to ANSI S1.4 and IEC 651

Tolerance: the acceptable difference from nominal, including the stated uncertainty, according to ANSI S1.4 and IEC 651

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor ***k***=2)

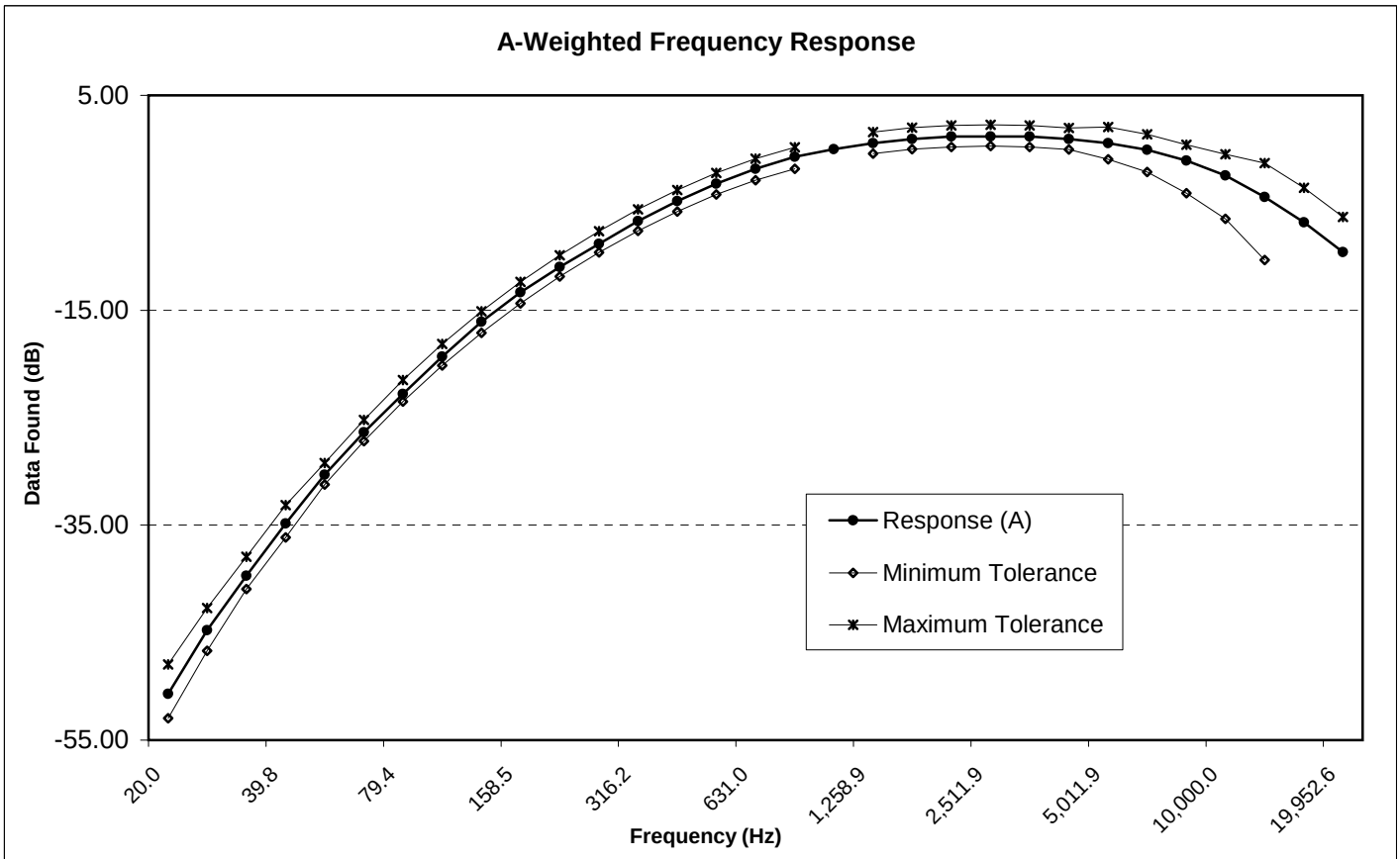
Deviation: difference between the nominal value and the data found; differential: current and previous measurement is not allowed to exceed 0.4 dB according to ANSI S1.4 and IEC 651

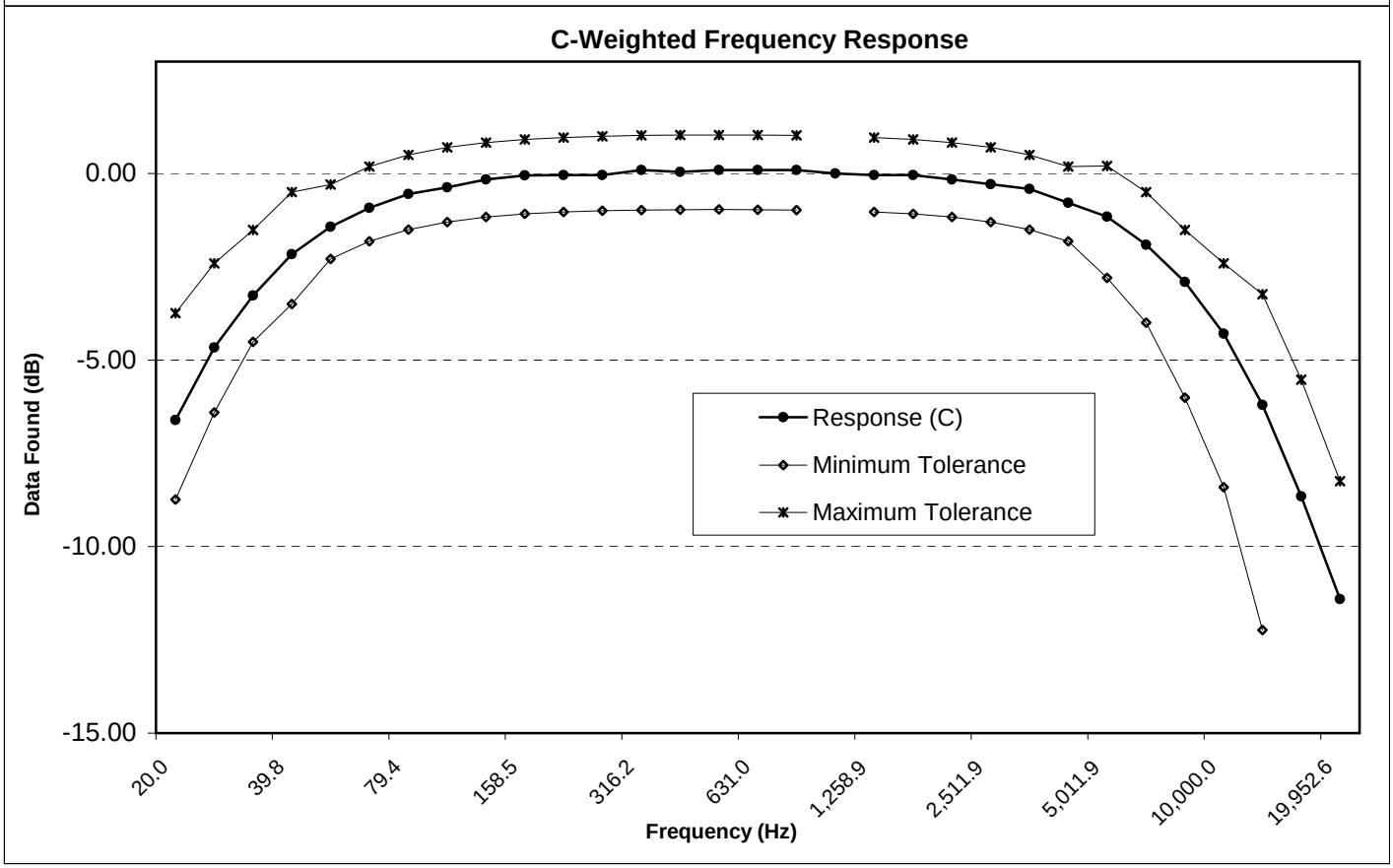
A-weighted

Input Level (dB)	Nominal Value (dB)	Tolerance (± dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB) Measured	Deviation (dB) Differential	Pass/Fail
114.0			**Reference**				
120.0	120.0	0.7	119.68	0.2	-0.3	N/A	**Pass**
125.0	125.0		124.93		-0.1	0.25	**Pass**
120.0	120.0		119.67		-0.3	-0.26	**Pass**
115.0	115.0		114.93		-0.1	0.26	**Pass**
110.0	110.0		109.81		-0.2	-0.12	**Pass**
105.0	105.0		104.56		-0.4	-0.25	**Pass**
100.0	100.0		99.80		-0.2	0.24	**Pass**
95.0	95.0		94.68		-0.3	-0.12	**Pass**
90.0	90.0		89.68		-0.3	0.00	**Pass**
85.0	85.0		84.81		-0.2	0.13	**Pass**
80.0	80.0		79.68		-0.3	-0.13	**Pass**
75.0	75.0		74.68		-0.3	0.00	**Pass**
70.0	70.0		69.81		-0.2	0.13	**Pass**
65.0	65.0		64.68		-0.3	-0.13	**Pass**
60.0	60.0		59.68		-0.3	0.00	**Pass**
55.0	55.0		54.68		-0.3	0.00	**Pass**

C-weighted

Input Level (dB)	Nominal Value (dB)	Tolerance (± dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB) Measured	Deviation (dB) Differential	Pass/Fail
114.0			**Reference**				
120.0	120.0	0.7	119.85	0.2	-0.2	N/A	**Pass**
125.0	125.0		125.10		0.1	0.25	**Pass**
120.0	120.0		119.85		-0.2	-0.25	**Pass**
115.0	115.0		114.85		-0.2	0.00	**Pass**
110.0	110.0		109.97		0.0	0.12	**Pass**
105.0	105.0		104.72		-0.3	-0.25	**Pass**
100.0	100.0		99.72		-0.3	0.00	**Pass**
95.0	95.0		94.85		-0.2	0.13	**Pass**
90.0	90.0		89.60		-0.4	-0.25	**Pass**
85.0	85.0		84.84		-0.2	0.24	**Pass**
80.0	80.0		79.84		-0.2	0.00	**Pass**
75.0	75.0		74.71		-0.3	-0.13	**Pass**
70.0	70.0		69.85		-0.2	0.14	**Pass**
65.0	65.0		64.72		-0.3	-0.13	**Pass**
60.0	60.0		59.59		-0.4	-0.13	**Pass**
55.0	55.0		54.84		-0.2	0.25	**Pass**


A-Weighted Frequency Response
5.00
-15.00
-35.00
-55.00
Data Found (dB)
Response (A)
Minimum Tolerance
Maximum Tolerance
20.0
39.8
79.4
158.5
316.2
631.0
1,258.9
2,511.9
5,011.9
10,000.0
19,952.6
Frequency (Hz)


C-Weighted Frequency Response
0.00
-5.00
-10.00
-15.00
Data Found (dB)
Response (C)
Minimum Tolerance
Maximum Tolerance
20.0
39.8
79.4
158.5
316.2
631.0
1,258.9
2,511.9
5,011.9
10,000.0
19,952.6
Frequency (Hz)

Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **23260-8**

Certificate of Calibration for Larson Davis Calibrator

This calibration is performed by comparison with measurement reference standard microphone:

Type No.	4134
Serial No.	1315901
Calibrated by	HL
Cal Date	08 DEC 2015
Due Date	08 DEC 2017

a) Estimated uncertainty of comparison: ± **0.05** dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± **0.06** dB
c) Total uncertainty: $\sqrt{a^2 + b^2}$ = ± **0.08** dB
d) Expanded uncertainty (coverage factor *k* = 2 for 95% confidence level): = ± **0.16** dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **TN-683/286992-15.**

CONDITION OF TEST		
Ambient Pressure	**987.54**	hPa
Temperature	**23**	°C
Relative Humidity	**37**	%
Date of Calibration	**26 MAY 2017**	
Re-calibration due on	**26 MAY 2018**	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001-2008, Certification NQA No. 11252.

Calibration procedure: Larson Davis CAL200, **23.2, 20170220.**

Calibration performed by

Harold Lynch

Harold Lynch, Service Manager

Calibrator type	**CAL200**
Serial no.	**12226**
Submitted by	**AECOM**
	San Diego, CA 92101
Purchase order no.	**04115939 MISC17**
Asset no.	**N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of a ½" microphone	94.0 ± 0.2 dB 114 ± 0.2 dB
Frequency	1,000 Hz ± 1%
Distortion	< 2%
At 1,013 hPa, 20°C, and 65% relative humidity	

PERFORMANCE AS RECEIVED		
Frequency	**1000.2**	Hz
SPL (94 dB)	**94.01**	dB
SPL (114 dB)	**114.02**	dB
Distortion (at 94 dB)	**0.2**	%
Battery Voltage	**9.3**	V

Was adjustment performed? **No**
Were batteries replaced? **No**

FINAL PERFORMANCE		
Frequency	**1000.2**	Hz
SPL (94 dB)	**94.01**	dB
SPL (114 dB)	**114.02**	dB
Distortion (at 94 dB)	**0.2**	%

Note: This calibrator was **within** manufacturer's specifications as received.

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

ODIN METROLOGY, INC.

Instrumentation used for calibration of pistonphones and calibrators

Instrument Type	Type no.	Serial no.	Cal. Date	Cal. Due	Cal. by
Measuring Amplifier	2113	486832	09 JUN 16	09 JUN 17	HL
Precision Barometer	141	299/95-10	28 NOV 16	28 NOV 17	CMI
Transducer Assembly	9545	390093	02 NOV 16	02 NOV 18	TE
Pistonphone	4228	1504084	15 NOV 16	15 NOV 17	TE
Pistonphone	4220	1048473	15 NOV 16	15 NOV 17	TE
Sound Calibrator	4231	2309106	20 FEB 17	20 FEB 18	HL
Microphone	4134	1315901	08 DEC 15	08 DEC 17	TE
HP Multimeter	34401A	3146A48348	09 SEP 16	09 SEP 17	PMI
HP Multimeter	34401A	MY41031678	28 DEC 16	28 DEC 17	PMI

Calibration of reference microphones 4160 serial numbers 991820, 991821, 1054926, standard pistonphones 4220 serial numbers 1048473, 1510240, 375837, 1476021 and 4228 serial number 1793011 are calibrated traceable to NIST with NIST test number **TN-683/286992-15.**

The verification/calibration listed on page 1 of this document was performed on a test system which conforms to and operates under the requirements of **ANSI/NCSL Z540-1** which also covers the requirements for **MIL STD 45662A**, **ISO 17025**, and ISO 9001:2008 NQA certification no.: **11252**.

*Traceability to NIST by NIST calibration of Transfer Standard Microphone is used to verify consistency between DANAK/DPLA and NIST calibrations.

This page revised: Rev. 23.2, 20170220

Appendix C

Traffic Data

US-191 Traffic Volumes for TNM Analysis

Traffic Observed During Short-Term Measurements

15 min observation

Location	Cars	Med Trucks	Heavy Trucks
ST01	313	13	24
ST02	293	12	25
ST03	337	10	29
ST04	335	16	29
ST05	259	11	15

Hourly Volume

Cars	Med Trucks	Heavy Trucks
1252	52	96
1172	48	100
1348	40	116
1340	64	116
1036	44	60

Per Lane

Lanes	Cars	Med Trucks	Heavy Trucks
4	313	13	24
2	586	24	50
2	674	20	58
2	670	32	58
2	518	22	30

Existing Peak (2004 from EA)

Cars	Med Truck	Heavy Truck	Total
582	141	159	882

Per lane (4 lanes)

Cars	Med Truck	Heavy Truck
146	35	40

Per lane (2 lanes)

Cars	Med Truck	Heavy Truck
291	71	79

Build Alt (LOS C) per lane

Cars	Med Truck*	Heavy Truck*	Total (both directions)
568	153	127	3392

*Future LOS C assumes same truck mix as 2016

Appendix C

Draft Wetlands and Waters of the US Report

DELINEATION of WETLANDS & WATERS OF THE US

US 191 Colorado River to 400 North
Moab, Grand County, Utah

UDOT Project No.: F-0191(152)126
PIN No.: 15329

Township & Range
Sections 26 & 35 T25S R21E
Section 36 T25S R22E

August 2018

Prepared for:
Utah Department of Transportation, Region 4
708 South 100 West
Richfield, UT 84701

Prepared by:
AECOM
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by UDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

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EXECUTIVE SUMMARY

Applicant – Ryan Anderson, PE, Utah Department of Transportation (UDOT) Region 4, 708 South 100 West, Richfield, Utah 84701.

Property owner – Utah Department of Transportation

Project area – Intersection of SR128 and US191 (MP128.2) to 400 N (MP126) and selected adjacent lands. US-191 Right-of-Way (ROW) within 100 feet + of the center line. Roadway widening, shoulders, curb and gutter, and sidewalk in some locations. Total project area is 102.38 acres.

Location – US-191 Colorado River to 400 North, Moab, Utah.

Directions – From St. George take I-15 north to I-70 (from Salt Lake take I-15 south to Highway 6 to I-70 east). Take US 191 south to the Colorado River Bridge at the north end of Moab, Utah.

Delineation method - The delineation was conducted in accordance with the guidelines and procedures outlined in the US Army Corps of Engineers' *Wetlands Delineation Manual* (Technical Report Y-87-1) and the *2008 Arid West Regional Supplement*.

Field work date(s) and existing field conditions – Field work was conducted March 28-30, 2018. The region is primarily desert badlands, rock outcrops and sandy lowlands. Within the ROW the existing road and fill slopes account for the majority of the project area and the remaining majority of the area is desert habitat or landscaped area bordered by urban development. A few small wetlands and waterways are present which originate from springs in the rocky hillslopes east of the ROW.

Vegetation – Species most common in dry areas include Mexican Fireweed *(Bassia scoparia)* Cheatgrass *(Bromus tectorum)* Tansy Mustard *(Descurainia pinnata)* Herron's Bill *(Erodium cicutarium)* Prickly Russian Thistle *(Salsola tragus)* and Shadscale *(Atriplex confertifolia).* Coastal Salt Grass *(Distichlis spicata)* Common Reed *(Phalaris arundinacea)* and Russian Olive *(Elaeagnus angustifolia)* are present in wetlands and uplands though Salt Grass and Reed are less robust in upland areas. By far the most common plants in wetlands are Cattail *(Typha).* Other species in wetlands include Foxtail Barley *(Hordeum jubatum)* Torrey's Rush *(Juncus torreyi)* Narrow-Leaf-Willow *(Salix exigua)* and Freemont Cottonwood *(Populus fremontii).*

Soils – Throughout the site soils are generally sandy loam or loamy sand to at least 12 inches. Subsoils have slightly more clay. In uplands soil color is reddish brown 5YR 3/4 or 4/4 both at the surface and in the subsoil. Hydric soil indicators are not particularly strong in wetlands. The soil color is slightly darker 5YR 3/2 or 3/3. Some areas have organic masses or slight evidence of higher organic matter. Poorly developed soil indicators are common in desert environments.

Hydrology – Wetland hydrology, where present is generally obvious due to perennial water sources and distinct topographic changes. Indicators of qualifying hydrology are minimal in dry washes versus non-qualifying runoff channels or erosion features.

Wetland boundary justification – Boundaries of natural wetlands are best defined by low topography, soil moisture and obvious wetland vegetation, often with distinct boundaries. Natural wetlands generally were vegetated with cattails and in some cases willows or cottonwoods.

Interstate and Foreign Commerce – No evidence of interstate or foreign commerce associated with these delineated waters of the United States, including wetlands, was found.

The Colorado River is considered Navigable at this location:
http://www.spk.usace.army.mil/Missions/Regulatory/Jurisdiction/Navigable-Waters-of-the-US/

Wetland vegetation demonstrated to be present solely due to irrigation – None

Natural wetlands/waters that appear to be isolated – Wetland W4 (0.021 acre) is the result of a culvert under the road that originates at a spring east of the highway. This wetland does not drain and does not appear to be connected to any wetlands or channels in the area.

Wetland W9 (0.003 acre) appears to be an isolated depression.

Dry washes DW4 (469 feet, 0.054 acre) and DW5 (220 feet, 0.025) also appear to be isolated.

Acreage of wetlands and waters

Wetlands Total – 1.112 acres

Seasonally wet meadow/emergent wetland (PEM) 1.112 acres.

Perennial Channels Total – 1949.2 linear feet, 0.524 acres.

Dry Washes Total – 977.2 linear feet, 0.113 acres.

1. INTRODUCTION

This wetland delineation was conducted for the Utah Department of Transportation (UDOT) Region 4 on a section of US 191 from the Colorado River to 400 North in Moab, Utah. The total project area is approximately 102.38 acres including the existing roadway. A location map is included as Sheet 1 in Appendix A. The purpose of this project is to delineate potentially jurisdictional wetlands and waters of the US as defined by Section 404 of the Clean Water Act (CWA).

The US Army Corps of Engineers (USACE) and the US Environmental Protection Agency (EPA) define wetlands as "areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Saturated soil conditions are further described as saturated to the surface at some time during the normal growing season."

2. SITE DESCRIPTION / EXISTING CONDITIONS

The region is primarily desert badlands, rock outcrops and sandy lowlands. Within the ROW the existing road and fill slopes account for the majority of the project area and the remaining majority of the area is desert habitat or landscaped area bordered by urban development. A few small wetlands and waterways are present which originate from springs in the rocky hillslopes east of the ROW. The elevation of the roadway is 4030 at the south end and 3985 at the north end. In places, the project area extends well outside of the roadway. On the east side where the project extends into the rocky hillslopes the highest elevation is 4100. On the west side the lowest elevation is 3970.

3. DELINEATION METHOD

This delineation was conducted according to the guidelines and procedures outlined in the US Army Corps of Engineers' *Wetland Delineation Manual*, (USACE, 1987), the *2008 Arid West Regional Supplement, (USACE, 2008)* and the *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, (USACE, 2008)*. The examination for wetlands was based on three parameters: vegetation, soils, and hydrologic features. At each data point, each of these parameters must exhibit wetland characteristics for that point to be within the wetland boundary.

Dominant vegetation species were identified at each data point. Percent cover for dominant species in each strata was noted based on visual estimation within a plot size representative of the data point. The sizes and shapes of plots can vary, as appropriate, to adapt to topography or other site conditions. Plots are typically a radius of 10 to 30 feet unless otherwise noted.

The 50/20 dominance test was used by combining dominant species across strata and applying the dominance test to the combined list. Dominants are the most abundant species that individually or collectively account for more than 50 percent of the total coverage of vegetation in the stratum, plus any other species that, by itself accounts for at least 20 percent of the total. If two or more dominant species are equal in coverage they are all considered to be dominants. Each species was assigned a rating as to wetland status according to the National Wetland Plant List: 2016 and Update of Wetland Ratings *(Lichvar, R.W. 2016)*. If more than 50 percent of the dominant plant species had a wetland indicator status (obligate [OBL], facultative wetland [FACW], or facultative [FAC]), the sample point met the criteria for wetland vegetation based on dominance. Each dominant species is treated equally. Thus, a plant community with seven dominant species across all strata would need at least four dominant species that are OBL, FACW, or FAC to be considered hydrophytic by this indicator.

If the vegetation dominance test failed to meet the criteria, but soil and hydrology criteria were met at the data point, then a test of prevalence of wetland vegetation was calculated. If this test met qualifying conditions (an end calculation equal to or less than three), the criteria for wetland vegetation was met based on prevalence and recorded on the data sheet. Data point locations and upland/wetland boundaries are presented on the Wetland Maps in Appendix A. Vegetation at each data point, along with the estimation of cover for each species, is listed on the data forms included in Appendix B.

Soils were examined for hydric characteristics by digging a hole to approximately 18 inches (or as necessary to evaluate soil characteristics relevant to hydric conditions). Soil moisture, texture and color were observed, and any evidence of high organic content, redoximorphic features/mottles, gleyed matrix or other hydric indicators were noted. Soils were moistened and compared to *Munsell Color Charts* (Macbeth, 1990) for determination of value, chroma and hue. If soil characteristics fit those described as hydric indicators in the *Field Indicators of Hydric Soils in the US, Version 8.1 (NRCS, 2017)* the criteria for hydric soils was met, and recorded on the data sheet.

Depth to groundwater and saturated soil within the data point soil pit were documented at the time of the field survey after waiting an appropriate time to allow groundwater to reach a static level. These two features were considered the most significant indicators of the hydrologic condition taking into account man-made and seasonal influences. If these features failed to indicate wetland hydrology (defined as seasonally or permanently saturated within the upper 12 inches) additional primary and secondary indicators were considered (sediment deposits, water marks, drainage patterns, etc.). If at least one primary, or two secondary, indicators were observed, the criteria for wetland hydrology was met and recorded on the data sheet.

Data points meeting all three parameters for classification as a wetland were mapped within the wetland boundary. The boundary line typically is positioned around areas with vegetation similar to the representative wetland data points. In some cases obvious and distinct changes in vegetation and/or topography are present and the wetland boundary follows these changes. In areas where these changes are not distinct, the wetland boundary is generally placed within an area where the plant species mix grades to a predominance of upland vegetation.

This wetland delineation will be provided to the USACE for their review and verification. Upon confirmation of the wetland delineation data the USACE will provide their concurrence with the estimate of potential waters of the US and a jurisdictional determination identifying all potentially jurisdictional waters of the US in the project area.

4. FIELD SURVEY RESULTS

Field work was conducted March 28-30, 2018. Data was recorded on Corps standard formatted data sheets included in Appendix B. The extent of wetlands and/or waters of the U.S. were determined based on broad observations of existing site conditions as well as specific vegetation, soils and hydrology data from specific upland and wetland areas. There are several separate wetlands/wetland complexes within the project area. Data point locations are shown on Wetland Survey Findings Maps (Sheets 3a – 3e) in Appendix A.

Four perennial waters cross the ROW within this project area. The source of these waters are hillside springs to the east of the ROW. Cattail *(Typha)* dominated wetlands have developed within three of these features. Figure 1 shows a typical cattail wetland (W8). One small wetland area (W4) is grass and sedge grown in at a road culvert outflow on the west side of the highway. The flow backs up into the ROW due to a stock watering trough (Figure 2).

One area in or near the ROW is forested with Fremont Cottonwoods with a grass understory and is the only wetland shown on the National Wetlands Inventory (NWI) Map (Figure 3). Two data points were dug (7, 7B) adjacent to surface water which is spreading out from the road culvert outflow. Due to apparent flushes of sediment and debris, the water flow pattern appears to change throughout this area of Fremont Cottonwoods, and never stays in one place long enough for development of wetland vegetation. The cottonwoods were obviously planted (standing in rows). Based on the data, this area does not meet the criteria for a wetland.

Two wetland areas (W5, W6) occur to the west of the project corridor. It is assumed that these may have historically been one larger wetland complex that has been divided by recent residential development and roads/driveways but are still connected via culverts, channels, and high ground water. Figure 4, taken from an adjoining property, shows the presence of hydrophytic vegetation. W6 is dominated by Reed Grass *(Phalaris)* which is present due to high groundwater providing saturated soil near the ground surface (Figure 5).

Figure 1 – Typical Cattail Dominated Wetland (W8)

Figure 2 – Wetland at Culvert Near Stock Watering Trough (W4)

Figure 3 – Forested Wetland (PSSA) on NWI Map

Figure 4 – Wetland Showing Hydrophytic Vegetation (facing west from data point 8C)

Figure 5 – Reed Grass Dominated Wetland (W6) (upland fringe in the background)

4.1. Vegetation

Due to dry desert conditions, vegetation cover in drylands often is thin leaving a majority of bare soil and rock. Wetlands are present due to perennial water sources, so in most cases wetland vegetation cover is thick. Wetland and dryland areas are generally distinctly different with regard to soil moisture and therefore, the plant communities are also distinctly different. The exception to this is at the farthest west edge of the project area where wetlands are present due to high groundwater, in which case some fringe uplands include FAC wetland species such as Salt Grass and Common Reed. Data point 8 is an example of this having these species but clearly lacking wetland hydrology.

Species most common in dry areas include Mexican Fireweed *(Bassia scoparia)* Cheatgrass *(Bromus tectorum)* Tansy Mustard *(Descurainia pinnata)* Herron's Bill *(Erodium cicutarium)* Prickly Russian Thistle *(Salsola tragus)* and Shadscale *(Atriplex confertifolia)*. Coastal Salt Grass *(Distichlis spicata)* Common Reed *(Phalaris arundinacea)* and Russian Olive *(Elaeagnus angustifolia)* are present in wetlands and uplands though Salt Grass and Reed are less robust in upland areas. By far the most common plants in wetlands are Cattail *(Typha)*. Other species in wetlands include Foxtail Barley *(Hordeum jubatum)* Torrey's Rush *(Juncus torreyi)* Narrow-Leaf-Willow *(Salix exigua)* and Freemont Cottonwood *(Populus fremontii)*. Common plant species are in Table 1.

Table 1
Common Plant Species and Wetland Indicator (2016 Arid West Plant List)

Scientific Name	Common Name	Indicator Status*
Wetland Species		
Bassia scoparia	Mexican Fireweed	FAC
Distichlis spicata	Coastal Salt Grass	FAC
Elaeagnus angustifolia	Russian Olive	FAC
Hordeum jubatum	Foxtail Barley	FAC
Juncus torreyi	Torrey's Rush	FACW
Phragmites australis	Common Reed	FACW
Salix exigua	Narrow-Leaf Willow	FACW
Symphyotrichum ericoides	White Heath American-Aster	FAC
Typha sp	Cattail	OBL
Dryland Species		
Agropyron cristatum	Crested Wheatgrass	NA
Atriplex confertifolia	Shadscale	NA
Bromus tectorum	Cheatgrass	NA
Cardaria draba	Whitetop	NA
Chrysothamnus nauseosus	Rubber Rabbitbrush	NA
Descurainia pinnata	Tansy Mustard	NA
Elyhordeum macounii	Foxtail Barley/Slender Wild Rye	FACU
Erodium cicutarium	Herron's Bill	NA
Populus fremontii	Fremont Cottonwood	NA
Salsola tragus	Prickly Russian-Thistle	FACU
Sisymbrium irio	London mustard	NA
Sporobolus cryptandrus	Sand Dropseed	FACU

* Wetland indicator status – National Wetland Plant List, 2016
OBL – plants that always occur in standing water or in saturated soil
FACW – plants that nearly always occur in areas of prolonged flooding or require standing water or saturate soils but may, on rare occasions, occur in non-wetlands
FAC – plants that occur in a variety of habitats, including wetland and mesic to xeric non-wetland habitats but often occur in standing water or saturated soils.
FACU – plants that typically occur in xeric or mesic non-wetland habitats but may frequently occur in standing water or saturated soils
UPL – plants that almost never occur in water or saturated soils
NA – not listed

4.2. Soils

Throughout the site soils are generally sandy loam or loamy sand to at least 12 inches. Subsoils have slightly more clay. In uplands soil color is reddish brown 5YR 3/4 or 4/4 both at the surface and in the subsoil. In wetlands the soil color is slightly darker 5YR 3/2 or 3/3. Some areas have organic masses or slight evidence of higher organic matter. Hydric soil indicators are not developed in wetlands and this is a common situation in arid environments particularly for moderately to very strongly alkaline soils. In cases of absent or poorly developed soil indicators in wet areas, problematic soils procedure was followed.

The Natural Resource Conservation Service (NRCS) classifies all of the east side of the highway as Rock Outcrop. The west side of the project area is mapped as Sheppard fine sand and Thoroughfare fine sandy loam along with Ustic Torrifluvents (which is a taxonomic class, not a series description). These soil series are described by NRCS below. Wetland soils within these series are inclusions which do not match the series descriptions with regard to soil moisture or color, though texture are similar. Upland soils were found to be similar to the NRCS descriptions.

Sheppard soils consist of very deep, somewhat excessively drained soils that formed in eolian material derived from sandstone. Sheppard soils are on structural benches, alluvial fans, dunes on structural benches, and terraces. Slopes range from 0 to 60 percent. Mean annual precipitation is about 9 inches and the mean annual air temperature is about 54 degrees F.

> TAXONOMIC CLASS: Mixed, mesic Typic Torripsamments
> TYPICAL PEDON: Sheppard fine sand - rangeland. (Colors are for dry soil unless otherwise noted.)
> C1--0 to 2 inches; reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6) moist; weak thick platy structure parting to single grain; soft, loose; few fine roots; many fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary. (0 to 2 inches thick)
> C2--2 to 12 inches; reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6) moist; single grain; soft, loose; few fine roots; many fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary. (9 to 16 inches thick)
> C3--12 to 60 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; single grain; soft, loose; few medium and fine roots; few coarse pores, many fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.4).

Thoroughfare soils have very friable granular calcareous A horizons and stratified calcareous fine sandy loam C horizons that lack continuous subhorizons of visible secondary calcium carbonate accumulation.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torrifluvents

TYPICAL PEDON: Thoroughfare fine sandy loam - grassland. (Colors are for dry soil unless otherwise noted.)

A1--0 to 4 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 4/4) moist; moderate fine granular structure; soft, very friable, nonplastic, nonsticky; calcareous; moderately alkaline (pH 8.4); clear smooth boundary. (2 to 8 inches thick)

C--4 to 60 inches; pink (5YR 7/4) fine sandy loam stratified with lenses of loam and loamy sand, light reddish brown (5YR 6/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; calcareous; moderately alkaline (pH 8.4).

RANGE IN CHARACTERISTICS: Depth to uniformly calcareous material ranges from 0 to 10 inches. Gypsum content of a majority of subhorizons in the control section ranges from 0 to 1.5 percent by weight. Exchangeable sodium ranges from 0 to 8 percent in a majority of subhorizons of the control section and in no subhorizon as much as 3 inches thick above a depth of 20 inches exceeds 8 percent. Conductivity ranges from 0 to 14 millimhos in most subhorizons of the control section and in no subhorizon as much as 3 inches thick above a depth of 20 inches exceeds 14 millimhos. Continuous subhorizons of genetically concentrated visible secondary calcium carbonate and/or sulfate do not occur above 40 inches, although some visible calcium carbonate and/or sulfate does occur as a natural feature of the parent material. The 10 to 40 inch control section is usually fine sandy loam stratified with coarser and finer textured materials and on a weighted average basis clay ranges from 5 to 18 percent, silt from 5 to 45 percent and sand from 45 to 82 percent with more than 35 percent being fine or coarser sand. Rock fragments range from 0 to 14 percent and dominantly range from 1/2 to 10 inches in diameter. A majority of subhorizons above 40 inches have hue of 5YR or yellower. The control section of some pedons contains few faint mottles not due to the segregation of lime with chroma of both matrix and mottles exceeding 2.

The A horizon has hue of 10YR through 2.5YR, value of 5 through 7 dry and 4 through 6 moist and chroma 1 through 6. It is mildly alkaline or moderately alkaline (1:5 dilution unbuffered organic dye).

The C horizon has hue of 7.5YR through 10R. It is moderately or strongly alkaline (1:5 dilution unbuffered organic dye). Calcium carbonate equivalent of the fine earth fraction ranges from less than 1 to about 14 percent.

4.3. Hydrology

Wetland hydrology, where present is generally obvious due to perennial water sources and distinct topographic and vegetation changes. Indicators of qualifying hydrology are minimal in dry washes versus non-qualifying runoff areas or erosion features. Sediment deposition was the most common indicator used to determine if a feature is a dry wash. Other typical indicators of flow such as water stained rocks, vegetative debris or change in vegetation are generally absent even in channels considered to qualify as a wash. Another factor is how well developed the channel is. Some erosion features are relatively short, don't connect to other downstream waterways or show evidence of changing location often. Some distinguishing features are illustrated below.

Figure 6 – Dry Detention Basin

Above Detention Basin (not mapped as a wash) Detention Basin (bare soil & upland veg.)

Sediment deposition in the basin shown above is minimal and does not cross the basin bottom, at least not recently enough to show. Data Point 3 documents upland vegetation in this basin.

The photograph below shows sediment deposition as well as a substantial structure constructed to handle heavy runoff. This is located at the confluence of two washes (DW2 & DW3). The wash containing the detention basin is by far the smaller drainage area. The other wash (DW1) is shown in Figure 8.

Figure 7 – Channel Mapped as Dry Wash Below Detention Basin

Figure 8 – Dry Wash with Willows (mapped as DW1)

Sometime in the past sediment was trapped in this wash long enough for willows to become well established. A new channel has scoured through the sediment causing dryer conditions in the sediment but the willows persist. Data Points 4 and 4B are at this location.

Figure 9 – Typical Features Not Mapped as Washes

Steep Unconsolidated Soil Erosion | No Channel Below this Flat Area

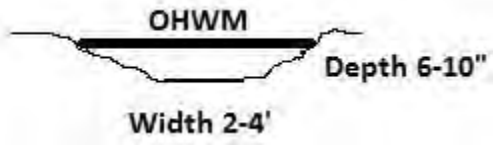
Figure 10 – Features Mapped as Dry Washes

Vegetation is bent downstream, patches of sediment & channels continue downstream.

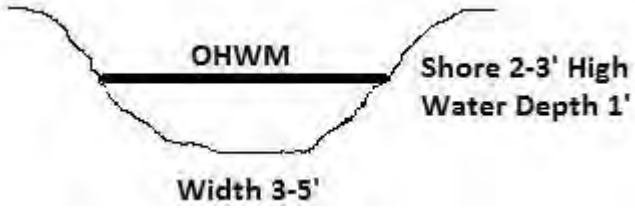
The wash on the left (wash DW4) has a small patch of water and wetland vegetation just above the project area. There are several poorly defined segments of wash or erosion features in this area and this one has recently been diked on the left side of it which is one reason it was mapped as the current channel. On the right, wash DW5 has a well developed channel evident in the aerial photograph. However, debris has changed the route of flow and several small erosion pathways have formed south of the old channel. These end at a flat shelf area with no evidence of flow downslope.

Perennial channels within the project area are described in detail as follows. Ordinary High Water Mark (OHWM) forms are included in Appendix B.

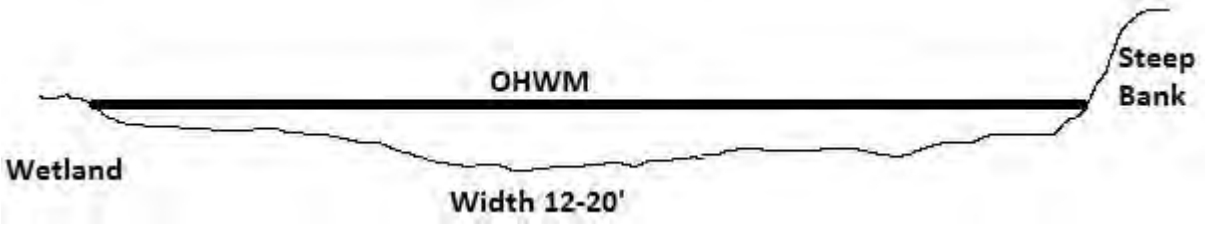
Channel PC1 is 2-4 feet wide with a fringe of cottonwoods and herbaceous wetland vegetation 12-15 feet wide. Therefore, this feature is shown within the wetland. Surface water flows from a pipe which reportedly originates not from the adjacent wetland but from a spring-fed pond on private land east of the highway and 1300 feet to the south.



Channel PC2 also is piped into the ROW from private land to the east. This feature is a ditch 3-5 feet wide and has recently been dredged on the north half. Data point 5b is on the south half which contains some cattails but is primarily open water. Given this segment has flowing water and will likely also be cleaned intermittently, the entire feature is classified a ditch.



Channel PC3 is an excavated open water feature primarily 12-20 feet wide. The source of this water is high groundwater supplemented by water piped from an off-site location and passing through the ditch at W6. The east bank of this feature is at least 5 feet above the elevation of the water. The west bank is wetland adjacent to the Mathers Wetland Preserve.



Channel segments PC4 through PC6 are all one feature connected by culverts. This channel is generally 2-5 feet wide and flows from a spring-fed ornamental pond (Figure 11). The pond outflow is piped for a distance of about 70 feet and discharges approximately 15 feet above the ground surface (Figure 12).

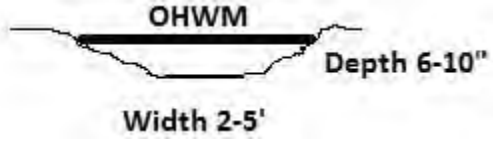


Figure 11 – Spring-fed Ornamental Pond

Figure 12 – Discharge Pipe from Ornamental Pond

5. CONCLUSIONS

Based on data collected March 28-30 the following conclusions are made concerning wetlands and waters within the project area:

Wetland boundary justification – Wetland hydrology, where present is generally obvious due to perennial water sources and distinct topographic changes. Indicators of qualifying hydrology are minimal in dry washes versus non-qualifying runoff channels or erosion features.

Interstate and Foreign Commerce – No evidence of interstate or foreign commerce associated with these delineated waters of the United States, including wetlands, was found.

Wetland vegetation demonstrated to be present solely due to irrigation – None

Natural wetlands/waters that appear to be isolated – Wetland W4 (0.021 acre) is the result a culvert under the road that originates at a spring east of the highway. This wetland does not drain and does not appear to be connected to any wetlands or channels in the area.

Wetland W9 (0.003 acre) appears to be an isolated depression.

Dry washes DW4 (469 feet, 0.054 acre) and DW5 (220 feet, 0.025) also appear to be isolated.

Acreage of wetlands and waters – See Table 2

Table 2 – Wetlands Classification and Acreage				
ID	**Cowardin**	**Acreage**	**Lat**	**Long**
W1	PEM	0.371	38.5952	-109.5686
W2	PEM	0.034	38.5956	-109.5685
W3	PEM	0.006	38.5954	-109.5684
W4	PEM	0.021	38.5924	-109.5648
W5	PEM	0.531	38.5893	-109.5697
W6	PEM	0.023	38.5886	-109.5685
W7	PEM	0.020	38.5838	-109.5549
W8	PEM	0.101	38.5883	-109.5538
W9	PEM	0.003	38.5838	-109.5513
Total PEM		**1.112**		

Table 2b - Open Water Classification, Length, and Acreage			
ID	**Water Feature Name**	**Linear Feet**	**Acreage**
PC1	Unnamed Stream	368	0.025
PC2	Unnamed Stream	428	0.039
PC3	Unnamed Stream	714	0.424
PC4	Unnamed Stream	46	0.004
PC5	Unnamed Stream	124	0.010
PC6	Unnamed Stream	269	0.022
Total Channel Length		**1949**	**0.524**

Table 2c – Dry Washes and Length			
ID	**Water Feature Name**	**Linear Feet**	**Acreage**
DW1	Unnamed Stream	92	0.011
DW2	Unnamed Stream	76	0.009
DW3	Unnamed Stream	120	0.014
DW4	Unnamed Stream	469	0.054
DW5	Unnamed Stream	220	0.025
Total Channel Length		**977**	**0.113**

6. REFERENCES

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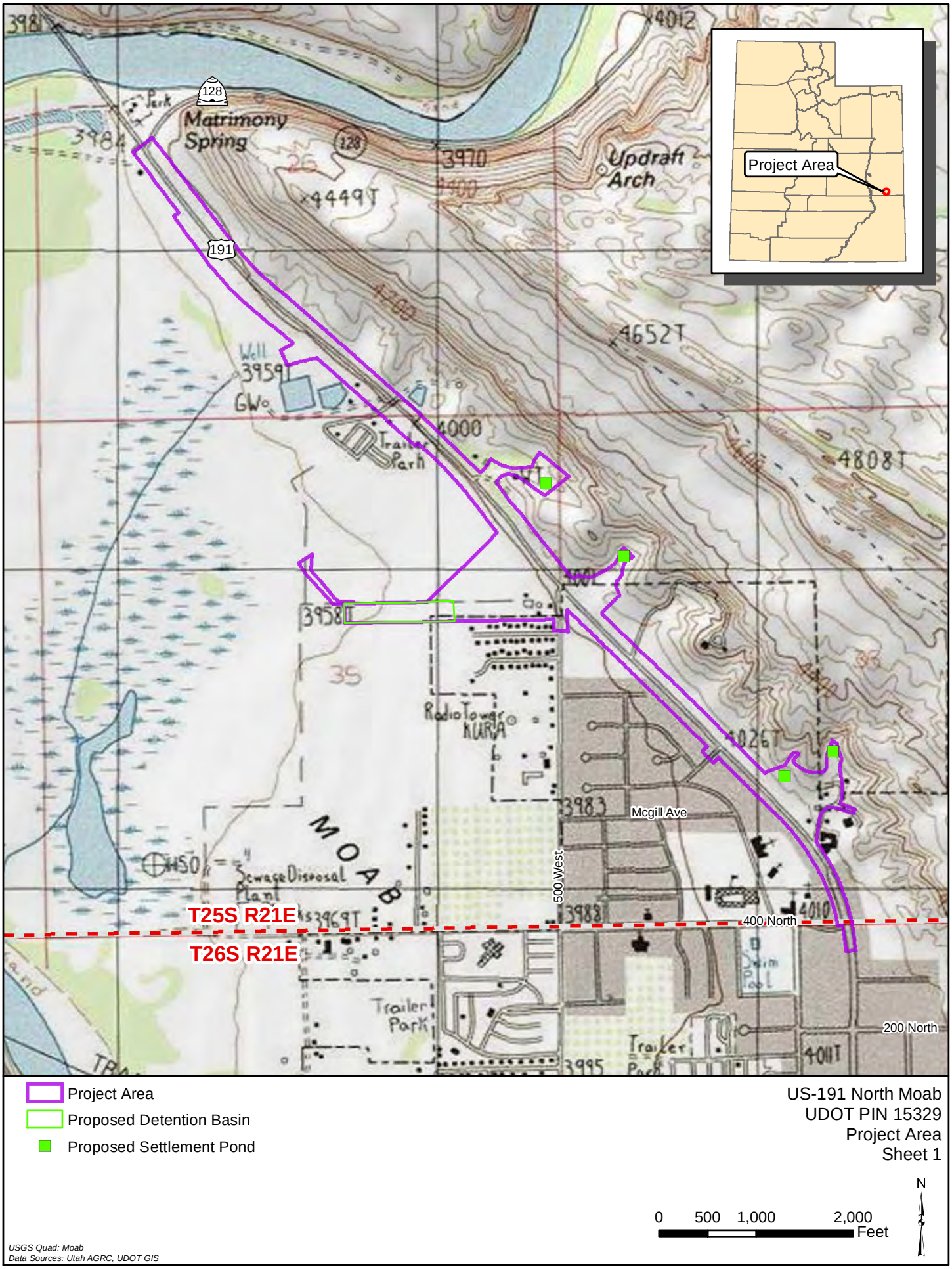
Appendix A

Maps



Project Area
Proposed Detention Basin
Proposed Settlement Pond

US-191 North Moab
UDOT PIN 15329
Project Area
Sheet 1

0 500 1,000 2,000 Feet

N

USGS Quad: Moab
Data Sources: Utah AGRC, UDOT GIS

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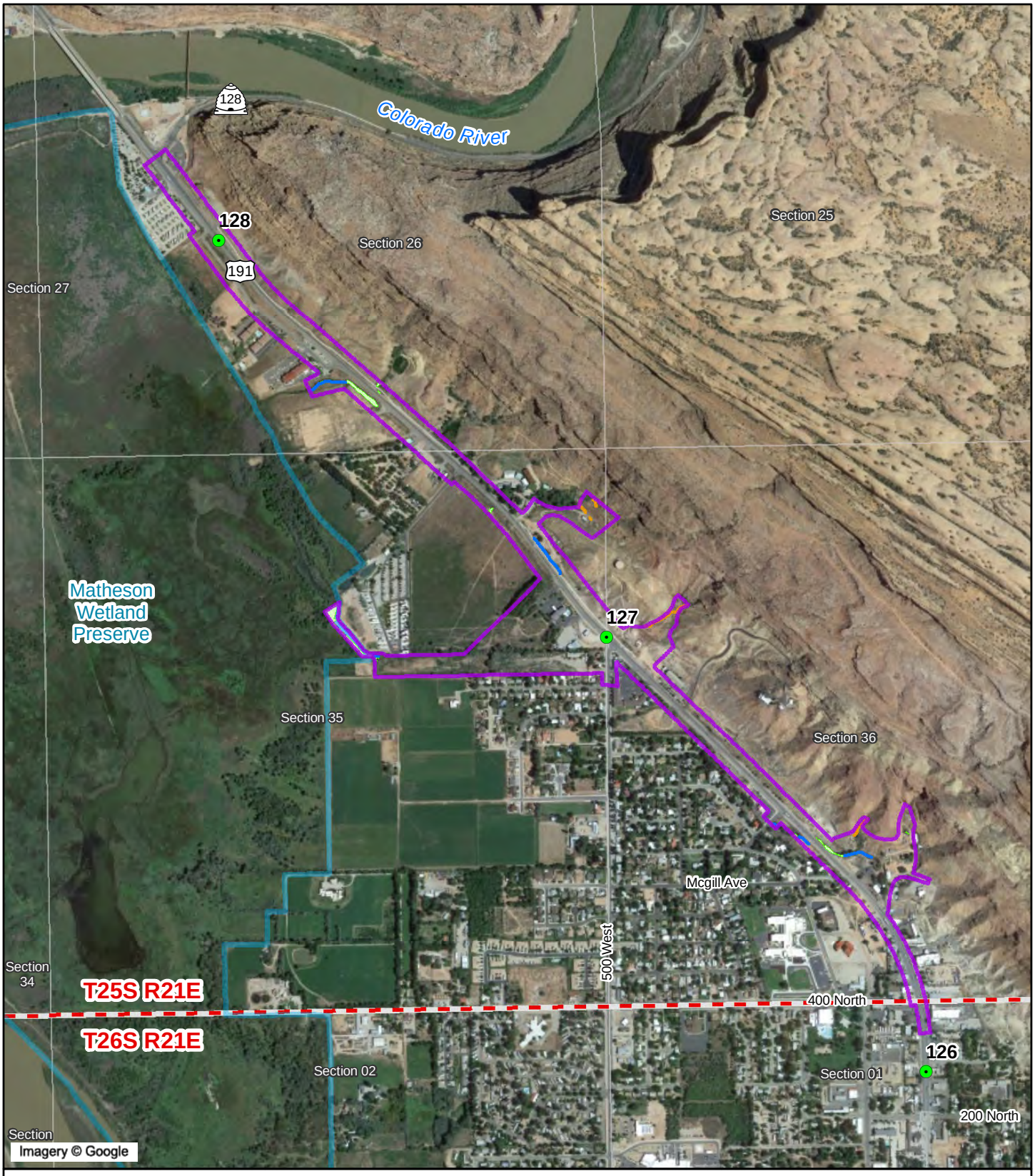

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- Milepost
- Project Area
- Matheson Wetland Preserve
- Perennial Channel
- Dry Wash
- Wetland
- Open Water/Channel

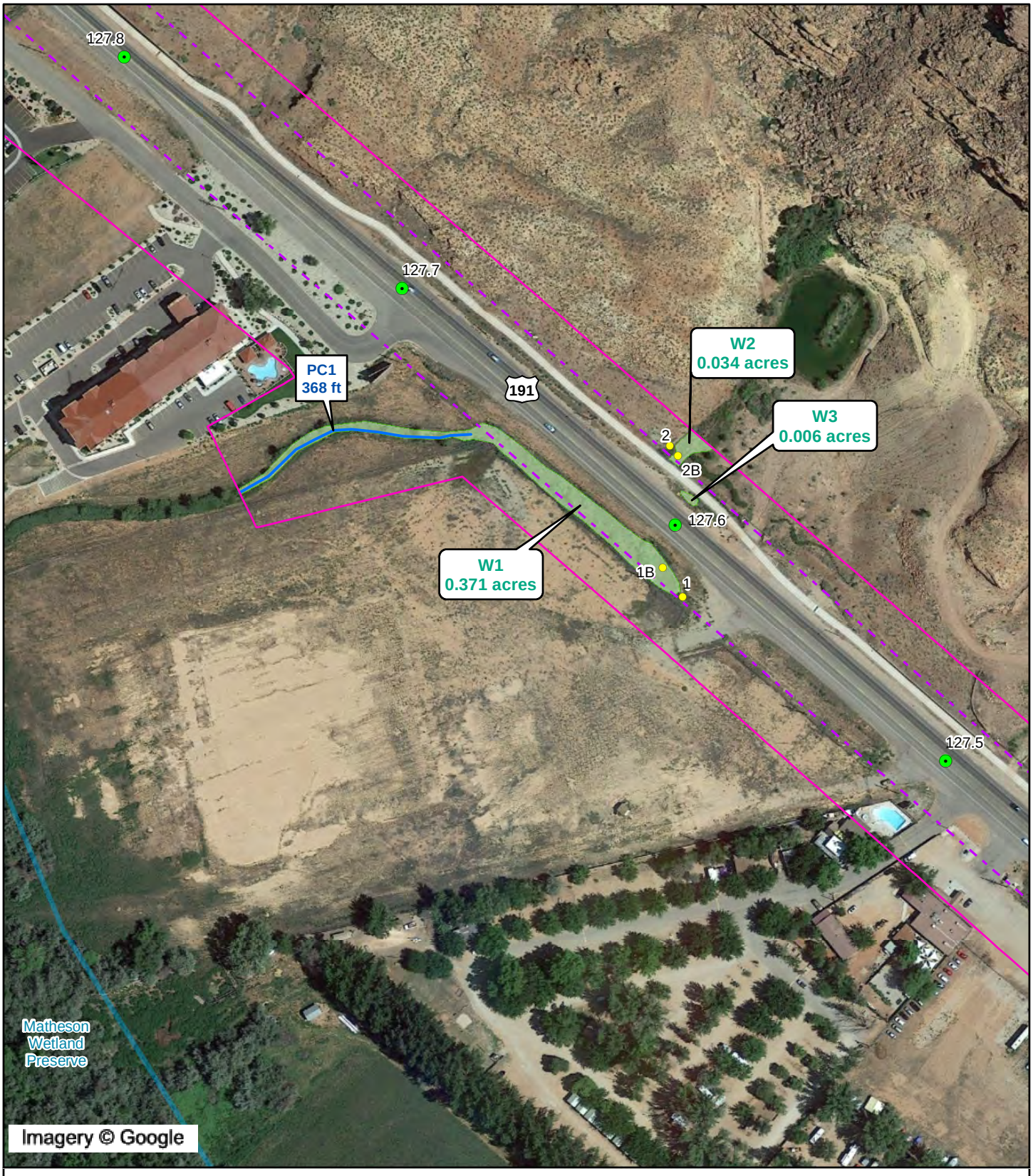
Project is within Salt Lake Base and Range
Data Sources: Utah AGRC, UDOT GIS

Total Project Length: 2.06 miles
Total Project Area: 102.38 acres
Total Wetlands: 1.11 acres
Total Open Water: 1,949 feet; 0.52 acres

0 500 1,000 2,000 Feet

N

US-191 North Moab
UDOT PIN 15329
Project Overview
Sheet 2



Data Point
Tenth_Mileposts
UDOT ROW
Project Area
Perennial Channel
Dry Wash
Wetland
Open Water/Channel
Matheson Wetland Preserve

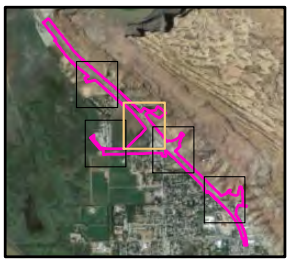
US-191 North Moab
Wetland Survey Findings
Sheet 3a

Map created on 8/14/2018 by:

AECOM
756 E Winchester St
Salt Lake City, UT 84107
801-904-4000

0 50 100 200 Feet
1 inch = 200 feet

N



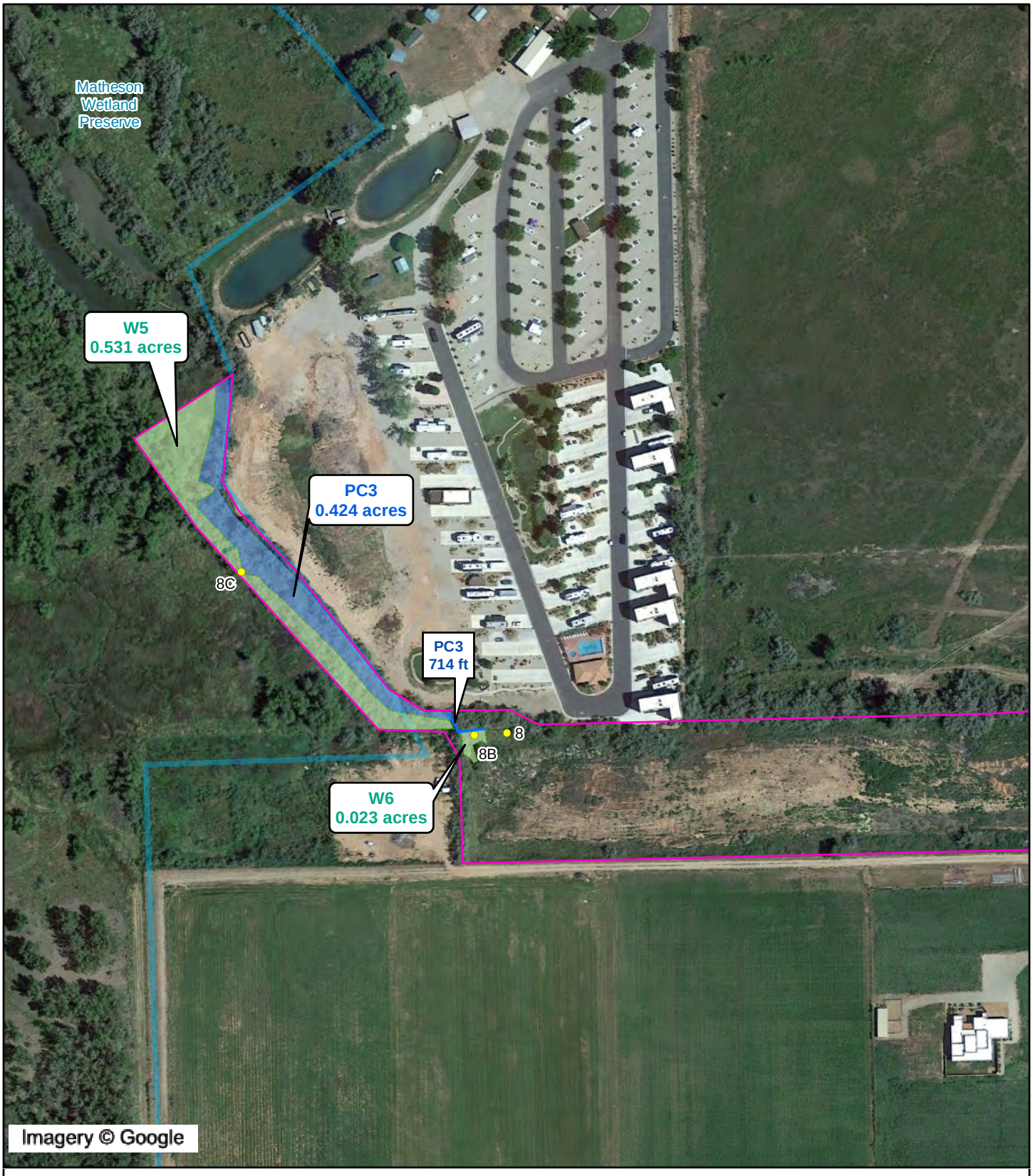
Data Point
Tenth_Mileposts
UDOT ROW
Project Area
Perennial Channel
Dry Wash
Wetland
Open Water/Channel

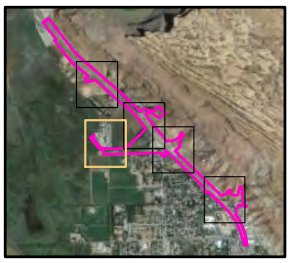
US-191 North Moab
Wetland Survey Findings
Sheet 3b

Map created on 8/14/2018 by:
AECOM
756 E Winchester St
Salt Lake City, UT 84107
801-904-4000

0 50 100 200 Feet
1 inch = 200 feet

N





Data Point
Tenth_Mileposts
UDOT ROW
Project Area
Perennial Channel
Dry Wash
Wetland
Open Water/Channel
Matheson Wetland Preserve

US-191 North Moab
Wetland Survey Findings
Sheet 3c

Map created on 8/14/2018 by:

AECOM
756 E Winchester St
Salt Lake City, UT 84107
801-904-4000

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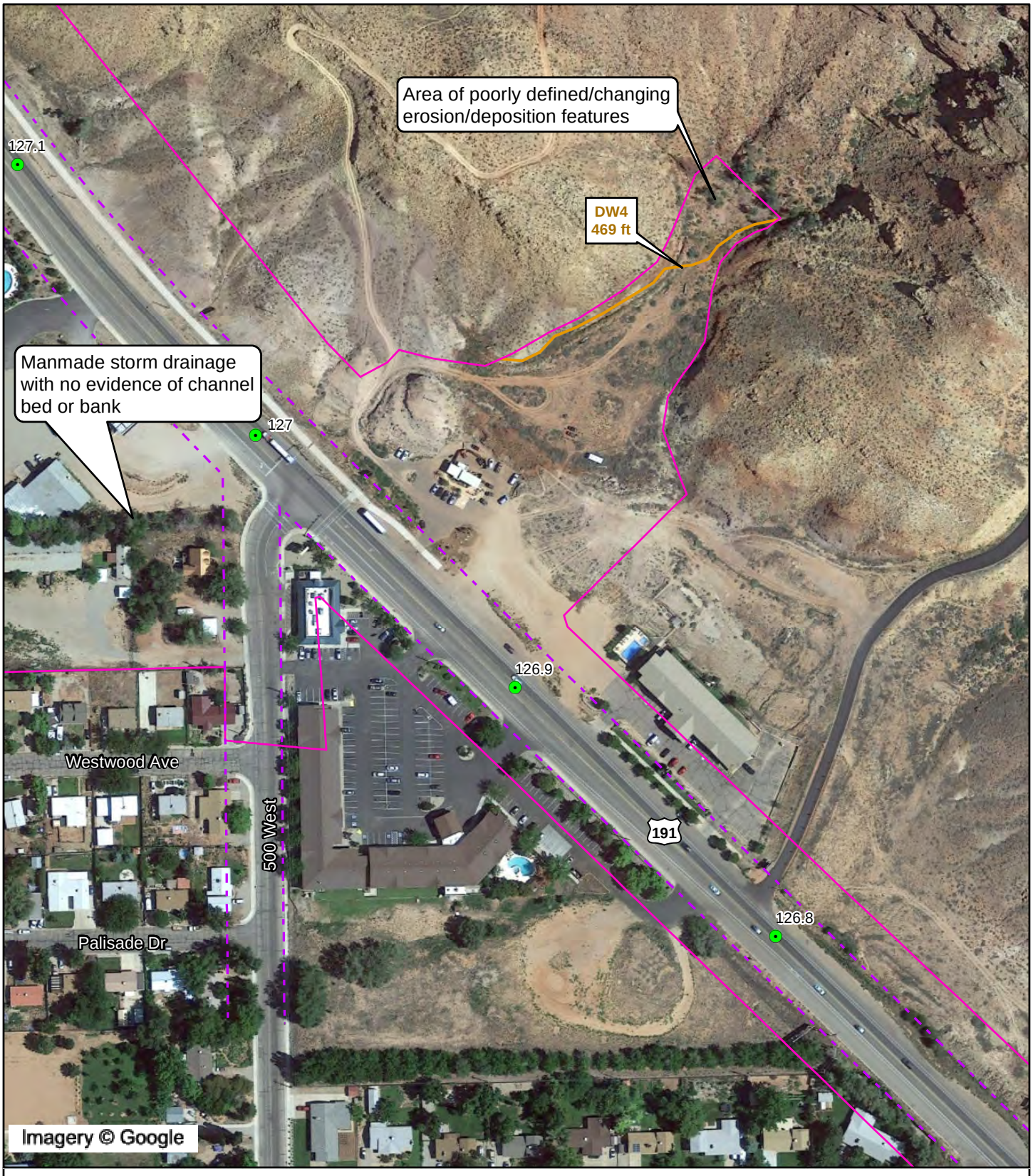
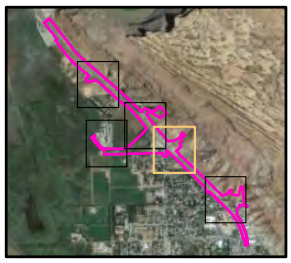
1 inch = 200 feet

N





Data Point
Tenth_Mileposts
UDOT ROW
Project Area
Perennial Channel
Dry Wash
Wetland
Open Water/Channel

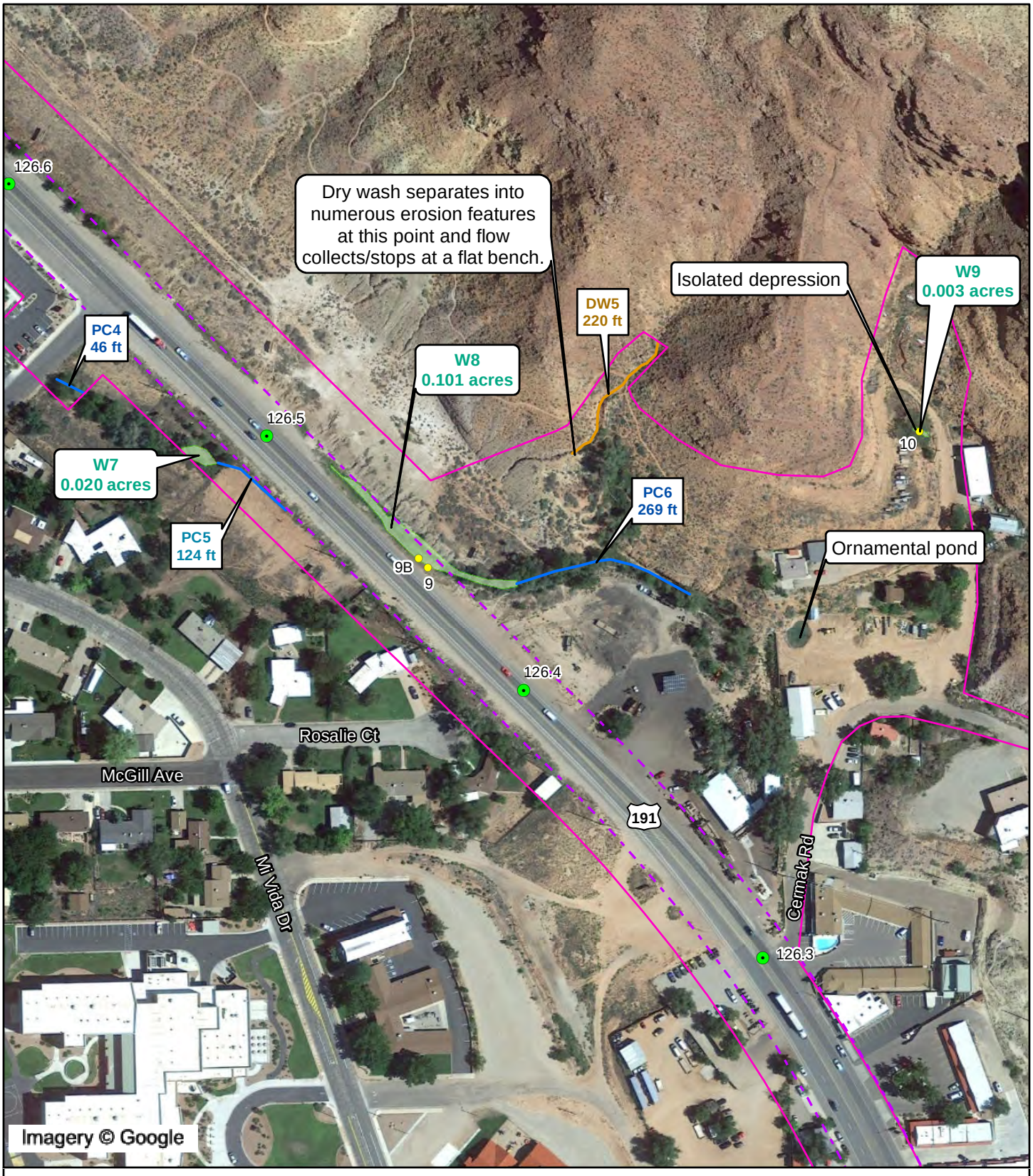
US-191 North Moab
Wetland Survey Findings
Sheet 3d

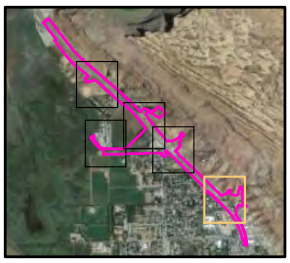
Map created on 8/14/2018 by:

AECOM
756 E Winchester St
Salt Lake City, UT 84107
801-904-4000

0 50 100 200 Feet
1 inch = 200 feet

N





Data Point
Tenth_Mileposts
UDOT ROW
Project Area
Perennial Channel
Dry Wash
Wetland
Open Water/Channel

US-191 North Moab
Wetland Survey Findings
Sheet 3e

Map created on 8/14/2018 by:
AECOM
756 E Winchester St
Salt Lake City, UT 84107
801-904-4000

0 50 100 200 Feet
1 inch = 200 feet

N

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- Milepost
- Project Area
- Perennial Channel
- Dry Wash
- Wetland
- Open Water/Channel

NWI Wetlands*

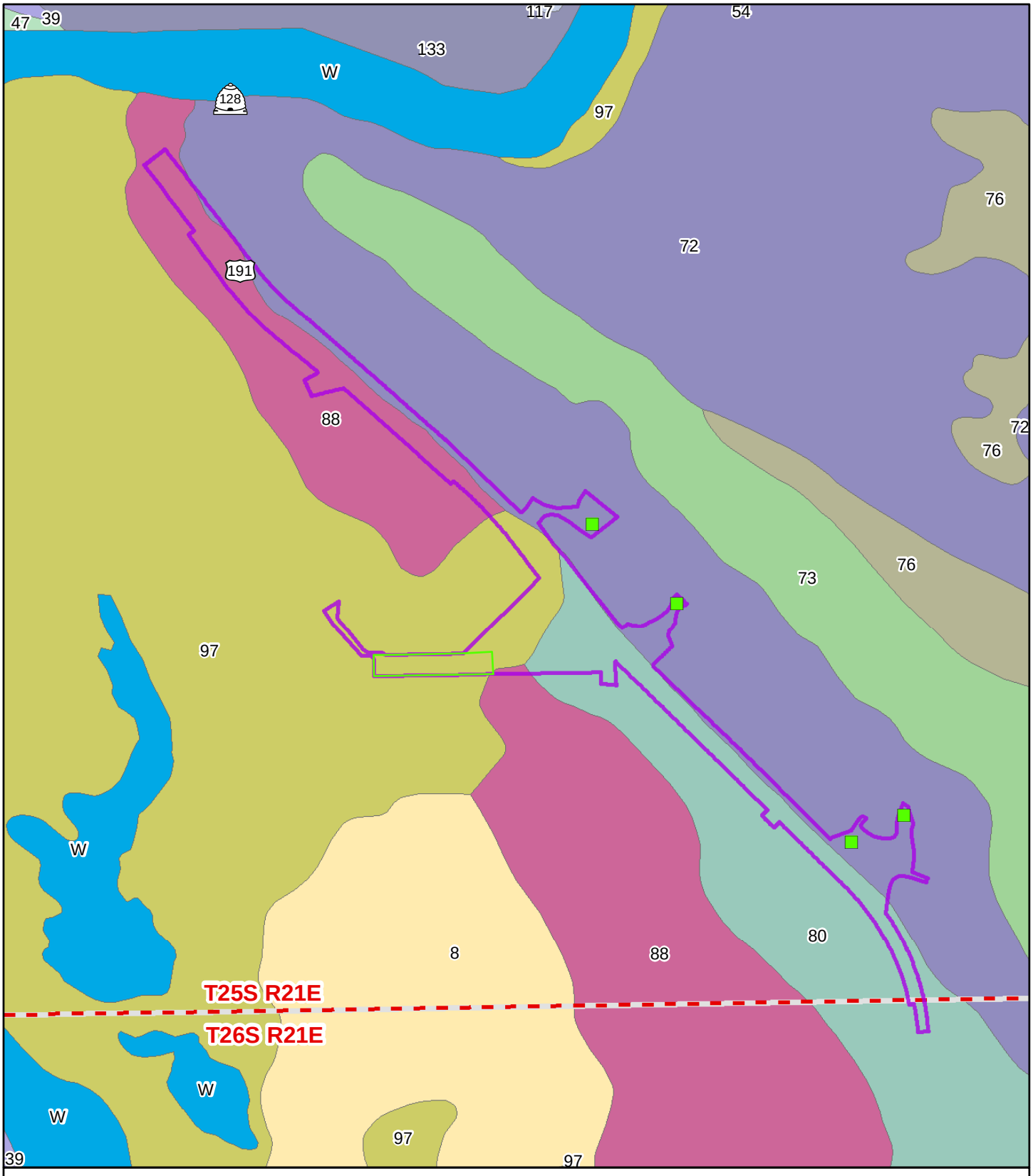
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

US-191 North Moab
UDOT PIN 15329
NWI Wetlands
Sheet 4

N

0 500 1,000 2,000 Feet

Project is within Salt Lake Base and Range
Data Sources: Utah AGRC, UDOT GIS



Project Area

Proposed Detention Basin

Proposed Settlement Pond

Soils

- 8 Begay fine sandy loam, moist, 2% to 6% slopes
- 133 Chedeski family, 15% to 60% slopes
- 54 Moab very cobbly fine sandy loam, 3% to 30% slopes
- 39 Myton family-Rock outcrop complex
- 47 Redbank-Flatnose families association
- 72 Rock outcrop
- 117 Rock outcrop-Arches complex, 2% to 15% slopes
- 73 Rock outcrop-Moenkopie complex, 3% to 15% slopes
- 76 Rock outcrop-Ustic Torripsamments complex, 2% to 15% slopes
- 80 Sheppard fine sand, 2% to 8% slopes
- 88 Thoroughfare fine sandy loam, 2% to 8% slopes
- 97 Ustic Torrifluvents-Ustic Torrifluvents, sodic-Typic Ustifluvents complex, 0% to 6% slopes
- W Water

0 500 1,000 2,000 Feet

N

US-191 North Moab
UDOT PIN 15329
Soils
Sheet 5

USGS Quad: Moab
Data Sources: Utah AGRC, UDOT GIS, NRCS

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Appendix B

Data Forms

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 1

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 26 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5950 Long: -109.5685 Datum: WGS84

Soil Map Unit Name: 88-Thoroughfare Fine Sandy Loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus tectorum	30	yes	NA
2. Sporobolus cryptandrus	20	yes	FACU
3. Bassia scoparia	10	no	FAC
4. Salsola tragus	10	no	FACU
5.			
6.			
7.			
8.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species 10	x 3 =	30
FACU species 30	x 4 =	120
UPL species 30	x 5 =	150
Column Totals: 70 (A)		300 (B)

Prevalence Index = B/A = 4.29

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	2.5YR 3/4						LS	Cobbly at 16 inches

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Dry hole

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 1b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 26 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5952 Long: -109.5686 Datum: WGS84

Soil Map Unit Name: 88-Thoroughfare Fine Sandy Loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No _____ Hydric Soil Present? Yes X No _____ Wetland Hydrology Present? Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix Exigua	20	yes	FACW
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha sp	60	yes	OBL
2. Juncus torreyi	20	yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks:

SOIL

Sampling Point: 1b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	5YR 3/3	90					LS	
	5YR 3/2	10					SCL	few organic masses

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Soil indicators are marginal/poorly developed. As noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Thoroughfare soil series pH is >8 throughout the soil profile. Hydric based on few organic masses and mixed matrix having a darker (chroma 2) color.

Note: Nearby land owner indicated this wet area developed or expanded after land use to the east changed a few years back allowing more water flow or overflow from a spring on the property. A relatively new wetland would account for lack of hydric soil indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): <12

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soil is moist at the surface, saturated in upper 12 inches. Hydrology is sufficient to be supporting OBL and FACW vegetation.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 2

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 26 T25S R21E

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): 5+

Subregion (LRR): Arid West LLR-D Lat: 38.5956 Long: -109.5686 Datum: WGS84

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes _____ No X**
Hydric Soil Present?	Yes _____ No X	
Wetland Hydrology Present?	Yes _____ No X	

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Atriplex confertifolia	20	yes	NA
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus tectorum	5	yes	NA
2. Erodium cicutarium	5	yes	NA
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 70 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes _____ No X**

Remarks: Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	2.5YR 3/4						SL	cobbly
14-16	2.5YR 4/3						LS	cobbly

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Very dry hole

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 2b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 26 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): Arid West LLR-D Lat: 38.5956 Long: -109.5685 Datum: WGS84

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No _____ Hydric Soil Present? Yes X No _____ Wetland Hydrology Present? Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha sp	80	yes	OBL
2. Symphyotrichum ericoides	20	yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks:

SOIL

Sampling Point: 2b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	5YR 3/2	80					SCL	cobbly beginning at 8 inches
	5YR 3/3	20					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Soil indicators are marginal/poorly developed. .As noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Thoroughfare soil series pH is >8 throughout the soil profile. Hydric based on mixed matrix having a darker (chroma 2) color.

Note: Nearby land owner indicated this wet area developed or expanded after land use to the east changed a few years back allowing more water flow or overflow from a spring on the property. A relatively new wetland would account for lack of hydric soil indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): <12

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soil is moist at the surface, saturated in upper 12 inches. Hydrology is sufficient to be supporting OBL vegetation.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 3

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5919 Long: -109.5614 Datum: WGS84

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: This is a dry, man-made detention basin and sparse vegetation is composed of dryland species.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Salsola tragus	20	yes	FACU
2. Descurainia pinnata	20	yes	NA
3. Cardaria draba	10	no	NA
4. Sporobolus cryptandrus	10	no	FACU
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	2.5YR 3/4						S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Very dry

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 4

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 3-5

Subregion (LRR): Arid West LLR-D Lat: 38.5926 Long: -109.5615 Datum: WGS84

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No X Hydric Soil Present? Yes _____ No X Wetland Hydrology Present? Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Shrub 8' tall (too early to identify)	20	no	NA*
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus tectorum	10	yes	NA
2. Descurainia pinnata	10	yes	NA
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: *This plant has been observed only in dry areas.

Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	2.5YR 3/4						S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 4b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 3-5

Subregion (LRR): Arid West LLR-D Lat: 38.5926 Long: -109.5616 Datum: WGS84

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X*	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** **X***
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: *The only indicator of wetland is the presence of willows and they are in poor condition. Soil is sand deposition and therefore lacking established hydric indicators. Given the desert environment, intermittent wetland hydrology is assumed to have once been present sufficiently for support of the willows. However, some of the sediment deposition has washed out creating a down cut channel that no longer provides potentially qualifying wetland hydrology.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Salix exigua	90	yes	FACW
2. Phragmites australis	10	no	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species 100	x 2 = 200
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: 100 (A)	200 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks:

SOIL

Sampling Point: 4b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	2.5YR 2/4						S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- X Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Sediment deposition has washed out creating a down cut channel that no longer provides potentially qualifying wetland hydrology.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 5

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5908 Long: -109.5627 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No X Hydric Soil Present? Yes _____ No X Wetland Hydrology Present? Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** X

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Chrysothamnus nauseosus	5	yes	NA
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Herb (too early to identify)	20	yes	NA*
2. Bromus tectorum	20	yes	NA
3. Descurainia pinnata	10	no	NA
4. Bassia scoparia	10	no	FAC
5. Sporobolus cryptandrus	10	no	FACU
6. Erodium cicutarium	5	no	NA
7.			
8.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: *This plant has been observed only in dry areas.

Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	2.5YR 3/4						SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Dry hole

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 5b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5909 Long: -109.5628 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X*	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X***
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes X*	No _____	

Remarks: This is a ditch classified as open water, not wetland. The purpose of this data point is to document why it is classified as open water rather than emergent wetland based on minimal vegetative cover and the likelihood of ditch maintenance. Only the south half of this ditch has not been maintained recently and is partly vegetated primarily with Typha. The ditch will likely be maintained at intervals sufficient to keep the open water classification. The north half of this ditch has been recently cleaned and has no vegetation.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha sp	20	yes	OBL
2. Phalaris arundinacea	5	no	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	25 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X***

Remarks: This feature is a ditch with perennial flowing water. Vegetation only covers 25% of this feature and the remainder is open water. Therefore, it is classified as a ditch, not wetland.

SOIL

Sampling Point: 5b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	5YR 4/4						SL	
8-14	5YR 4/4							texture is primarily gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- X Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No _____ Depth (inches): 8

Water Table Present? Yes X No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Primarily open water

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 6

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): Arid West LLR-D Lat: 38.5924 Long: -109.5648 Datum: WGS84

Soil Map Unit Name: 88-Thoroughfare Fine Sandy Loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No X Hydric Soil Present? Yes _____ No X Wetland Hydrology Present? Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Herb (too early to identify)	30	yes	NA*
2. Bromus tectorum	30	yes	NA
3. Sporobolus cryptandrus	10	no	FACU
4. Bassia scoparia	10	no	FAC
5.			
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: *This plant has been observed only in dry areas.

Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	5YR 3/3						SL	
15-18	5YR 3/4						LS	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Dry hole

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 6b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 5

Subregion (LRR): Arid West LLR-D Lat: 38.5924 Long: -109.5648 Datum: WGS84

Soil Map Unit Name: 88-Thoroughfare Fine Sandy Loam NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X* No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks: This point likely has not been historically wet. Water exiting a culvert at this location is somewhat confined due to the presence of a stock watering trough adjacent to the ROW. A relatively new wet condition would not have developed hydric soil indicators.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	85	yes	FACW
2. Carex sp (too early to identify)	10	no	F-OBL
3. Symphyotrichum ericoides	5	no	FAC
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks:

SOIL

Sampling Point: 6b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	5YR 3/3						SL	
	5YR 3/4						SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X* No _____

Remarks: This wetland has developed due to a manmade influence. As such, it is too new for soil to have developed hydric characteristics. It is assumed to currently be under reduced conditions due to being saturated by adjacent perennial flow.

Also, as noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Thoroughfare soil series pH is >8 throughout the soil profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): <12

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This data point is about 2 feet from surface water flowing from a road culvert to the trough on the adjacent property to the west.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 7

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 3

Subregion (LRR): Arid West LLR-D Lat: 38.5903 Long: -109.5630 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: PSSA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus tectorum	60	yes	NA
2. Hordeum jubatum	20	yes	FAC
3. Bassia scoparia	10	no	FAC
4. Salsola tragus	5	no	FACU
5. Herb (too early to identify)	5	n0	NA*
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species 30	x 3 =	90
FACU species 5	x 4 =	20
UPL species	x 5 =	
Column Totals: 35 (A)		110 (B)

Prevalence Index = B/A = 3.14

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: * This plant has been observed only in dry areas.

Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	5YR 3/3						SL	
16-18	5YR 3/3	80					SL	
	2.5YR 4/4	20					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Dry hole

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 7b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 3

Subregion (LRR): Arid West LLR-D Lat: 38.5903 Long: -109.5631 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: PSSA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No X Hydric Soil Present? Yes _____ No X Wetland Hydrology Present? Yes _____ No X*	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**

Remarks: * See note in hydrology section

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus fremontii	30	yes	FAC
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Elyhordeum macounii*	70	yes	FACU
2. Chrysothamnus nauseosus	5	no	NA
3.			
4.			
5.			
6.			
7.			
8.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species 30	x 3 = 90
FACU species 70	x 4 = 280
UPL species 5	x 5 = 25
Column Totals: 105 (A)	395 (B)

Prevalence Index = B/A = 3.76

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: The dominant plant here is *Elyhordeum macounii* which is a cross between Elymus trachycaulus (FACU) and Hordeum jubatum (FAC). This cross is listed as FACU.

Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 7b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	5YR 4/3	40					SL	
	5YR 3/3	60					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _X_

Remarks: As with other wetland in this area, the water is discharged from a culvert in an area that was not historically natural wetland, so hydric soil indicators would not have time to develop. In this case there is not even the slightly darker soil color found at wetland data points.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
_X_ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
_X_ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _X_ Depth (inches): _____

Water Table Present? Yes _____ No _X_ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _X_ No _____ Depth (inches): _<12_

Wetland Hydrology Present? Yes _X*_ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This data point was dug adjacent to surface water which is spreading out from the road culvert outflow. Due to apparent flushes of sediment and debris, the water flow pattern appears to change throughout this area of Fremont Cottonwoods, and never stays in one place long enough for development of wetland vegetation. The cottonwoods were obviously planted (standing in rows).

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 8

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5885 Long: -109.5687 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks: Upland fringe near wetland supported by high groundwater. See comment sections below.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	50	yes	FACW
2. Distichlis spicata	30	yes	FAC
3. Bassia scoparia	20	yes	FAC
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: Bassia scoparia is commonly observed in uplands throughout the project area even though it has a FAC classification. Phalaris and Distichlis are present in fringes of both uplands and wetlands in some other parts of the project area, though they are less robust in uplands.

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/2						CL	
20-30	10YR 3/2						C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: This soil sample data is taken from an existing vertical wall of a dry ditch bank. The excavation is 30 inches deep with less than an inch of water in the bottom of it. A thick root layer has developed due to the presence of Phalaris, but the roots are not decomposed. In contrast, data point 8b shown as wetland has developed a fibric component in the root layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Saturation is more than 20 inches below the ground surface. The depth to water/saturation does not qualify as wetland hydrology, particularly given that this is spring season data and unlike other wetland data points, the hydrology source is groundwater, not surface flows, which even if currently dry are assumed to intermittently flow often enough to qualify where wetland vegetation is present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 8b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5886 Long: -109.5685 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No _____ Hydric Soil Present? Yes X No _____ Wetland Hydrology Present? Yes X No _____	**Is the Sampled Area within a Wetland? Yes X No _____**

Remarks: Fill for a path separates this wetland from data point 8. This west side of the path is lower ground and this wetland is within the edge of an expansive wetland complex to the northwest.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Elaeagnus angustifolia	10	yes	FAC
2.			
3.			
4.			
	10 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	80	yes	FACW
2. Symphyotrichum ericoides	20	yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: 8b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2						CL	Somewhat organic/fibric root layer
6-14	10YR 2/2						CL	
14-20	10YR 3/2						C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Root layer is thicker than at data point 8, somewhat fibric and soil is moist to the surface. It nearly qualifies as histic which is a significant soil development factor in an arid environment.

As noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Adjacent soil series, Thoroughfare and Sheppard soil series, have pH >8 throughout the soil profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): <12

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soil is moist to the surface and saturated within 12 inches. There is also groundwater at about 16 inches below the ground surface in the bottom of the ditch mapped on the north edge of this wetland. This ditch segment likely always contains some water in the bottom, though it had essentially no flow when observed. Wetland hydrology qualifies based on saturation near the ground surface well above the groundwater level. This high saturation is likely due to the clay soil texture which is unique to this lowland area compared to sandy soil found through most of the project area.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 8c

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 35 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5886 Long: -109.5685 Datum: WGS84

Soil Map Unit Name: 97- Ustic Torrifluvents-Ustic Torrifluvents, sodic-typic Ustifluvents complex NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No _____ Hydric Soil Present? Yes X No _____ Wetland Hydrology Present? Yes X No _____	**Is the Sampled Area within a Wetland? Yes X No _____**

Remarks: This point is within an obvious large wetland which is part of a wetland complex that continues to the west.

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Elaeagnus angustifolia	10	yes	FAC
2.			
3.			
4.			
	10 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	100	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: The Elaeagnus angustifolia follows the ditch bank which is slightly higher than the cattail wetland, possibly due to dredging or ditch construction many years ago.

SOIL

Sampling Point: 8c

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/2						CL	High organic content-fibric
7-10	10YR 4/2						C	Few organic masses

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: Fibric root layer, not quite thick enough to qualify as a histic epipedon. This is a significand hydric soil indicator in an arid environment.

As noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Adjacent soil series, Thoroughfare and Sheppard soil series, have pH >8 throughout the soil profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes X No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 9

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 36 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 3

Subregion (LRR): Arid West LLR-D Lat: 38.5833 Long: -109.5538 Datum: WGS84

Soil Map Unit Name: 80-Sheppard fine sand 2 to 8 percent slope NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No X Hydric Soil Present? Yes _____ No X Wetland Hydrology Present? Yes _____ No X	**Is the Sampled Area within a Wetland?** **Yes** _____ **No X**

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Agropyron cristatum	20	yes	NA
2. Distichlis spicata	20	yes	FAC
3. Bromus tectorum	10	no	NA
4. Hordeum jubatum	10	no	FAC
5. Salsola tragus	10	no	FACU
6. Sisymbrium irio	10	no	NA
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species 30	x 3 = 90
FACU species 10	x 4 = 40
UPL species 40	x 5 = 200
Column Totals: 80 (A)	330 (B)

Prevalence Index = B/A = 4.125

Hydrophytic Vegetation Indicators:

____ Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No X**

Remarks: Plant species not listed in the National Wetland Plant List (i.e., NA) will be considered UPL.

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	5YR 3/2	50					LS	
	5YR 3/4	50					LS	
15-18	5YR 4/4	70					SL	Few darker patches 5YR 4/2
	5YR 4/3	30					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks: The darker 4/2 patches below 15 inches could possibly be a sign of reduced soil conditions perhaps due to being near the edge of perennial wetland. However, the depth at which these occur do not qualify as a hydric soil indicator.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 9b

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 36 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): concave Slope (%): 3

Subregion (LRR): Arid West LLR-D Lat: 38.5883 Long: -109.5538 Datum: WGS84

Soil Map Unit Name: 80-Sheppard fine sand 2 to 8 percent slope NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** **Yes X No _____**
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha sp	60	yes	OBL
2. Distichlis spicata	30	yes	FAC
3. Symphyotrichum ericoides	10	no	FAC
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

____ Prevalence Index is ≤3.0[1]

____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No _____**

Remarks: Also trace of Juncus torreyi

SOIL

Sampling Point: 9b

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11	5YR 2/2						SCL	
11-16	5YR 4/4	70					SCL	
	5YR 3/2	30					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks: As at other locations in this project, the location of the water source may not be where it was originally naturally located. Also as noted in the Arid West Manual (chapter 5) Alkaline soils pH>7.9 can have poorly developed indicators. Shephard soil series pH is >8 throughout the soil profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes X No _____ Depth (inches): 5

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The source of water is a channel with perennial flow. Where it ponds at the roadside the water table is high outside of the surface water area.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: US-191 North Moab to Colorado Bridge F-0191(152)126 City/County: Moab/Grand Sampling Date: 3/29/2018

Applicant/Owner: Utah Department of Transportation (UDOT) Region 4 State: Utah Sampling Point: 10

Investigator(s): Harriet Natter/Jaime White Section, Township, Range: Section 36 T25S R21E

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): <3

Subregion (LRR): Arid West LLR-D Lat: 38.5838 Long: -109.5513 Datum:

Soil Map Unit Name: Rock Outcrop NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	**Is the Sampled Area within a Wetland?** **Yes X No**
Hydric Soil Present?	Yes X* No	
Wetland Hydrology Present?	Yes X No	

Remarks: This point is in a tiny depression/hole. A small seep at the base of a rock ledge keeps this hole moist. There is no outlet or evidence of any connected water feature downgradient nor above it. This hole is 148 square feet. The cattail in this feature have recently been burned but the extent of vegetative cover is still evident. This feature is surrounded primarily by rock and bare soil (obvious upland/no upland data point). A test hole was not dug due to thick layer of ash and debris from recent burn.

VEGETATION

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size:)			
1. Typha sp	60	yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X* No ___

Remarks: *Hole not dug due to thick layer of burned ash/organic material over sandy clay loam. Assumed hydric soil due to presence of surface saturation and Typha under present conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Small seep keeps this depression moist at the surface

Project: US 191 North Moab to Colorado River River
Project Number: F-0191(152)126
Stream: PC1-Unnamed
Investigator(s): Harriet Natter

Date: 3/29/2018 **Time:**
Town: Moab **State:** Utah
Photo begin file# **Photo end file#**

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates: 38.5957 -109.5698

Notes:

Brief site description:

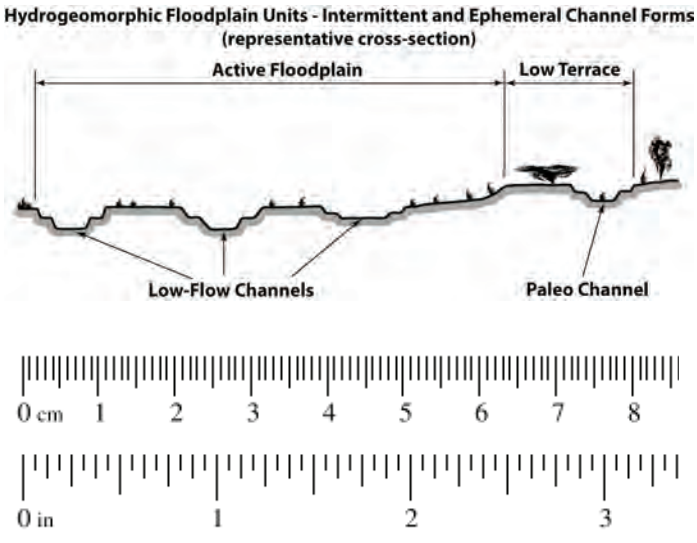
This is a man-made channel generally 2-4 feet wide (some places are slightly wider). Water depth 6-10 inches and flow appears to vary little. This channel is bordered by and supports wetland vegetation, primarily cottonwoods.

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [ ] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
- [ ] Clinometer / level
- [ ] History of recent effective discharges
- [ ] Results of flood frequency analysis
- [ ] Most recent shift-adjusted rating
- [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	Gravel
0.157	4	Pebble	Gravel
		Granule	Gravel
0.079	2.00		
0.039	1.00	Very coarse sand	Sand
0.020	0.50	Coarse sand	Sand
1/2 0.0098	0.25	Medium sand X	Sand
1/4 0.005	0.125	Fine sand	Sand
1/8 0.0025	0.0625	Very fine sand	Sand
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	Silt
1/128 0.00015	0.0039	Very fine silt	Silt
		Clay	Mud



☒ **Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**

☒ **Locate the low-flow channel (lowest part of the channel). Record observations.**

Characteristics of the low-flow channel:

Average sediment texture: Sand

Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☒ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: _____

Other: ☐ _____
☐ _____
☐ _____
☐ _____

☒ **Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.**

Characteristics used to delineate the low-flow/active floodplain boundary:

☐ Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb
☐ Change in overall vegetation maturity
☐ Change in dominant species present
☐ Other ☒ Presence of bed and bank
☐ Drift and/or debris
☐ Other: _____
☐ Other: _____

☐ **Continue walking the channel cross-section. Record observations below.**

Characteristics of the active floodplain:

Average sediment texture: sand

Total veg cover: 80 % Tree: 80 % Shrub: _____% Herb: _____%

Community successional stage:

☐ NA ☒ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: Populus fremontii

Other: ☐ _____
☐ _____
☐ _____
☐ _____

Project: US 191 North Moab to Colorado River River
Project Number: F-0191(152)126
Stream: PC2 Unnamed
Investigator(s): Harriet Natter

Date: 3/29/2018 **Time:**
Town: Moab **State:** Utah
Photo begin file# **Photo end file#**

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates: 38.5911 -109.5630

Notes:

Brief site description:

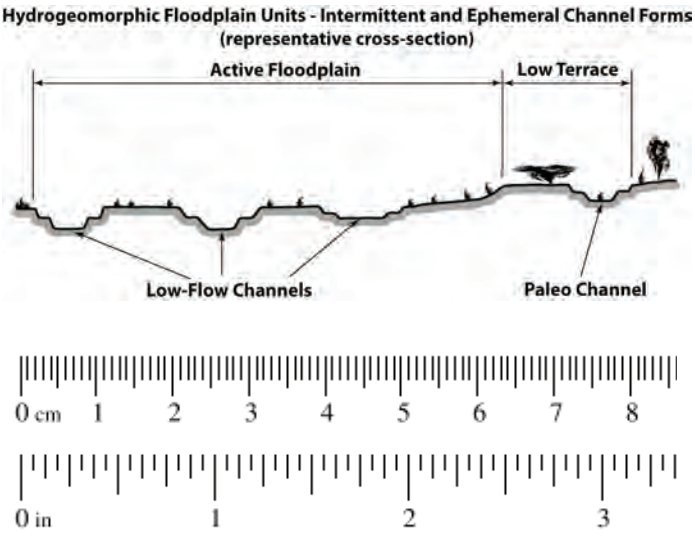
Ditch partially cleaned/excavated recently

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [ ] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
- [ ] Clinometer / level
- [ ] History of recent effective discharges
- [ ] Results of flood frequency analysis
- [ ] Most recent shift-adjusted rating
- [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	
2.56	64	Cobble	Gravel
0.157	4	Pebble	
		Granule	
0.079	2.00		
0.039	1.00	Very coarse sand	
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand X	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



☒ **Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**

☒ **Locate the low-flow channel (lowest part of the channel). Record observations.**

Characteristics of the low-flow channel:

Average sediment texture: Sand

Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☐ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: Typha only in the ditch section that has not been recently cleaned

Other: ☐ _____
☐ _____
☐ _____
☐ _____

☒ **Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.**

Characteristics used to delineate the low-flow/active floodplain boundary:

☒ Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb
☐ Change in overall vegetation maturity
☐ Change in dominant species present
☐ Other ☒ Presence of bed and bank
☐ Drift and/or debris
☐ Other: _____
☐ Other: _____

☐ **Continue walking the channel cross-section. Record observations below.**

Characteristics of the active floodplain:

Average sediment texture: sand

Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☒ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: _____

Other: ☐ This is a ditch with no floodplain
☐ _____
☐ _____
☐ _____

Project: US 191 North Moab to Colorado River River
Project Number: F-0191(152)126
Stream: PC3 Unnamed
Investigator(s): Harriet Natter

Date: 3/29/2018 **Time:**
Town: Moab **State:** Utah
Photo begin file# **Photo end file#**

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates: 38.5890 -109.5692

Notes:

Brief site description:

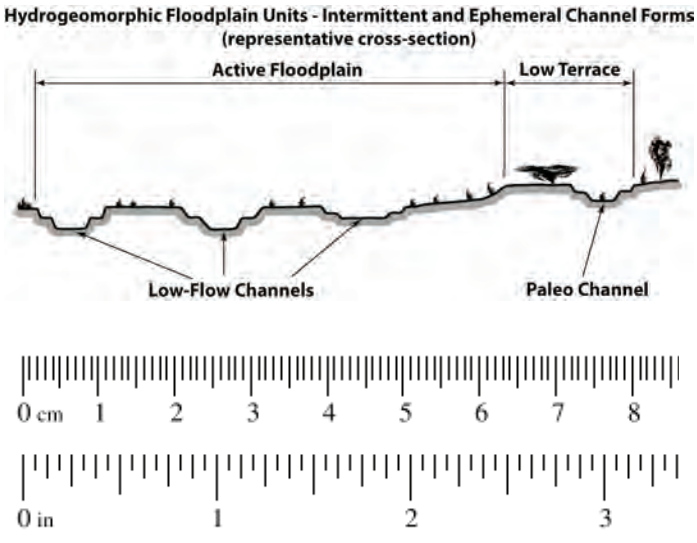
This is a broad reletively shallow channel, likely excavated or dredged, located in cattail dominated wetland. The east shore is fill at least 5 feet high.

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [ ] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
  Period of record:
- [ ] Clinometer / level
- [ ] History of recent effective discharges
- [ ] Results of flood frequency analysis
- [ ] Most recent shift-adjusted rating
- [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

The dominant Wentworth size class that imparts a characteristic texture to each zone of a channel cross-section is recorded in the average sediment texture field under the characteristics section for the zone of interest.

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	
2.56	64	Cobble	Gravel
0.157	4	Pebble	
		Granule	
0.079	2.00		
0.039	1.00	Very coarse sand	
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand X	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



☒ **Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**

☒ **Locate the low-flow channel (lowest part of the channel). Record observations.**

Characteristics of the low-flow channel:

Average sediment texture: Sand/Silt

Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☐ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: _____

_____

_____

Other: ☐ _____
☐ _____
☐ _____
☐ _____

☒ **Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.**

Characteristics used to delineate the low-flow/active floodplain boundary:

☐ Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb
☐ Change in overall vegetation maturity
☐ Change in dominant species present
☐ Other ☒ Presence of bed and bank
☐ Drift and/or debris
☐ Other: _____
☐ Other: _____

☐ **Continue walking the channel cross-section. Record observations below.**

Characteristics of the active floodplain:

Average sediment texture: sand/silt

Total veg cover: 80 % Tree: 80 % Shrub: _____% Herb: _____%

Community successional stage:

☐ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☒ Late (herbaceous, shrubs, mature trees)

Dominant species present: Elaeagnus angustifolia

Typha wetland to the west beyond shoreline fill

_____

Other: ☐ Natural channel but both shorelines confined by fill. High fill on the east and a 1-2 ft. low bank on the west
☐ _____
☐ _____
☐ _____

Project: US 191 North Moab to Colorado River River
Project Number: F-0191(152)126
Stream: PC4-PC6 Unnamed
Investigator(s): Harriet Natter

Date: 3/29/2018 **Time:**
Town: Moab **State:** Utah
Photo begin file# **Photo end file#**

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates: 38.5833 -109.5532

Notes:

Brief site description:

Perennial channel/ditch piped from a spring/ornamental pond. Width 2-5 feet, depth 6-10 inches
Cottonwoods line the east segment and patches of cattail are present in other areas.

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
  Scale:
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [ ] Global positioning system (GPS)
- [ ] Other studies
- [ ] Stream gage data
  Gage number:
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- [ ] Clinometer / level
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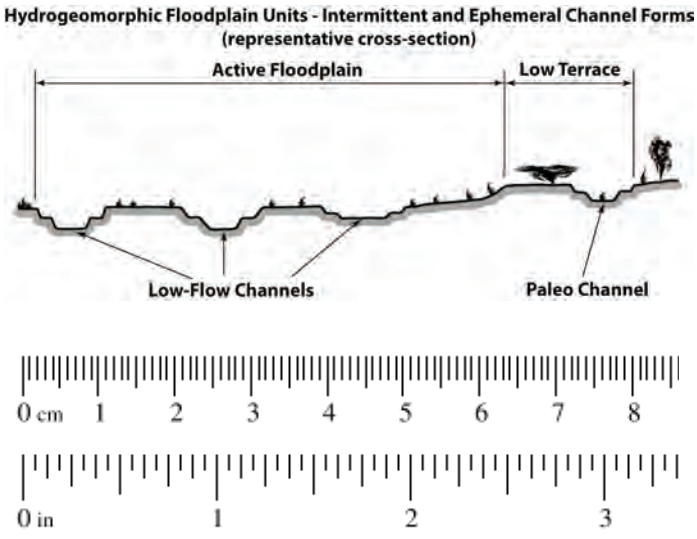
1/2 0.0098	0.25	Medium sand X	Sand
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	
1/32 0.00061	0.0156	Medium silt	Silt
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



☒ **Walk the channel and floodplain within the study area to get an impression of the vegetation and geomorphology present at the site. Record any potential anthropogenic influences on the channel system in "Notes" above.**

☒ **Locate the low-flow channel (lowest part of the channel). Record observations.**

Characteristics of the low-flow channel:

Average sediment texture: Sand

Total veg cover: _____ % Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☒ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Dominant species present: _____

Other: ☐ _____
☐ _____
☐ _____
☐ _____

☒ **Walk away from the low-flow channel along cross-section. Record characteristics of the low-flow/active floodplain boundary.**

Characteristics used to delineate the low-flow/active floodplain boundary:

☐ Change in total veg cover ☐ Tree ☐ Shrub ☐ Herb
☐ Change in overall vegetation maturity
☐ Change in dominant species present
☐ Other ☒ Presence of bed and bank
☐ Drift and/or debris
☐ Other: _____
☐ Other: _____

☐ **Continue walking the channel cross-section. Record observations below.**

Characteristics of the active floodplain:

Average sediment texture: sand

Total veg cover: 80 % Tree: 80 % Shrub: _____% Herb: _____%

Community successional stage:

☐ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☒ Late (herbaceous, shrubs, mature trees)

Dominant species present: Populus fremontii

Other: ☐ _____
☐ _____
☐ _____
☐ _____

Appendix D

Biological Assessment

BIOLOGICAL ASSESSMENT

US-191: North Moab to Colorado River Bridge
Project No. F-0191(152)126 PIN 15329
Moab, Grand County, Utah

November 29, 2018

Prepared for:
Utah Department of Transportation
Region 4
210 West 800 South
Richfield, Utah 84701

Prepared by:
AECOM
756 East Winchester Street, Suite 400
Salt Lake City, Utah 84107

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FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

The Utah Department of Transportation (UDOT) has initiated a re-evaluation of the 2007 Environmental Assessment (EA) for improvements to US-191 from 400 North in Moab to SR-279 (Colorado River Bridge Project EA). This re-evaluation was initiated to evaluate proposed improvements not included in the 2007 EA. These improvements include a new stormwater system, three sedimentation basins, a vegetated water quality swale, a sedimentation dropout channel, and several new outfalls. Actions previously completed under the 2007 EA include removal and replacement of the Colorado River Bridge and widening of the Lower Courthouse Wash structure. These actions, and all other previously completed project actions, were evaluated as part of the 2006 Biological Assessment (BA) (Baker 2006), in response to which the USFWS issued a Final Biological Opinion (USFWS 2006).

This BA has been prepared to evaluate potential effects (both beneficial and adverse) of new project components on federally listed species and designated critical habitats, in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA assures that, through consultation with USFWS, federal actions do not jeopardize the continued existence of any threatened, endangered, proposed, or candidate species, or result in the destruction or adverse modification of critical habitat (ESA §7(a)(2)). Conservation measures are identified in this BA to avoid or minimize any adverse project effects on listed species and their habitat.

2.0 PURPOSE AND NEED

As stated in the EA, the purpose of the US-191 Project is to meet the existing and projected travel demand and provide continuity with the existing four-lane sections at either end of the project limits, provide a bridge that accommodates US-191 traffic over the Colorado River and also meets current structural design standards, improve safety throughout the project corridor, and facilitate the movement of bicycle and pedestrian traffic along US-191. The proposed revisions included with the final segment do not change the original project concept or project purpose; therefore, the purpose of and need for the project remain valid.

The 2017 City of Moab Storm Water Master Plan identified existing storm water infrastructure in the vicinity of US-191 as not adequately capturing, conveying, or treating storm water runoff. The current US-191 project design addresses identified storm water infrastructure needs via inclusion of debris basins, a water quality swale, and discharge culverts designed to manage, treat, and convey stormwater runoff from the highway and adjacent hillslopes. The water quality swale would treat and convey stormwater runoff up to quantities expected during a 50 year storm event. After passing through the swale, stormwater would be discharged into an existing ditch and eventually into the Colorado River through a ½ mile interconnected system of channels, wetlands, ponds, and overland flow through the Matheson Wetland Preserve.

3.0 PROJECT AREA AND ACTION AREA

The proposed project is located within and just outside the city limits of Moab, Grant County, Utah (Figure 1). It encompasses portions of Sections 26, 35, and 36 of Township 25 South Range 21 East, and Section 1 of Township 26 South Range 21 East of the Great Salt Lake Base and Meridian. The “project area” includes all roadway improvements that would occur along US-191 between 400 North (MP 126.1) and SR-128 (MP 128.2), as well as the new stormwater system, three sedimentation basins, water quality swale, sediment drop out channel, and new outfalls that would be constructed (Figures 1 and 2). For the

purposes of this analysis, the “action area” includes the project area and includes a ½ mile radius buffer to account for potential noise effects to listed wildlife species from construction activities within the confines of the wetlands area. The action area also encompasses the adjacent 100-year floodplain of the Matheson Wetlands Preserve which includes all of the channels, ponds, wetlands, and overland flow areas where project stormwater could be conveyed downstream to the confluence with the Colorado River at approximately River Mile 970. The project site and action area do not include the Colorado River since no measurable water quality or water quantity changes are expected that would affect listed fish species or critical habitats in the river.

Project Area
Proposed Water Quality Swale
Action Area
Matheson Wetland Preserve

N
W E
S

0 1,000 2,000 4,000
Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 1
Project Area
Biological Assessment
US-191 MP 126.1 to 128.2
UDOT PIN 15329

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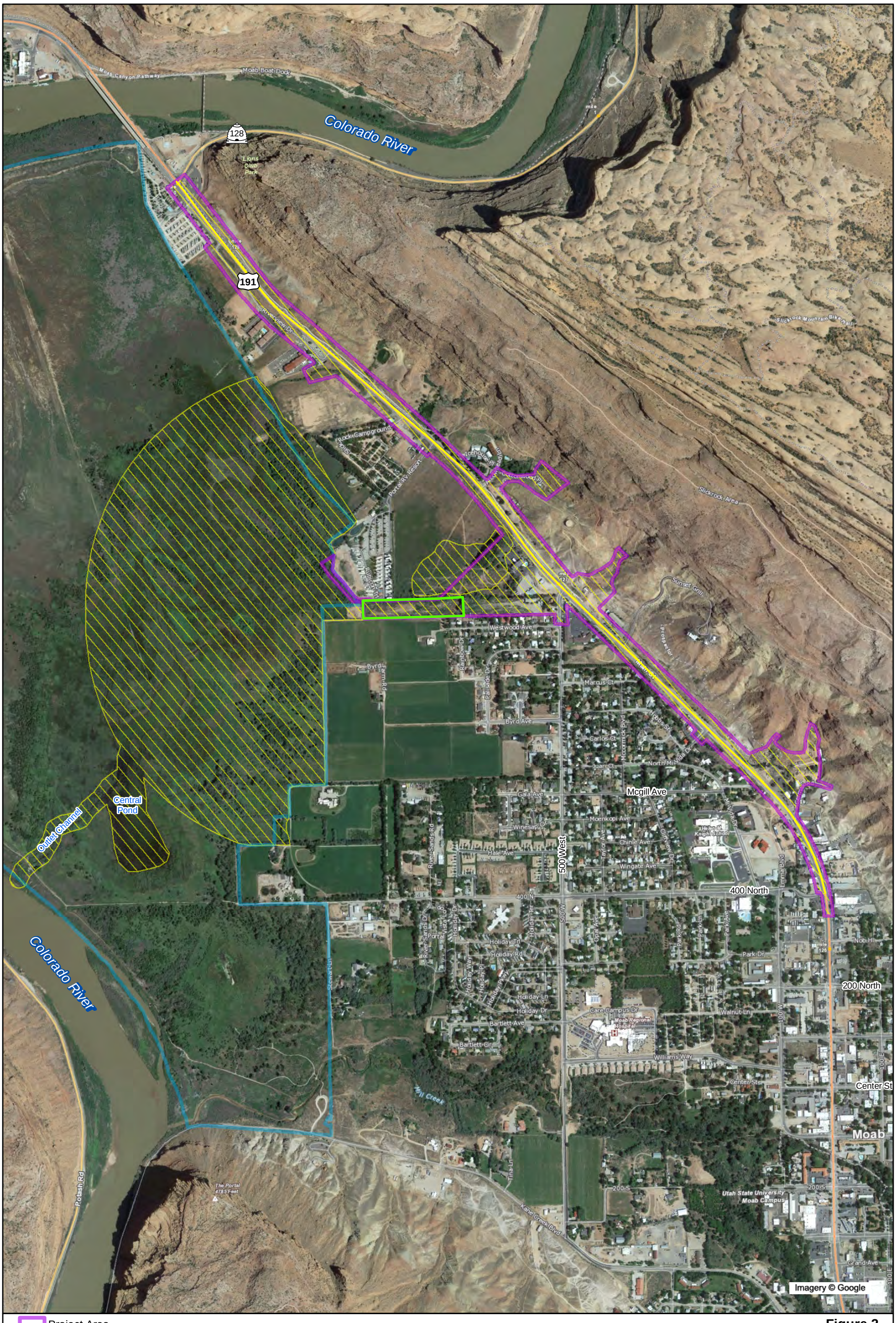


Project Area
Proposed Water Quality Swale
Action Area
Matheson Wetland Preserve

N
W E
S

0 250 500 1,000
Feet

Figure 2
Action Area
Biological Assessment
US-191 MP 126.1 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Biology\BA\BA_ActionArea.mxd

4.0 SITE DESCRIPTION

The US-191 corridor, within the action area, encompasses land within the city of Moab or unincorporated Grand County. Land uses within Moab are developed for tourist-related commercial uses and include hotels, outdoor outfitters (cycling and river runners), off-road vehicle rentals, as well as local services. Land uses along the north portion of the corridor are less developed, but also include a mix of tourist-related commercial uses and some residences. The project corridor lies in the Spanish Valley at an elevation ranging between 3,960 and 4,030 feet above mean sea-level (msl).

The Scott M. Matheson Wetlands Preserve (Preserve) is located between US-191 and the Colorado River and encompasses a portion of the action area. The Preserve is the largest intact wetlands system on the Colorado River in Utah, and hosts more than 200 species of birds, amphibians and mammals. The Nature Conservancy and the Utah Division of Wildlife Resources (DWR) purchased the 875-acre wetland in 1990, with the agreement that The Nature Conservancy would manage the Preserve. The Preserve is periodically flooded by the Colorado River, but the flooding frequency and duration have both declined since 1959 when dams were constructed on the Upper Colorado River (Collins 1994 *in* WRI 2018). Discrete portions of the Preserve such as the Central Pond achieve connection through gated canals during yearly high flow events. The Preserve has been identified as the only site within a 64-mile reach on the Colorado River that is capable of providing suitable nursery habitat as outlined in the recovery goals for the razorback sucker. The presence of wild razorback sucker larvae was recently documented in the Colorado River along the wetland (Jones and DeMille 2018).

Vegetation within the Matheson Wetlands portion of the action area is predominantly wetland and riparian habitat, with some areas containing riparian tree and shrub overstories (AECOM 2018). Riparian overstory vegetation is composed of Fremont cottonwood (*Populus fremontii*), Russian olive (*Elaeagnus angustifolia*), and narrowleaf willow (*Salix exigua*). Common herbaceous species are saltgrass (*Distichlis spicata*), common reed (*Phalaris arundinacea*), cattail (*Typha latifolia*), hardstem bulrush (*Schoenoplectus acutus*), Torrey's rush (*Juncus torreyi*), and foxtail barley (*Hordeum jubatum*). Vegetation in areas within and around the proposed water quality swale are typical of disturbed sites and include burningbush (*Bassia scoparia*), cheatgrass (*Bromus tectorum*), western tansymustard (*Descurainia pinnata*), redstem stork's bill (*Erodium cicutarium*), and prickly Russian thistle (*Salsola tragus*).

5.0 PROPOSED ACTION

5.1 Background

In 2007, UDOT, in cooperation with the Federal Highway Administration (FHWA), completed an EA for the US-191 Colorado River Bridge Project [Project No.: BHF-0191(27)129E]. The project involved the replacement of the US-191 bridge over the Colorado River and widening of the roadway within a 3.7-mile-long segment of US-191 from 400 North in Moab to State Route (SR) 279 (Potash Road). FHWA signed the Finding of No Significant Impact for the project in May 2007, and UDOT completed Phase 1 of the project in 2010, which included the construction of the bridge and roadway improvements within an approximately 1.7-mile-long segment of US-191 from SR-279 to SR-128.

5.2 Project Overview

UDOT and FHWA are now planning to complete the last two miles of the project south of the Colorado River on US-191 from SR-128 to 400 North in Moab. This phase of the project (Phase 2) would include widening of the roadway to include four 12-foot-wide lanes with a 12-foot median in some locations, 6-foot shoulders, curb and gutter, and a sidewalk along the west side of the roadway (Appendix A). The proposed alignment would typically follow the centerline of the existing road. Sedimentation basins would be reconstructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. Stormwater runoff would be conveyed from the roadway and sedimentation basins into an existing 500-foot long channel which would serve as a sedimentation dropout basin before entering a 330-foot long vegetated water quality swale. The sedimentation dropout basin and water quality swale would be constructed on the west side of the roadway north of Westwood Avenue (Figure 3). The swale would provide water quality treatment before stormwater runoff is discharged to the Nature Conservancy's Matheson Wetlands Preserve and eventually the Colorado River.

5.3 Sedimentation Basins

The three proposed sedimentation basins are existing basins that have filled in with sediment from the adjacent hillslope over time. They would not be sized for any type of stormwater flows but would be cleaned out back to their original size. The removed sediment would be transported to and disposed of at an upland site. The discharge pipes at the outlet of the sedimentation basins would be sized to accommodate the 50-year design storm. The sedimentation basins would be maintained over time to ensure their functionality. Please refer to Appendix A for design details of the sedimentation basins.

5.4 Stormwater Facilities

UDOT has designed the new stormwater facilities to comply with UDOT's Drainage Manual of Instruction (UDOT 2018) and the City of Moab Stormwater Master Plan (City 2017). UDOT also complies with a statewide Municipal Separate Storm Sewer System (MS4) Discharge Permit required by the US Environmental Protection Agency (EPA) which is regulated by the State Division of Water Quality (DWQ). This permit allows UDOT to discharge stormwater from roadways and maintenance facilities. The project would also adhere to UDOT's Stormwater Management Program (SWMP) plan that describes the minimum control measures and other activities to minimize the discharge of pollutants from UDOT roadways and facilities to "waters of the State". Water quality swale design flows and design dimensions are shown in Tables 1 and 2, respectively.

Project Area
Proposed Water Quality Swale
Matheson Wetland Preserve
Storm Drain
Culvert

N
W E
S

0 250 500 1,000
Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 3
Project Plan
Biological Assessment
US-191 MP 126.1 to 128.2
UDOT PIN 15329

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Biology\BAIBA_ProjectPlan.mxd

A new storm drain would convey combined roadway and offsite stormwater under US-191 just north of the intersection with 500 West. Approximately 3 percent of the managed stormwater runoff is expected to result from new SR-191 project; the remaining runoff would originate from off-site areas. The underground storm drain would be routed southwest and then to the west before discharging water through a 72" outfall culvert into a 500 foot long sedimentation dropout ditch before water is conveyed through a 300 foot long vegetated water quality swale (Figure 3). Vegetated swales are permanent drainage features designed to convey stormwater runoff. They allow sediment and fine particulates (along with trace metals) in stormwater to settle out before being discharged to downstream waterways. After passing through the vegetated swale, stormwater would pass through two 52" 120-foot long culverts before discharging into an existing vegetated ditch and two existing ponds. Excess stormwater would then be conveyed into the Matheson Wetlands Preserve and would pass through a series of ponds, channels and wetlands for a distance of approximately ½ mile before reaching the Central Pond (Figure 2). The rerouting of stormwater runoff through the Preserve would increase and maintain flows in the Central Pond during the spring months when razorback chub and other listed fish species may be present and would discharge into the Colorado River through an egress channel when water levels are high.

Table 1. Water Quality Swale Design Flows and Channel Conditions

Storm Event	Discharge	Depth	Velocity
1-year	20 cfs	0.64 feet	1.2 fps
50-year	283 cfs	3.03 feet	3.0 fps

Acronyms: cfs=cubic feet per second; fps=feet per second

Table 2. Recommended and Proposed Water Quality Swale Channel Design Dimensions

Swale Design Parameter	Recommended Geometry of Vegetated Swales		
	EPA Stormwater Technology Fact Sheet – Vegetated Swales[1]	NCHRP Report 802 Volume Reduction of Highway Runoff[2]	Proposed Swale Geometry
Length	-	-	330 feet
Width	-	1 to 10 feet	Varies: 19 to 25 feet[3]
Slope	Less than 2%	1% to 5%	0.2%
Velocity of Flow	Less than 3 feet/sec	-	1.5 feet/sec (1-year storm event)
Depth of Flow	Less than vegetation height	0 to 6 inches	1 feet (1-year storm event)
Side Slopes	3H:1V or flatter	3H:1V or flatter	2H:1V (stabilized with rock riprap)

[1]USEPA 1999; [2]NASEM 2014; [3]Greater bottom widths help to lower flow depths and velocities.
Acronyms: EPA= US Environmental Protection Agency; NCHRP= National Cooperative Highway Research Program

5.5 Project Schedule

The approximate schedule for the project is as follows:

- Site preparation, staging, and vegetation clearing: March through June 2019

- Roadway widening and construction of sedimentation basins and water quality features: April through October 2019
- Clean-up and de-mobilization: As construction allows, concluding at the end of December 2019
- Site restabilization and reclamation: Starting as construction allows, concluding in spring of 2020

6.0 COORDINATION/CONSULTATION HISTORY WITH USFWS

A preliminary coordination meeting was held with USFWS on June 25, 2018. The official species list for the action area was acquired on September 12, 2018 through the USFWS Information for Planning and Conservation (IPaC) website (Consultation code 06E23000-2018-SLI-0253)(Appendix B).

7.0 SPECIES IDENTIFICATION AND ANALYSIS

7.1 Species and Critical Habitats Considered for Analysis

The IPaC database listed ten federally listed species that may occur within the action area (Table 3). Five of these species are not analyzed in this BA due to an absence of potential habitat in the action area and/ or exceedingly low potential that the species would migrate through the action area. Effects of the project on the remaining five species: southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and bonytail chub (*Gila elegans*) are presented in Section 7.2. Although not identified in the database, the Matheson Wetlands portion of the action area has been designated critical habitat for Colorado pikeminnow and razorback sucker as it is within the 100-year floodplain of the Colorado River (59 FR 13374).

USFWS definitions of effects are used in this analysis [50 CFR §402.02]. **Direct effects** are those that are caused by or will result from, and occur contemporaneous with, the proposed action. **Indirect effects** are effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. **Insignificant effects** relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated. **Discountable effects** are those effects that are extremely unlikely to occur. **Interdependent actions** are actions having no independent utility apart from the proposed action. **Interrelated actions** are actions that are part of a larger action and depend on the larger action for their justification. No interdependent or interrelated actions were identified in relation to the proposed action. **Cumulative effects** are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.

Table 3. Threatened and Endangered Species with Potential to Occur in the Action Area.

Common Name *Scientific Name*	Status	Habitat Association	Considered in Analysis	Rationale
BIRDS				
California condor (*Gymnogyps californianus*) Population: USA only, except where listed as an experimental population	Experimental Population, Non-Essential (Considered Endangered)	Usual habitat is mountainous country at low and moderate elevations, especially rocky and brushy areas with cliffs available for nest sites, with foraging habitat encompassing grasslands, oak savannas, mountain plateaus, ridges, and canyons (AOU 1983).	No	No effect. Nesting and roosting habitat components for this species are not found in the action area; as potential for use of the project area for foraging is exceedingly low there would be no plausible route for effect.
Mexican spotted owl (*Strix occidentalis lucida*) Population: Entire	Threatened	Canyons and mountainous areas in mesic old-growth transition forests (USFWS 2012).	No	No effect. Habitat components for this species are not found in the action area.
Southwestern willow flycatcher (*Empidonax traillii extimus*) Population: Entire	Endangered	Nests in dense riparian habitats (cottonwood/willow and tamarisk vegetation) with saturated soils, standing water, or nearby streams or pools. Habitat not suitable for nesting but may be used for migration and foraging (USFWS 2015a).	Yes	May affect. Potential migration habitat for this species occurs in the action area for the project; however, habitat is not likely to be suitable for nesting.
Yellow-billed cuckoo (*Coccyzus americanus*) Population: Western U.S. Distinct Population Segment	Threatened	Nests in mature riparian woodland with dense understories of willow and other deciduous species. Nesting areas are large tracts of closed-canopy broad-leaved forest (USFWS 2001).	Yes	May affect. Potential migration habitat for this species occurs in the action area for the project; however, habitat is not likely to be suitable for nesting.
FISHES				
Colorado pikeminnow (*Ptychocheilus lucius*)	Endangered	Occurs in the warm, swift waters of the big rivers of the Colorado Basin, adapted to rivers with seasonally variable flow, high silt loads, and turbulence (USFWS 2002a). Young-of-the-year and juvenile Colorado pikeminnow live in shallow backwater areas, with little or no current over silt and sand bottoms (USFWS 2014a).	Yes	May affect. Larvae rely on off-channel floodplains such as those found in the Preserve portion of the action area.
Razorback sucker (*Xyrauchen texanus*)	Endangered	Occurs in medium to large rivers and their impoundments and is usually associated with sand, mud, and rock substrate in areas with sparse aquatic vegetation, where temperatures are moderate to warm. It favors slow-moving water, backwaters, and eddies, and uses flooded lowlands and lower portions of tributary streams for resting and feeding during the breeding season (USFWS 2014a).	Yes	May affect. Larvae have been recently observed along the shoreline of the Matheson Preserve and may enter seasonally flooded portions of Preserve during the spring.
Humpback chub (*Gila cypha*)	Endangered	Inhabits specific warm-water canyon areas of the Colorado River characterized by rocky habitat and swift currents (USFWS 2017).	No	No effect. Historical distribution for this species is not within the project vicinity. Species does not rely on off-channel habitats or floodplains as part of its life cycle.
Bonytail chub (*Gila elegans*)	Endangered	Prefer backwaters with rocky or muddy bottoms and flowing pools, although they have been reported in swiftly moving water. They are mostly restricted to rocky canyons today, but were historically abundant in the wide downstream sections of rivers (USFWS 2014a).	Yes	May affect. Require back water channels for nursery habitat which are present in the Preserve portion of the action area.
PLANTS				
Navajo sedge (*Carex specuicola*)	Threatened	Hanging gardens (seep-spring pockets) along the Navajo Sandstone Formation bedrock within the Great Basin Conifer Woodland (Phillips et al.1981).	No	No effect. Habitat components for this species are not found in the action area of the Project.
Jones cycladenia (*Cycladenia humilis* var. *jonesii*)	Threatened	Desert scrub and juniper plant communities receiving 6 to 9 inches of mean annual precipitation; endemic to gypsiferous, saline soils; elevations from 4,300 to 6,000 feet (Tilley et al. 2010a).	No	No effect. The project area is outside the elevation range for this species. (The elevation of the project area is around 4,000 feet.)

7.2 Species Accounts and Analysis of Impacts

7.2.1 Southwestern Willow Flycatcher

Endangered Species Act Status:	Endangered
Critical Habitat:	Designated critical habitat does not occur in the action area
Determination:	May affect, not likely to adversely affect species

Status and Life History

The southwestern willow flycatcher is federally-listed as endangered under the ESA. The southwestern willow flycatcher is usually less than 6 inches from head to tail, with an olive-brown to gray-green body, pale olive breast, and yellow belly. The southwestern willow flycatcher is an insectivore and primarily catches its prey by flying/hovering over foliage and sometimes captures insects off the ground. They typically lay 3-4 eggs per clutch and raise one brood per year, unless they have to re-nest after a nest failure (USFWS 2015a).

The species nests in dense riparian vegetation, typically consisting of stands of willows (*Salix* sp.) with a cottonwood (*Populus* sp.) forest overstory. The species rarely nests where non-native tamarisk and Russian olive trees are interspersed with native willows (McDonald et al.1995).

This species typically arrives in breeding habitat between early May and early June, although a few individuals may establish territories in very late April (USFWS 2015a). The breeding season for the southwestern willow flycatcher in Utah is approximately May 1 to September 1 (USFWS 2014).

Threats to the species include loss and degradation of dense riparian habitat, altered water flows, fire, and human disturbances, including building development and disturbances at nesting sites (USFWS 2015a).

Status within Action Area

UNHP historic occupancy data (UDRW 2018) did not identify southwestern willow flycatcher within the Action Area. AECOM surveyed the area within ½ mile of new project components on April 10, 2018 for dense riparian habitat composed of native and/or exotic woody species in the habitat assessment area. The USGS and USFWS document *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher* (Sogge 2010) was used as the reference for comparing riparian habitats in the survey area to identified habitats for this species. Surveys identified widespread potential habitat for southwestern willow flycatcher in the Matheson Wetlands and along drainages (Figure 4). Potential habitat in the action area includes areas where coyote willow or Russian olive is the dominant shrub species either with or without an overstory of Fremont poplar (AECOM 2018).

Applicable Conservation Measures

Revegetation of the water quality swale with native species would increase foraging habitat for this species in the long term.

Effects Analysis

Direct Effects

Vegetation removal would occur in a small area around the water quality swale, though potential habitat for southwestern willow flycatcher in this area is minimal (Figure 4). Direct effects to nesting birds are not likely to occur as construction activity would begin prior to April 15, which would deter this species from establishing nests in this area.

Indirect Effects

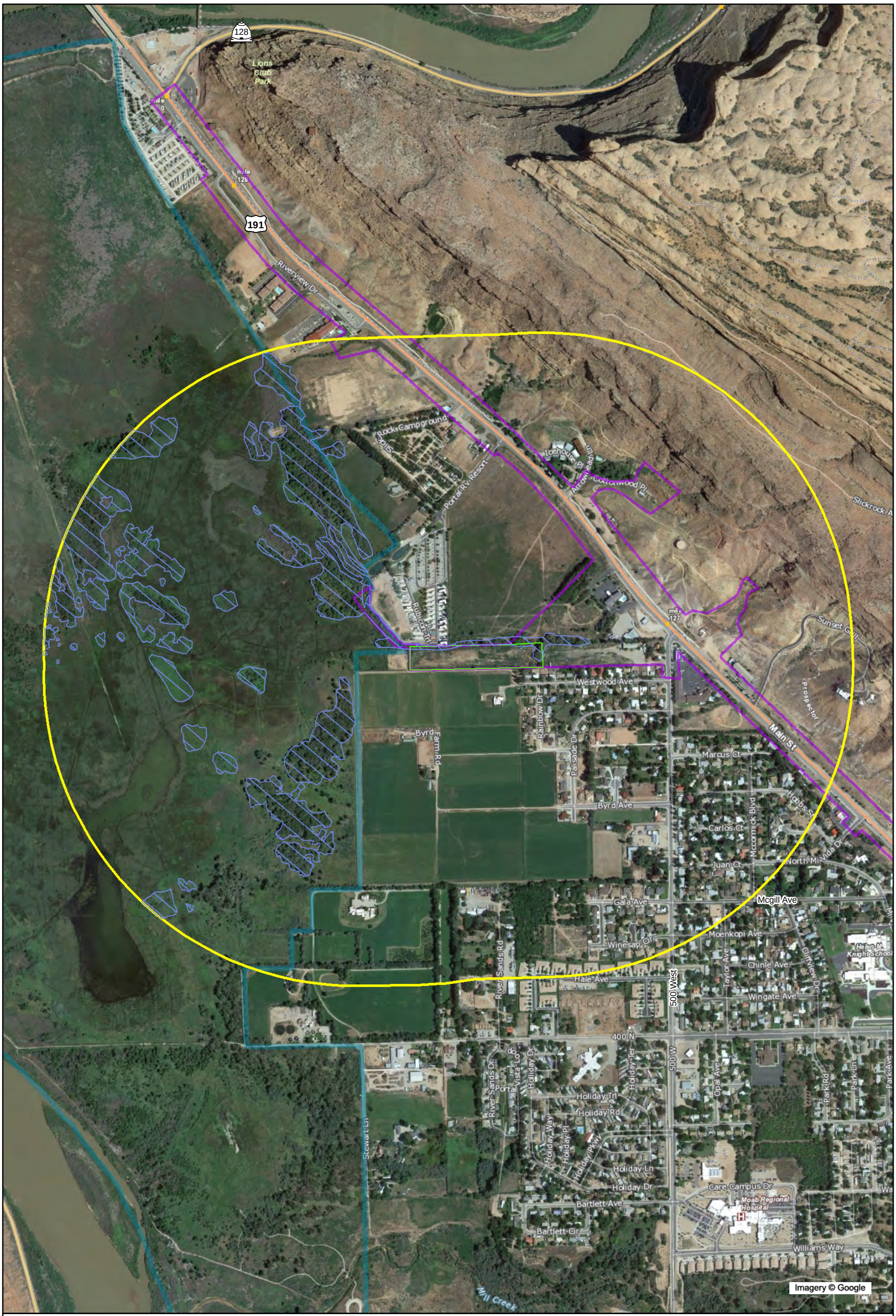
Indirect effects are not anticipated to occur as part of the proposed action. Removal of vegetation in construction areas would eliminate a minimal extent of potential foraging habitat, which could impact this species in subsequent seasons through displacement. As the vegetation removal areas would be small, it is anticipated that the effects of displacement would be insignificant. Construction of the proposed action would begin prior to April 15, and therefore this area would be avoided by nesting individuals. As such, effects from increased noise associated with construction are unlikely.

Cumulative Effects

Any future state, private, or non-Federal restoration activities in the Preserve may provide benefits to southwestern willow flycatcher and their habitat.

Determination

The project *"may affect, but is not likely to adversely affect"* southwestern willow flycatcher due to the insignificant indirect effects of vegetation clearing during project construction.



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Project Area
Proposed Water Quality Swale
Analysis Area
Potential Southwestern Willow Flycatcher Habitat
Matheson Wetland Preserve

N
W E
S

0 500 1,000 2,000
Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 4
Potential Southwestern Willow Flycatcher Habitat
Biological Assessment
US-191 MP 126.1 to 128.2
UDOT PIN 15329

7.2.2 Yellow-billed Cuckoo

Endangered Species Act Status:	Threatened
Critical Habitat:	Designated critical habitat does not occur in the action area
Determination:	May affect, not likely to adversely affect species

Status and Life History

The yellow-billed cuckoo is federally-listed as threatened under the ESA. In the arid Southwest, the yellow-billed cuckoo resides in dense woody habitats with nearby water, including dense thickets along streams and marshes, abandoned farmland, and overgrown orchards. Cuckoos build flat, oblong nests out of loose sticks and twigs, and line them with dried leaves and bark. The yellow-billed cuckoos' breeding season in Utah is approximately May 15 to September 1 (Halterman 2015).

Threats to the species include conversion of habitat to housing, habitat fragmentation, pesticides, and degradation of cottonwood-willow riparian habitat, due to encroachment of non-native species, such as tamarisk.

Status within Action Area

AECOM surveyed the area within ½ mile of new project components on April 10, 2018 following the 2015 USFWS Guidelines for the identification of suitable habitat for WYBCU in Utah. Specifically, the survey area was assessed for the following yellow-billed cuckoo habitat requirements:

- Vegetation that is predominantly multi-layered, with riparian canopy trees and at least one layer of understory shrubby vegetation. The listing decision for this species (USFWS 2014b) describes habitat as "structurally complex with tall trees, a multistoried vegetative understory, low woody vegetation… and a higher shrub area than sites without western yellow-billed cuckoos." Riparian overstory and understory vegetation that supports suitable cuckoo habitat may include: cottonwood (*Populus* spp.), willow (*Salix* spp.), alder (*Alnus* spp.), walnut (*Juglans* spp.), boxelder (*Acer negundo*), sycamore (*Plantanus* spp.), ash (*Fraxinus* spp.), mesquite (*Prosopis* spp.), tamarisk (*Tamarix* spp.), and Russian olive (*Elaeagnus angustifolia*). Suitable understory vegetation does not include grasses or forbs although herbaceous vegetation is often present alongside shrubby understory.

- Patches of multi-layered vegetation (as described above) that are at least 12 acres or greater in extent and separated from other patches of suitable habitat by at least 300 meters. (Note: The proposed rule [USFWS 2013] for this species stated yellow-billed cuckoo almost exclusively nests in areas of at least 50 acres, and sites less than 37 acres have been considered unsuitable habitat [Halterman 2015].)

During field surveys in April, 2018, patches of multi-story riparian areas that approximately requirements based on USFWS 2015 guidelines were identified as potential habitat for this species. All areas of identified potential habitat for yellow-billed cuckoo are shown on Figure 4. One patch of potential habitat greater than 12 acres in size and three more patches of potential habitat less than 12 acres in size, but which were separated by less than 300 meters, were identified in the analysis area. However, the cover and density of understory shrubs in areas that were visited during the April 10 field visit did not consistently match habitat descriptions (USFWS 2014b) as the understory shrub cover was sparse and generally lacked diversity and a strong component of native species. Potential habitat shown in Figure 5 is marginal and would not likely be utilized as nesting or foraging habitat by this species. However, the

habitat could be suitable stopover habitat due to the presence of mature cottonwood trees in parts of the overstory.

Applicable Conservation Measures
None.

Effects Analysis

Direct Effects

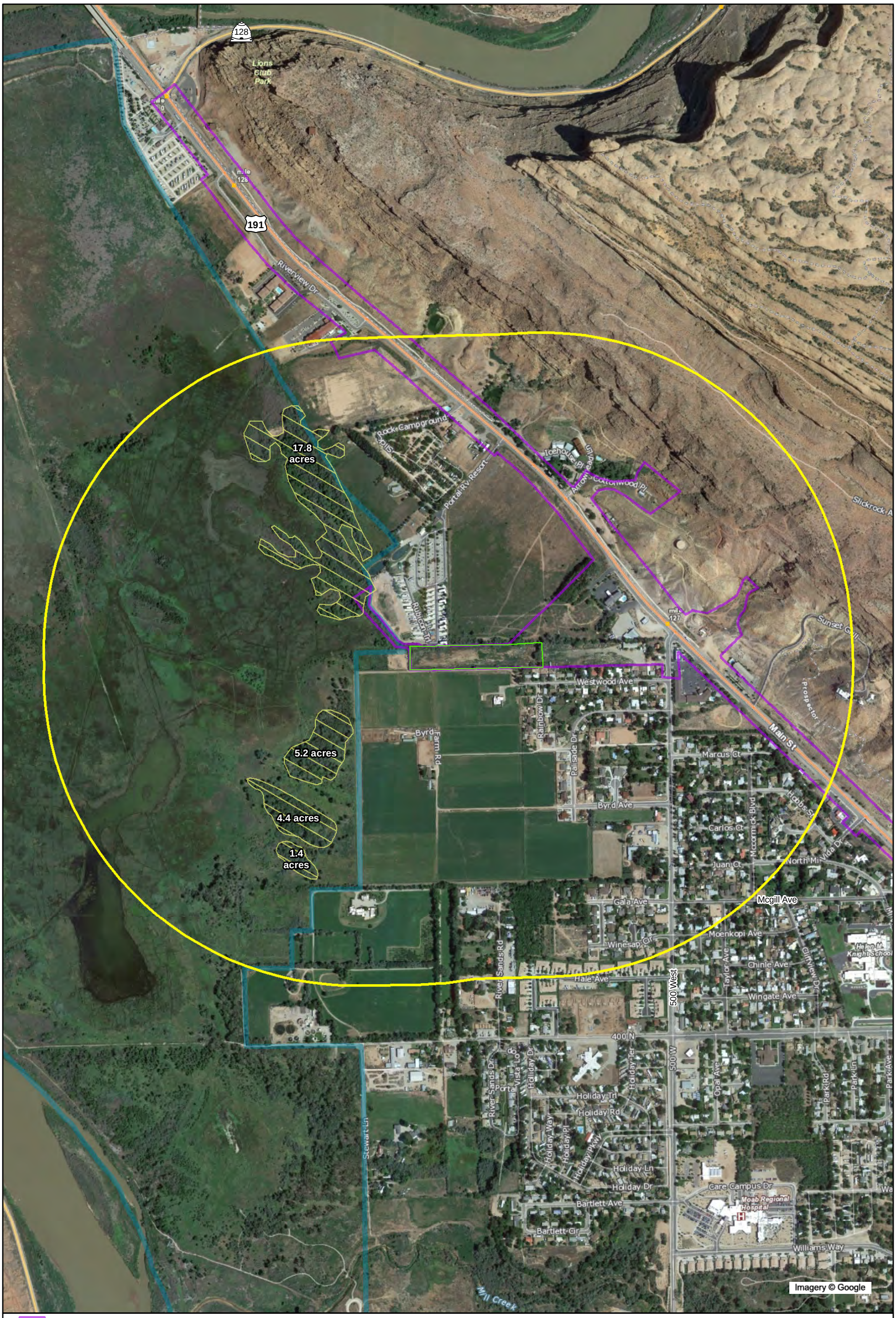
Potential direct effects to yellow-billed cuckoos are anticipated to be discountable as use of the action area for nesting and foraging is not expected. Use of the habitat patches for stopover may occur but is expected to be uncommon; UNHP occurrence data shows no recent observations of yellow-billed cuckoo within the action area or in Grand County west of the confluence of the Colorado and Dolores Rivers. Additionally, construction of the project would not result in the temporary or permanent conversion of habitat to other uses and would begin prior to nesting season.

Indirect Effects

The project is not anticipated to indirectly impact yellow-billed cuckoo.

Cumulative Effects
Any future state, private, or non-Federal restoration activities in the Preserve may provide benefits to yellow-billed cuckoo and their habitat.

Determination
The Project *"may affect but is not likely to adversely affect"* yellow-billed cuckoo due to the presence of potential stopover habitat within the action area.



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Project Area
Proposed Water Quality Swale
Analysis Area
Potential Yellow-billed Cuckoo Habitat
Matheson Wetland Preserve

N
W E
S

0 500 1,000 2,000 Feet

Data Sources: Utah AGRC, UDOT GIS

Figure 5
Potential Western Yellow-billed Cuckoo Habitat
Biological Assessment
US-191 MP 126.1 to 128.2
UDOT PIN 15329

7.2.3 Colorado Pikeminnow

Endangered Species Act Status:	Endangered
Critical Habitat:	Critical habitat has been designated within the action area (100-year floodplain of Colorado River)
Determination:	May affect, not likely to adversely affect species or critical habitat

Status and Life History

The Colorado pikeminnow was listed as endangered by the USFWS in 1967 (32 FR 4001) and was provided full protection under the ESA in 1973 (38 FR No. 106). Critical habitat was designated in April 1994 (59 FR 13374). This species is endemic to the Colorado River Basin of the southwestern United States. Wild, reproducing populations exist in the Green and upper Colorado River sub-basins of the Upper Colorado River Basin. The San Juan River Basin Recovery Implementation Program continues to stock Colorado pikeminnow to develop a separate, self-sustaining population (CRR 2018).

The Colorado pikeminnow is a long-distance migrator; adults move hundreds of miles to and from spawning areas, and require long sections of river with unimpeded passage. Adults require pools, deep runs, and eddy habitats maintained by high spring flows. These high spring flows maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, form gravel and cobble deposits used for spawning, and rejuvenate backwater nursery habitats (USFWS 2006).

Spawning occurs after spring runoff at water temperatures typically between 18 and 23°C. Adults spawn from late June to early August in fast-flowing rapids in deep canyons where the eggs stick to the gravel substrate. After hatching and emerging from spawning substrate, larvae drift downstream to nursery backwaters that are restructured by high spring flows and maintained by relatively stable base flows (UC Davis 2018). In spring, adults may also use floodplain habitats, flooded tributary mouths, and eddies that are available only during high flows; these areas can be beneficial for adults as they offer a source of prey and also provide flow refugia (USFWS 2006).

After emergence, larvae drift downstream to backwaters in sandy, alluvial regions, where they remain through most of their first year of life (USFWS 2006). They tend to occur in backwaters that are large, warm, deep, and turbid (Tyus and Haines 1991 *in* USFWS 2006). Larvae and juveniles have been found to prefer backwaters created when a secondary channel is cut off at the upper end, but remains connected to the river at the downstream end (USFWS 2006). These chute channels are deep and may persist even when discharge levels change dramatically. An optimal river-reach environment for growth and survival of early life stages of Colorado pikeminnow has warm, relatively stable backwaters, warm river channels, and abundant food (Muth et al. 2000 *in* USFWS 2006).

Primary threats to Colorado pikeminnow include stream alteration and habitat fragmentation caused by dam construction, irrigation dewatering, channelization, and the introduction of competitive and predatory nonnative fishes (USFWS 2014a).

Status within Action Area

No information was found on the use of the Matheson Wetlands Preserve by adult or juvenile Colorado pikeminnow. However, the preserve was considered to be a critical staging area for pikeminnow larvae when it was established in 1991 (Barker 1991). Although Colorado pikeminnow is not known to spawn in the vicinity of the action area, both adults and subadults have been observed in Moab Wash, which is an ephemeral drainage and floodplain area just across the river from the Preserve (USGS 2002 *in* DOE 2004). Further, the Utah Department of Water Resources has identified backwater areas that have high potential for providing nursery habitat for pikeminnow on the east side of the river (DOE 2004). Over 50 juvenile pikeminnow were captured within a distance of 20 miles (upstream and downstream) from the Matheson Preserve outlet channel to the Colorado River (Osmundson et al. 1997 *in* DOE 2004). Further, in a mark-recapture study of adult pikeminnow in this same reach, 41 percent were caught within 5 miles of the Preserve outlet channel (*ibid.*).

Considering that adults travel long distances between spawning areas and both adults and larvae are known to use floodplain habitats in the spring, it is very possible that various life stages of Colorado pikeminnow may be found in the Central Pond and other portions of the Preserve wetlands during the spring months. Larvae and juveniles may continue to utilize the Central Pond and outflow channel throughout the year.

Designated critical habitat for the Colorado pikeminnow includes floodplain habitats of the Colorado River, which are present in the Matheson Wetlands portion of the action area (59 FR 13374). The primary constituent elements (PCEs) (which are now referred to as “physical or biological features [PBFs]”) determined necessary for survival and recovery of Colorado pikeminnow include, but are not limited to: water, physical habitat, and biological environment. As defined, “physical habitat” includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding and rearing habitats, or access to these habitats (59 FR 13374). This definition includes the 100-year floodplain of the Colorado River which is located within the Matheson Wetlands portion of the action area. Please note that the 2016 revised critical habitat regulations have replaced the term “PCEs” with physical or biological features (PBFs) (81 FR 7414). As such, we reference the term “PBFs” when referring to specific critical habitat features throughout this document.

Applicable Conservation Measures

The project would implement the conservation measures listed in Section 8 to avoid or minimize potential adverse effects on Colorado pikeminnow and their critical habitat. These include following general roadway construction protective measures, as well as implementing pollution prevention and spill control plans. The fish conservation measures described in Section 8.4 are designed to help improve habitat for Colorado pikeminnow that may use the Matheson Wetlands Preserve. These include managing water levels in the Central Pond and working with other entities to develop a stormwater management plan that is protective of listed fish species that use the Preserve.

Effects Analysis

Direct Effects

No direct effects to Colorado pikeminnow or their critical habitat are anticipated.

Indirect Effects

Stormwater runoff represents an indirect effect to Colorado pikeminnow because any effects from increased runoff resulting from the project would be later in time from the proposed action but are still reasonably certain to occur. Improved water quality treatment of stormwater runoff and reduced sedimentation into the Matheson Wetlands Preserve is expected to provide a net benefit to various life stages of Colorado pikeminnow that may be present in the wetlands area. Reestablishment of the three sedimentation basins on the east side of US-191 would help capture sediments that erode from the adjacent cliffs and capture debris before they enter the stormwater system. Further, all of the stormwater would be conveyed into the 500-foot long existing ditch which would allow for additional settling of sediments before water is conveyed into the vegetated water quality swale.

Copper, lead, and zinc are the dominant toxic pollutants in highway stormwater runoff (FHWA 1981 *in* UDOT 2017). UDOT recently investigated the effectiveness of vegetated swales to remove total suspended solids and trace metals from stormwater runoff at the Mountain View Corridor (Salt Lake County) (UDOT unpublished data 2018). The pollutant removal results are compared with previous EPA and National Cooperative Highway Research Program (NCHRP) results in Table 4.

The UDOT results indicate that the Mountain View Corridor vegetated swale was effective in removing a high percentage of TSS and metal pollutants, and the swale effectiveness was generally consistent with previous findings from other studies. The lower range of pollutants removed was slightly lower than the EPA and NCHRP studies. However, after passing through the water quality swale, the stormwater would then be conveyed through an existing channel and ponds before entering the Matheson Preserve wetlands area where it would flow for approximately ½ mile before entering the Central Pond where Colorado pikeminnow may be present. According to the USFWS, Colorado pikeminnow and other listed fish species are not likely to move into upper portions of the Preserve where the new outfall would discharge stormwater and where low concentrations of stormwater contaminants may have settled out. Further, the improved water quality treatment system would provide cleaner water to the wetland than what is currently being delivered via roadway culverts and sheet flow.

The roadway project would also increase the flow of water into the Preserve after storm events, which would add to the base flow that is currently provided by springs and streams in the system. This would help maintain stormwater in the wetland area which would benefit listed fish species that use the Central Ponds and other portions of the Preserve. Since the project would combine multiple discharges into a single outlet, there is a risk of providing too much water into the system which could flood the Central Ponds and potentially cause stranding of listed fish species, if present. This would be a particular concern during large storm events. UDOT plans to work with the USFWS and the Matheson Preserve to evaluate options that could be implemented to reduce the risk of pond flooding and effects to listed fish species.

Overall, the proposed project is considered a net benefit to listed fish species since it would improve water quality through sediment drop out and heavy metal removal in the swale and through the wetlands prior to entering the Central Pond which may provide adult refugia and nursery rearing habitat for listed fish species. It is possible that low levels of stormwater contaminants may be conveyed downstream. However, most of the metals are expected to adhere to suspended sediments and settle out in the water quality facilities and wetlands area before reaching areas that may be occupied by listed fish species. Any changes in water quality or quantity to the Colorado River are not expected to be measurable and would not adversely affect any listed fish in the mainstem river system. Only 3 percent of the stormwater treated would originate from the widening project. The remaining 97 percent of stormwater would originate from

exiting roadway or hillside that does not provide any treatment before entering the Preserve. In summary, we anticipate a net benefit to listed fish species due to the increased water quality provided by the storm water swale and adjacent wetlands area and a more reliable water source of water to the Preserve.

Table 4. Comparison of Pollutant Removal Effectiveness of Vegetated Swales.

Pollutant	Pollutant Removal of Vegetated Swales - %		
	EPA Stormwater Technology Fact Sheet – Vegetated Swales[1]	NCHRP Report 792 Long-Term Performance of Stormwater BMPs[2]	UDOT Wet Weather Sampling Results[3] 2017 & 2018
Total Suspended Solids (TSS)	81	75	65 to 77
Copper	51	64	38 to 71
Lead	67	67	44 to 72
Zinc	71	80	56 to 80

[1]USEPA 1999; [2]NASEM 2014; [3]UDOT unpublished data 2018
Acronyms: BMPs= Best Management Practices; EPA= US Environmental Protection Agency; NCHRP= National Cooperative Highway Research Program; UDOT= Utah Department of Transportation

The project would also benefit PBFs of critical habitat for Colorado pikeminnow by providing increased quantity and quality of water at "a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species". Water would be supplied during the spring when Colorado pikeminnow may be present in the Matheson Wetlands Preserve. The project would not adversely affect the physical habitat or biological environment PBFs for Colorado pikeminnow. Increased water supply would improve physical habitat for pikeminnow during the spring months and may entice other riverine fish species (prey species) to enter the Central Pond and Preserve which could benefit Colorado pikeminnow.

Cumulative Effects

Any future development and related changes to stormwater runoff/treatment patterns in the Matheson Wetlands area would need to conform to federal and state water quality regulations. However, assuming that future stormwater runoff is adequately managed, it is possible that some additional beneficial cumulative effects could result from increased stormwater releases into the pond during the spring periods when pikeminnow may be present. Any future state, private, or non-Federal restoration activities in the Preserve are anticipated to benefit listed Colorado pikeminnow and their critical habitat.

Determination

The Project "*may affect but is not likely to adversely affect"* Colorado pikeminnow and its designated critical habitat. This is based primarily on proposed benefits to the species and critical habitat PBFs due to improvements in water quality as well as increased flows to the Central Pond and Matheson Wetlands area during the spring months when adult and juvenile life stages may be present. The vegetated water quality swale is expected to provide stormwater treatment up to the 50-year storm event which would reduce exposure of stormwater pollutants to any pikeminnow that may be present in the Central Pond portion of the Matheson Wetlands Preserve.

7.2.4 Razorback Sucker

Endangered Species Act Status:	Endangered
Critical Habitat:	Critical habitat has been designated within the action area (100-year floodplain of Colorado River)
Determination:	May affect, not likely to adversely affect species or critical habitat

Status and Life History

The razorback sucker was listed as endangered under the ESA in October 1991 (56 FR 54597). Critical habitat was designated in April 1994 (59 FR 13374). Razorback sucker habitat is very diverse; they are known to occur in mainstream channels and backwaters of medium and large rivers. Razorbacks spend the majority of their lives in deeper waters where ultraviolet light can't penetrate. However, adults migrate into shallow reaches to spawn. During breeding season (mostly April–June), when river flows are high, adult razorback sucker congregate in flooded bottomlands and gravel pits, backwaters, and impounded tributary mouths near spawning sites (USFWS 2002b). It is believed that spawning occurs in broad alluvial, flat-water regions over large gravel cobble bars and coarse sand substrates (USFWS 2002b). Off-channel habitats are typically much warmer than the mainstem river and razorback suckers presumably move to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle (USFWS 2006).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (USFWS 2006). Young razorback suckers require nursery environments with quiet, warm, shallow water, low velocity habitats in littoral zones, backwaters, and inundated floodplains and tributary mouths downstream of spawning bars. Young-of-year appear to stay in these sheltered habitats for several weeks after hatching, then disperse to deeper water (Minckley et al. 1991 *in* USFWS 2002b). Razorback suckers prefer gravel, sand, or mud bottoms and tend to feed on algae, insect larvae, plankton, and detritus (USFWS 2014a).

Status within Action Area

Razorback spawning occurs in the Colorado River during the spring during high flow conditions. Adults, juveniles, and larvae may use portions of the Matheson Wetlands Preserve, within the action area, for foraging and rearing. Historically, during this high-water period, larvae drifted from the spawning area, and entered the backwaters where they were protected and grew into young fish. With the loss of wetlands, these fish populations have declined (Sullivan 2018). Further, development, industry and agricultural practices have altered the flow of the Colorado River, which has decreased the availability of slow-moving, back-eddy fish habitat for the larvae to grow, safe from predators. The proliferation of nonnative tamarisk trees along the riverbanks has also contributed to fish habitat loss. The Endangered Fish of the Colorado River Basin Recovery Program started stocking the river with razorback suckers during the 1990s, after a steep decline in the fish population. Natural breeding, however, is needed for the fish population to survive,

In 2015, DWR fish biologists noted an unexpected resurgence of razorback sucker larvae along the shores of the Matheson Wetlands Preserve (Sullivan 2018). To help improve survival to adulthood, the Nature Conservancy and DWR are proposing to construct a fish nursery at the preserve that would provide a safe haven for larvae to grow. Construction is slated to begin by late fall 2018. The project would restore the connection between the Colorado River and the preserve by renovating a canal to create a large channel from the river to the Preserve's Central Pond. This would allow more water to carry larvae into the preserve during the spring runoff period. The nursery would provide warm, shallow water for the razorback sucker larvae to grow and thrive before being released back into the river. The fish nursery would maintain that water throughout the summer, and then allow for drainage in the fall when the larvae have matured into young fish.

Designated critical habitat for the razorback sucker includes floodplain habitats of the Colorado River, which are present in the Matheson Wetlands portion of the action area (59 FR 13374). The PCEs (now PBFs) determined necessary for survival and recovery of razorback sucker include, but are not limited to: water, physical habitat, and biological environment. As defined, physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100- year flood plain, which when inundated provide spawning, nursery, feeding and rearing habitats, or access to these habitats (59 FR 13374). This definition includes the 100-year floodplain of the Colorado River which is located within the Matheson Wetlands portion of the action area.

Applicable Conservation Measures

The project would implement the conservation measures listed in Section 8 to avoid or reduce or minimize potential adverse effects on razorback sucker and their critical habitat. These include following general roadway construction protective measures, as well as implementing pollution prevention and spill control plans. The fish conservation measures in described in Section 8.4 are designed to help improve habitat for razorback sucker that may use the Matheson Wetlands Preserve. These include managing water levels in the Central Pond and working with other entities to develop a stormwater management plan that is protective of listed fish species that use the Preserve.

Effects Analysis

Direct Effects

No direct effects to razorback sucker or their critical habitat are anticipated.

Indirect Effects

Stormwater runoff would represent an indirect effect to razorback sucker because any effects from increased runoff resulting from the project would be later in time from the proposed action but are still reasonably certain to occur. The Effects Analysis provided for Colorado pikeminnow and their critical habitat would also apply to razorback sucker and their critical habitat.

Cumulative Effects

Any future development and related changes to stormwater runoff/treatment patterns in the Matheson Wetlands area would need to conform to federal and state water quality regulations. However, assuming that future stormwater runoff is adequately managed, it is possible that some additional beneficial cumulative effects could result from increased stormwater releases into the pond during the spring

periods when razorbacks may be present. Any future state, private, or non-Federal restoration activities in the Preserve are anticipated to benefit listed razorback sucker and their critical habitat.

Determination

The proposed project "*may affect, but is not likely to adversely affect*" razorback chub and its designated critical habitat. This is based primarily on proposed benefits to the species and critical habitat PBFs due to improvements in water quality as well as increased flows to the Central Pond and Matheson Wetlands area during the spring months when adult and juvenile life stages may be present. The vegetated water quality swale is expected to provide stormwater treatment up to the 50-year storm event which would reduce exposure of stormwater pollutants to any razorbacks that may be present in the wetlands area.

7.2.5 Bonytail Chub

Endangered Species Act Status:	Endangered
Critical Habitat:	Critical habitat has not been designated within the Action Area
Determination:	May affect, not likely to adversely affect species. No effect on critical habitat.

Status and Life History

The bonytail chub was listed as endangered under the ESA in April 1980 (45 FR 27710). Critical habitat was designated in April 1994 but does not include the action area (59 FR 13374). The bonytail is endemic to the Colorado River Basin and was historically common to abundant in warm-water reaches of larger rivers of the basin from Mexico to Wyoming. The species experienced a dramatic decline starting about 1950, following construction of several mainstem dams, introduction of nonnative fishes, poor land-use practices, and degraded water quality (USFWS 2002c). Currently, no self-sustaining populations of bonytail are known to exist in the wild, and very few individuals have been caught anywhere within the basin. However, to support recovery efforts in the Upper Colorado River Basin, bonytail are raised at hatchery facilities and stocked in the Green and upper Colorado Rivers. Stocking efforts in the Upper Colorado River Basin have expanded into floodplain wetlands to enhance bonytail growth and survival.

The bonytail is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (USFWS 2006). Similar to other closely related *Gila* species, bonytail probably spawn in rivers in spring over rocky substrates; spawning has been observed in reservoirs over rocky shoals and shorelines. Flooded bottomlands may provide important bonytail nursery habitat. The recent Nature Conservancy Matheson Wetlands fish nursery proposal states that “management of the Central Pond can contribute significantly to the recovery of razorback sucker and other native fish that require back water channels for nursery habitat such as the bonytail chub (*Gila elegans*)” (WRI 2018). Because there were so few bonytail in existence when recovery efforts began, their preferred habitat is still unknown. Through research and monitoring of stocked fish, researchers continue to gain information to help determine this species’ life-history needs and ways to improve their survival (CRR 2018).

Status within Action Area

The bonytail chub is among North America’s most endangered fish species. Its distribution and numbers are so low that it is threatened with extinction. No reproducing populations are known in the wild. Bonytail chub has not been recently observed near the Matheson Wetland Preserve or in the action area. However, the UCR Recovery Program began a reintroduction program in 1996 and has stocked about 84,600 bonytails into the Colorado River since then (Badame and Hudson 2003 *in* USFWS 2006). Recaptures of these stocked individuals have been observed throughout the river, including near the US-191 Bridge. In 2003 and 2004, stocked adult bonytails were captured by USFWS just upstream of the bridge (USFWS 2006). Researchers continue to recapture these hatchery reared fish (in fewer numbers than reported for the razorback sucker) throughout the Colorado River system including locations near the project area (USFWS 2006). As such, it is possible that a few bonytail chub larvae could enter the Matheson Wetland Area after they emerge from spawning gravels in the spring.

Applicable Conservation Measures

The project would implement the conservation measures listed in Section 8 to avoid or minimize potential adverse effects on bonytail chub. These include following general roadway construction protective measures, as well as implementing pollution prevention and spill control plans. The fish conservation measures described in Section 8.4 are designed to help improve habitat for bonytail chub that may use the Matheson Wetlands Preserve. These include managing water levels in the Central Pond and working with other entities to develop a stormwater management plan that is protective of listed fish species that use the Preserve.

Effects Analysis

Direct Effects

No direct effects to bonytail chub are anticipated. There would be no effects to their critical habitat since it has not been designated within the action area.

Indirect Effects

Stormwater runoff would represent an indirect effect to bonytail chub because any effects from increased runoff resulting from the project would be later in time from the proposed action but are still reasonably certain to occur. The Effects Analysis provided for Colorado pikeminnow would also apply to bonytail chub.

Cumulative Effects

Any future development and related changes to stormwater runoff/treatment patterns in the Matheson Wetlands area would need to conform to federal and state water quality regulations. However, assuming that future stormwater runoff is adequately managed, it is possible that some additional beneficial cumulative effects could result from increased stormwater releases into the pond during the spring periods when bonytail chub may be present. Any future state, private, or non-Federal restoration activities in the Preserve are anticipated to benefit bonytail chub.

Determination

The proposed project *"may affect, but is not likely to adversely affect"* bonytail chub. The project would not affect critical habitat since it has not been designated within the action area. The species determination is based primarily on proposed benefits to the species due to improvements in water quality as well as increased flows to the Central Pond and Matheson Wetlands area during the spring months when adult and juvenile life stages may be present. The vegetated water quality swale is expected to provide stormwater treatment up to the 50-year storm event which would reduce exposure of stormwater pollutants to any bonytail chub that may be present in the wetlands area.

8.0 CONSERVATION MEASURES

8.1 General Roadway Construction Standard Operating Procedures

UDOT would incorporate the following environmental conservation measures to avoid or minimize effects to listed species and critical habitats:

- Disturbance due to construction would be minimized to the extent practicable.
- Silt fencing would be installed to prevent material from entering wetlands or drainages.
- Erosion control barriers and bank stabilization techniques would be implemented to reduce possible erosion.
- All construction equipment would be cleaned prior to entering the construction area to minimize the transfer of non-native weed species. The cleaning of equipment would also be done any time thereafter if the equipment leaves the construction site, is used on another project, and then re-enters the site.
- Large equipment access in wetland and floodplain areas would be minimized.
- All mechanized equipment would be inspected for leaks and repairs would be made to stop leaks prior to use.
- Cleared areas would be revegetated with native species (e.g., willows [*Salix* spp.]) intended to provide soil stability and habitat value that is equivalent to the tree/shrub species currently at the site.
- Equipment maintenance and refueling would occur at least 100 feet away from wetlands and other aquatic areas. Equipment refueling and lubrication would be completed with spill containment pads/basins in place and spill prevention kits available on-site at all times in case of after-hours equipment maintenance.
- Implementation of protective measures specified in the Stormwater Pollution Prevention Plan (SWPPP) would provide erosion and sediment control and minimize or avoid accidental spills of hazardous materials. A project Spill Prevention and Countermeasures (SPCC) Plan would be developed and followed during construction. This plan would identify riparian zones and drainages and outline conservation measures to ensure protection. UDOT would implement a plan to identify and protect sensitive resources through applicable conservation measures. The SPCC and SWPPP would address:
    - Refueling of construction equipment near floodplains, riparian zones, or drainages would be done in accordance with applicable state and county codes.
    - Floodplains, riparian zones, and drainages would be defined by staking and flagging in appropriate areas.
    - Equipment near riparian or floodplain zones would contain a hazardous materials response kit to prevent impacts to aquatic species.
- Fill materials would be obtained from a validated clean source.

8.2 Sedimentation Basins and Water Quality Facilities

- The Utah DWQ issued UPDES Permit No. UTS000003 to UDOT that authorizes the discharge of stormwater from UDOT's multiple separate storm sewer system (MS4) to Waters of the State,

subject to meeting the terms and conditions of the Permit. The Permit requires that best management practices (BMPs) be implemented for both construction site stormwater runoff and long-term (permanent) stormwater runoff. BMPs for long-term stormwater quality are designed using UDOT's Stormwater Quality Design Manual.

- Construction site stormwater BMPs include measures to reduce erosion from ground disturbances and capture sediment before it leaves the project site. BMPs for construction site stormwater runoff are described in the project's Stormwater Pollution Prevention Plan (SWPPP). The SWPPP is an implementation plan for addressing the temporary impacts of construction activities on stormwater runoff. The SWPPP contains project-specific information related to how the project will be constructed, a description of the proposed erosion and sediment control BMPs to be implemented and frequency of inspections to be performed.
- The contractor would follow the general roadway construction procedures as described above, as well as implementing pollution prevention and spill control plans.
- Vegetation removal would occur in a small area around the water quality swale. Direct effects to nesting birds are not likely to occur as construction activity would begin prior to April 15, which would deter this species from establishing nests in this area.
- Revegetation of disturbed areas would occur as soon as feasible. Revegetation of the water quality swale with native tree, shrub, and forb species would increase foraging habitat for this species in the long term.

8.3 Wildlife-Specific Conservation Measures

- If construction is to occur within 0.5 mile buffer of southwestern willow flycatcher suitable habitat during the nesting season (May 1 – September 1), construction must be fully underway in these areas prior to April 15th with no breaks in construction activities.

8.4 Fish-Specific Conservation Measures

- Stormwater input to the Central Pond would be managed so that the water level does not exceed 3 feet, which would overtop the pond. This may involve increasing the size of the pond or adding an extra overflow channel. UDOT would work with USFWS, UDWR, and the Nature Conservancy to develop a stormwater management plan that is protective of listed fish species that may be present within the system.
- The City of Moab would be responsible for the future maintenance of the stormwater system. UDOT would execute an agreement with the City to detail the future maintenance responsibilities.

9.0 SUMMARY

Species effect determinations are summarized in Table 5.

Timing of proposed project components and potential species presence within the action area is shown in Table 6.

Table 5. Species and Critical Habitat Effect Determinations

Species	Species Determination	Critical Habitat Determination
Southwestern willow flycatcher	May affect, not likely to adversely affect.	NA
Yellow-billed cuckoo	May affect, not likely to adversely affect.	NA
Colorado pikeminnow	May affect, not likely to adversely affect.	May affect, not likely to adversely affect.
Razorback sucker	May affect, not likely to adversely affect.	May affect, not likely to adversely affect.
Bonytail chub	May affect, not likely to adversely affect.	NA

Table 6. Project Timeline and Species Considerations

	Mar 2019				Apr 2019				May 2019				Jun 2019				Jul 2019				Aug 2019				Sept 2019				Oct 2019				Nov 2019				Dec 2019				Jan 2020				Feb 2020				Mar 2020				Apr 2020			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Project Components																																																						
Site preparation; staging materials and equipment; vegetation clearing																																																						
Roadway widening and construction of stormwater features																																																						
Final clean-up and demobilization																																																						
Restabilization and reclamation																																																						
Species Considerations																																																						
Southwestern Willow Flycatcher																																																						
Breeding season																																																						
Yellow-billed Cuckoo																																																						
Breeding season																																																						
Colorado Pikeminnow																																																						
Pre-spawning adults																																																						
Larvae and Juveniles																																																						
Razorback Sucker																																																						
Pre-spawning adults																																																						
Larvae and Juveniles																																																						
Bonytail Chub																																																						
Larvae and Juveniles																																																						

References: Halterman 2015; UC Davis 2018; USFWS 2002b, 2006; USFWS 2014

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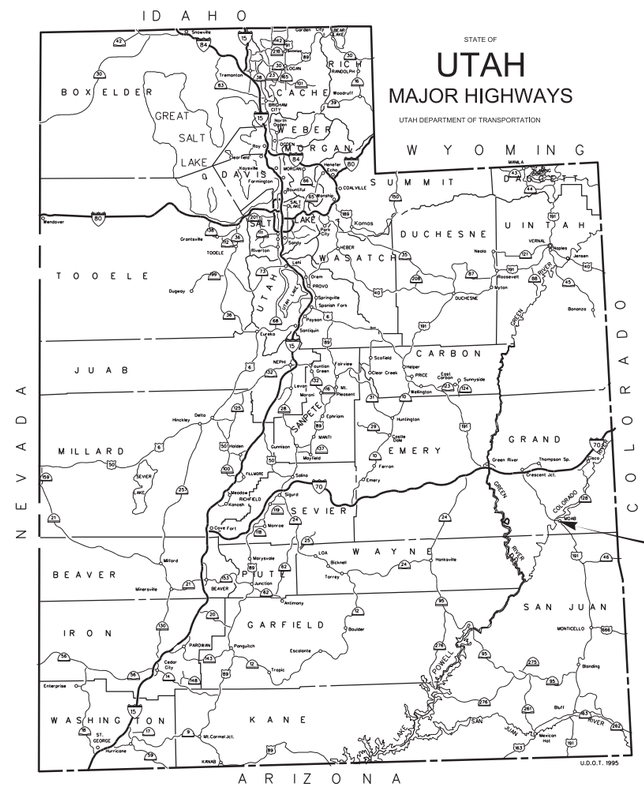
Appendix A

Relevant Project Plans



F-0191(152)126

UTAH
DEPARTMENT OF TRANSPORTATION

SEE SHEET 1A FOR INDEX TO PLAN

SHEET NO. 1

U.S. Standard Units (Inch-Pound Units)

ALL UNITS IN FEET UNLESS OTHERWISE NOTED

PLAN-IN-HAND

PLANS OF PROPOSED STATE ROAD

FEDERAL AID PROJECT

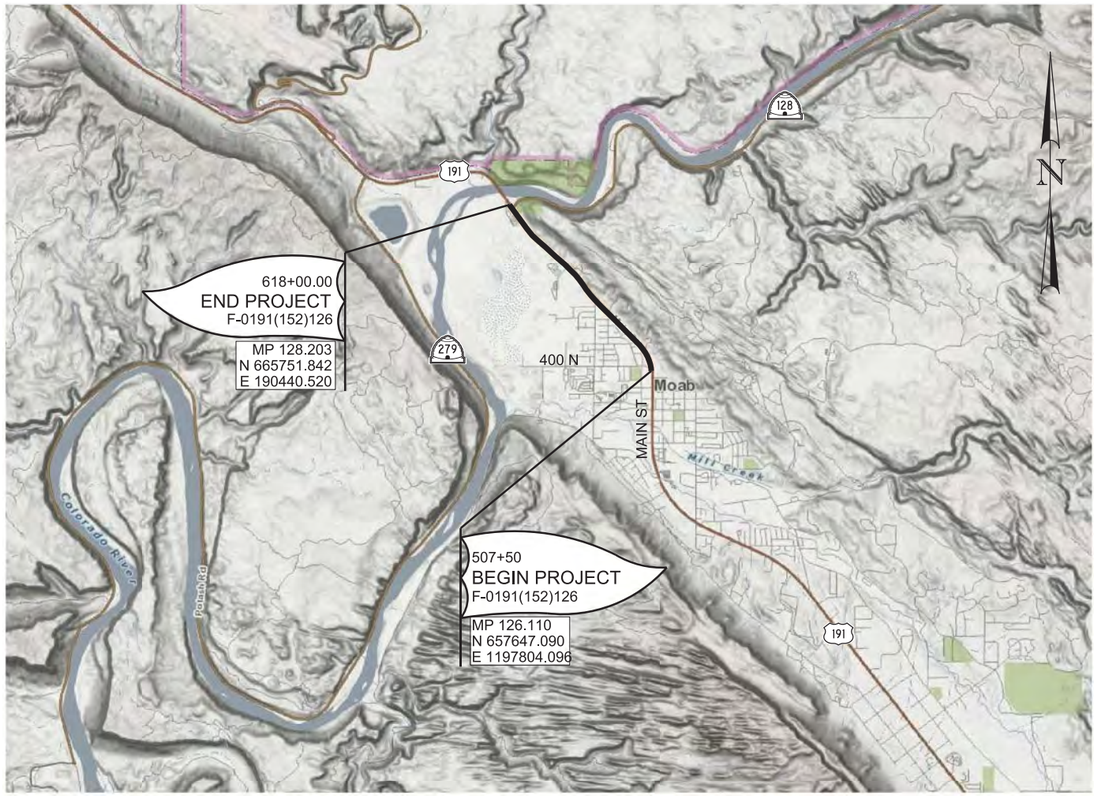
F-0191(152)126 PIN: 15329

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

HIGH VOLUME

GRAND COUNTY

LENGTH 2.053 MILES



THIS SEAL APPLIES TO ALL SHEETS CONTAINING THIS SIGNATURE

VERIFIED FOR SUBMISSION FOR ADVERTISEMENT

DESIGN ENGINEER

UTAH DEPARTMENT OF TRANSPORTATION

APPROVED FOR USE BY UDOT

REGION 4 PRECONSTRUCTION ENGINEER

11-JUL-2018 DGN File:IP_PWP:d0317800\15329_1_TitleSheet.dgn

INDEX TO SHEETS

ROADWAY DRAWINGS		
SHEET NUMBER	NUMBER OF SHEETS	DESCRIPTION
1	1	TITLE SHEET
1-A	1	INDEX TO SHEETS
1-B	1	ABBREVIATIONS AND LEGEND
CR-01	1	CROSS REFERENCE
SC-01 TO SC-02	2	SURVEY CONTROL
TS-01TO TS-05	5	TYPICAL SECTION
DT-01 TO DT-16	16	DETAILS
SM	-	SUMMARY
RD-01 TO RD-22	22	ROADWAY
RP-01 TO RP-22	22	ROADWAY PROFILE
DR-01 TO DR-30	58	DRAINAGE
SSDT-01	1	SIGNING AND STRIPING DETAILS
SS-01 TO SS-22	22	SIGNING AND STRIPING
SG-01A	1	SIGNAL
SG-02A	1	CIRCUIT
SG-S01 TO SG-S03	3	SIGNAL SCHEDULE

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV
QC CHECKED BY TWT
DATE 7/11/2018

APPROVED

PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PROJECT NUMBER: F-0191(152)126 PIN 15329

INDEX TO SHEETS

SHEET NO. 1-A

11-JUL-2018 DGN File:P_PWPad0317880\15329_1-A.dgn

LINE STYLES

SURFACE FEATURE LINE STYLES

- CUT — CUT CATCH LINE
- FILL — FILL CATCH LINE
- TEMPORARY BERM
- CABLE BARRIER
- BUILDING
- FENCE, CHAIN LINK
- Fence, Chain Link Existing
- FENCE, WIRE
- Fence, Wire Existing
- FENCE, WOOD
- Fence, Wood Existing
- FLOW LINE
- Flow Line Existing
- GUARDRAIL
- Guardrail Existing
- NOISE WALL
- Noise Wall Existing
- RAILROAD
- Ditch Irrigation
- PAVE CUT — PAVEMENT CUTTING
- SEDIMENT BARRIER
- SILT FENCE
- STRAW BALE
- VEGETATION LINE
- CONCRETE BARRIER
- Concrete Barrier Existing
- Stone Lined Channel
- River Existing

RIGHT OF WAY LINE STYLES

- SEC — SECTION LINE
- 1/4 — QUARTER SECTION LINE
- 40 — 40 ACRE LINE
- CITY BOUNDARY LINE
- PL — PROPERTY LINE
- N/A — HWY NO-ACCESS LINE
- n/a — Existing No-Access Line
- R/W N/A — HWY R/W & NO-ACCESS LINE
- r/w n/a — Existing R/W & No-Access Line
- L/A — HWY LIMITED-ACCESS LINE
- l/a — Existing Limited-Access Line
- R/W L/A — HWY R/W & LIMITED-ACCESS LINE
- r/w l/a — Existing R/W & Limited-Access Line
- RR — RAILROAD R/W LINE
- rr — Existing Railroad R/W Line
- FRTG R/W — FRONTAGE ROAD R/W
- frtg r/w — Existing Frontage Road R/W
- R/W — HIGHWAY R/W
- r/w — Existing Highway R/W
- PE — PERPETUAL EASEMENT
- pe — Existing Perpetual Easement
- TE — TEMPORARY EASEMENT

SUBSURFACE/OVERHEAD LINE STYLES

- BCTV — CABLE BURIED
- bctv — Cable Buried Existing
- CTV — CABLE OVERHEAD
- ctv — Cable Overhead Existing
- CONDUIT
- Conduit Existing
- PC — PIPE CULVERT
- pc — Pipe Culvert Existing
- BE — ELECTRIC BURIED
- be — Electric Buried Existing
- E — ELECTRIC OVERHEAD
- e — Electric Overhead Existing
- FO — FIBER OPTICS
- fo — Fiber Optics Existing
- G — GAS
- g — Gas Existing
- IR — IRRIGATION
- ir — Irrigation Existing
- PETRO — PETROLEUM
- petro — Petroleum Existing
- SWR — SANITARY SEWER
- swr — Sanitary Sewer Existing
- SD — STORM DRAIN
- sd — Storm Drain Existing
- BTEL — TELEPHONE BURIED
- btel — Telephone Buried Existing
- TEL — TELEPHONE OVERHEAD
- tel — Telephone Overhead Existing
- WTR — WATER
- wtr — Water Existing

SIGNAL LINE STYLES

- pwr — Power Source Circuit Existing
- PWR — POWER SOURCE CIRCUIT
- sig — Signal Circuit Existing
- SIG — SIGNAL CIRCUIT
- ped — Pedestrian Circuit Existing
- PED — PEDESTRIAN CIRCUIT
- psh — Push Button Circuit Existing
- PSH — PUSH BUTTON CIRCUIT
- det — Detection Circuit Existing
- DET — DETECTION CIRCUIT
- fut — Future Conduit Existing
- FUT — FUTURE CONDUIT
- ltg — Lighting Circuit Existing
- LTG — LIGHTING CIRCUIT
- vid — Video Detection Circuit Existing
- VID — VIDEO DETECTION CIRCUIT
- rad — Radar Detection Circuit Existing
- RAD — RADAR DETECTION CIRCUIT
- pem — Preemption Circuit Existing
- PEM — PREEMPTION CIRCUIT

SYMBOLS

- ATMS CABINET
- B.M — Bench Mark
- Cable TV Box
- Electrical Transformer
- Center Line
- Section Corner Found
- Section Corner Not Found
- A — CURB RETURN RADIUS
- Geotech Drill Hole
- TH # — SUE Test Hole
- TREE
- Fire Hydrant
- Valve
- SIGN, GAS
- GP — Gate Post
- Guy Wire or Anchor
- 1 — HORIZONTAL CURVE (#)
- HORIZONTAL/VERTICAL P.I.
- HORIZONTAL/VERTICAL CURVE POINT
- METER
- JUNCTION BOX STREET LIGHT
- JUNCTION BOX
- LIGHT POLE
- UP — UTILITY POLE
- PS — POWER SOURCE
- MAIL BOX
- ME — MANHOLE ELECTRIC
- MG — MANHOLE GAS
- MT — MANHOLE TELEPHONE
- MSD — MANHOLE STORM DRAIN
- MSS — MANHOLE SANITARY SEWER
- MW — MANHOLE WATER
- MONUMENT
- 24:E — PARCEL BALLOON
- RIGHT OF WAY MARKER
- SIGN (SINGLE POST)
- SIGN (DOUBLE POST)
- Signal Pole Existing
- Delineator
- Water Well
- UNDERGROUND SERVICE PED

PROJECT SPECIFIC SYMBOLS AND LINE STYLES

NOTE:
THE LINE STYLES AND SYMBOLS CONTAINED HEREIN ARE NOT ALL INCLUSIVE. ANY ADDITIONAL LINE STYLES NOT SHOWN HERE ARE SHOWN ON THEIR RESPECTIVE SHEETS WITHIN A LEGEND.

PLAN-IN-HAND

REVISIONS | NO. | DATE | APPROVED BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY: DCV | CHECKED BY: TWT | QC | APPROVED | PROFESSIONAL ENGINEER

DATE: 7/11/2018

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PIN: 15329

PROJECT NUMBER: F-0191(152)126

ABBREVIATIONS AND LEGEND

SHEET NO. 1-B

DGN File: P:\Proj\0317800\15329_1-B.dgn
11-JUL-2018

618+00.00
END PROJECT
F-0191(152)126

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E 190440.520

SR-128

RD-22
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SS-22

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DR-02
SS-02

RD-01
RP-01
DR-01
SS-01

DR-24

DR-23

DR-29

DR-27

DR-26

SG-01

DR-30

DR-28

610+00

600+00

590+00

580+00

570+00

560+00

550+00

540+00

530+00

520+00

510+00

US-191

RUBICON TRAIL

500 W

MIVIDA DR

CERMAK ST

400 N

507+50.00
BEGIN PROJECT
F-0191(152)126

MP 126.110
N 657647.090
E 197804.096

N

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV
QC CHECKED BY TWT
DATE 7/11/2018

APPROVED

PROFESSIONAL ENGINEER

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PIN 15329

PROJECT NUMBER F-0191(152)126

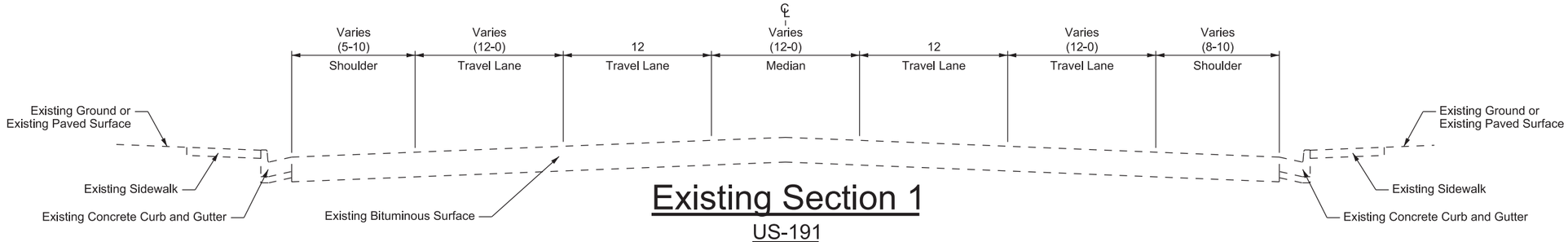
PROJECT

CROSS REFERENCE

SHEET NO. CR-01

DGN File: IP_PWPro\317800\15329_CR-01.dgn

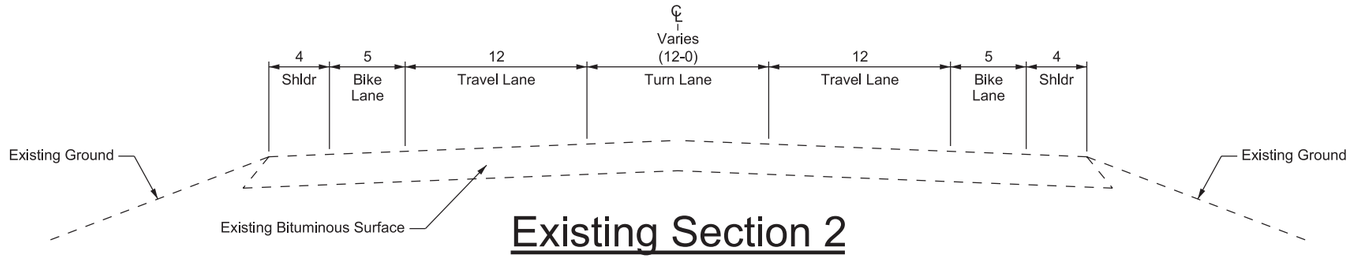
11-JUL-2018



Existing Section 1

US-191

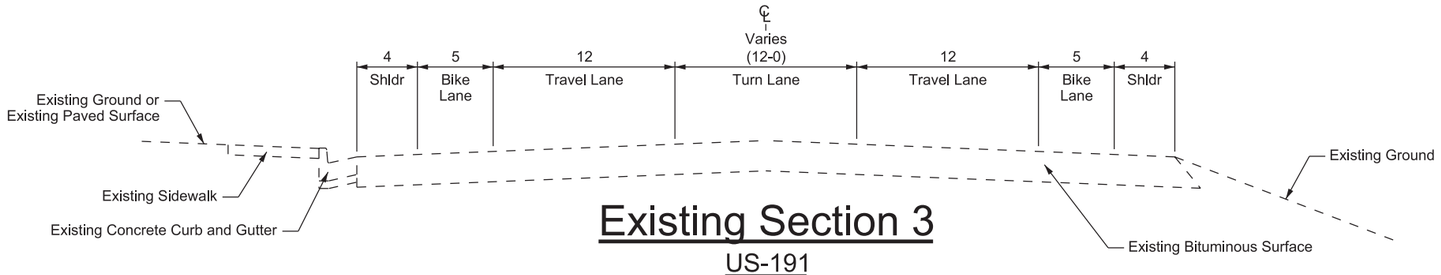
508+44.00 TO 516+78.00



Existing Section 2

US-191

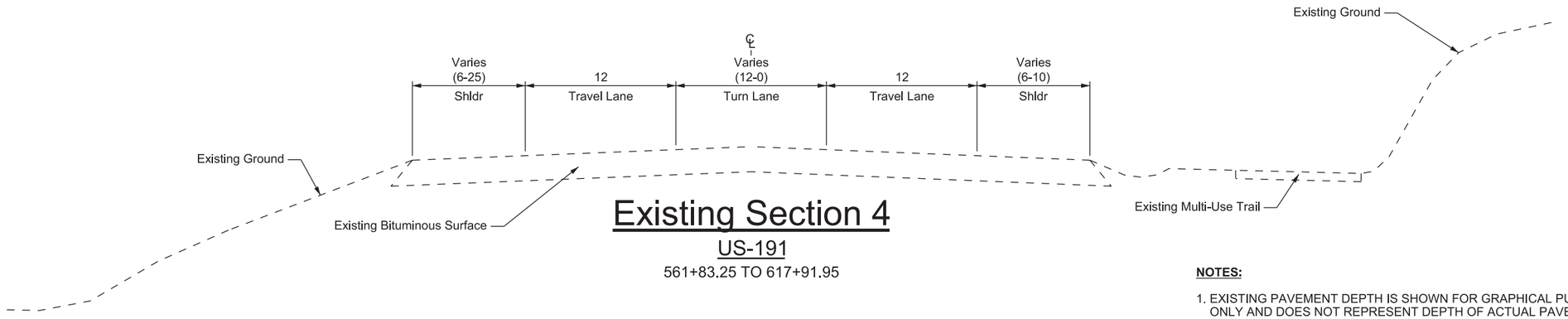
516+78.00 TO 531+33.68
534+77.44 TO 539+76.67



Existing Section 3

US-191

531+33.68 TO 534+77.44
539+76.67 TO 561+83.25



Existing Section 4

US-191

561+83.25 TO 617+91.95

NOTES:

1. EXISTING PAVEMENT DEPTH IS SHOWN FOR GRAPHICAL PURPOSES ONLY AND DOES NOT REPRESENT DEPTH OF ACTUAL PAVEMENT AND SHOULD NOT BE USED FOR CALCULATING QUANTITIES OR ESTIMATING.

PLAN-IN-HAND

REVISIONS | NO. | DATE | APPROVED BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV | CHECKED BY TWT | QC

APPROVED

7/11/2018 DATE

PROFESSIONAL ENGINEER

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PROJECT

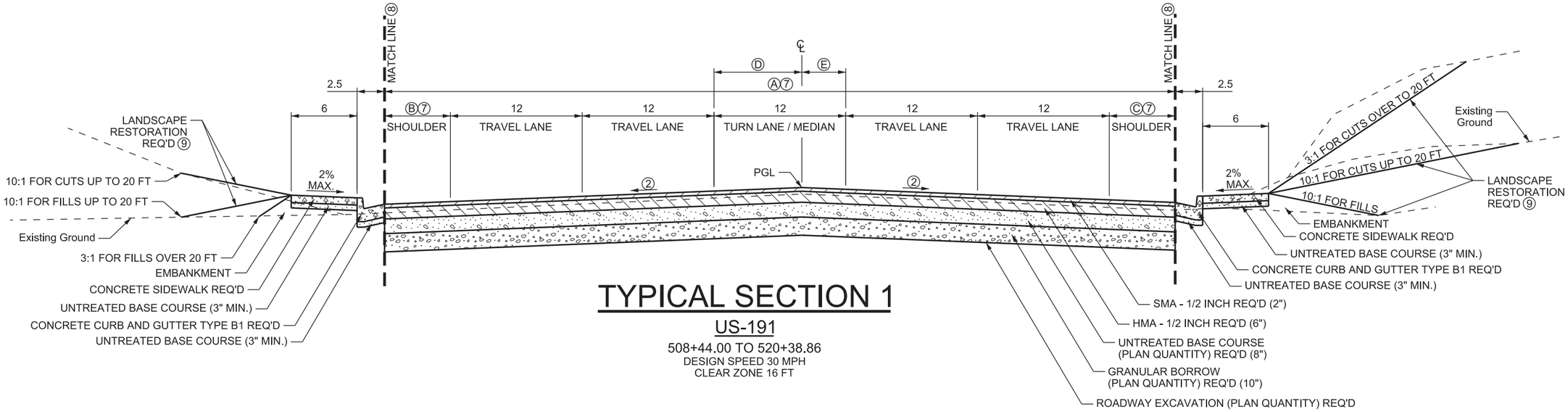
F-0191(152)126 PIN 15329

PROJECT NUMBER

TYPICAL SECTION

SHEET NO. TS-01

DGN File: P:\Proj\0317880\15329_TS-01.dgn
11-JUL-2018



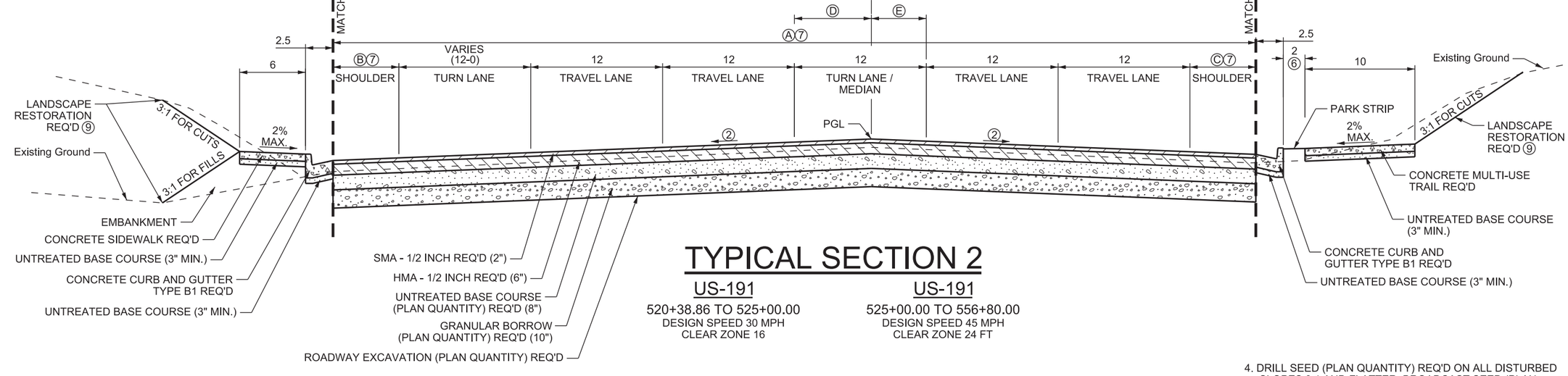
TYPICAL SECTION 1

US-191

508+44.00 TO 520+38.86

DESIGN SPEED 30 MPH

CLEAR ZONE 16 FT



TYPICAL SECTION 2

US-191

520+38.86 TO 525+00.00

DESIGN SPEED 30 MPH

CLEAR ZONE 16

US-191

525+00.00 TO 556+80.00

DESIGN SPEED 45 MPH

CLEAR ZONE 24 FT

NOTES:

1. EXISTING PAVEMENT DEPTH IS SHOWN FOR GRAPHICAL PURPOSES ONLY AND DOES NOT REPRESENT DEPTH OF ACTUAL PAVEMENT AND SHOULD NOT BE USED FOR CALCULATING QUANTITIES OR ESTIMATING.

② SUPERELEVATE ROADWAY ACCORDING TO SUPER ELEVATION DIAGRAM SHOWN ON RP SHEETS.

3. STRIP, STOCKPILE, AND SPREAD TOPSOIL (PLAN QUANTITY) REQ'D

   STRIP AT A 4 - INCH MINIMUM THICKNESS, TOPSOIL FROM EDGE OF EXISTING PAVEMENT TO NEW CATCH POINT, EXCEPT ON ROCK OUTCROPPINGS.

   SPREAD TOPSOIL AT A 4 - INCH MINIMUM THICKNESS ON ALL DISTURBED SLOPES UP TO THE BOTTOM OF UNTREATED BASE COURSE, EXCEPT ON ROCK OUTCROPPINGS.

4. DRILL SEED (PLAN QUANTITY) REQ'D ON ALL DISTURBED SLOPES 3:1 AND FLATTER, BROADCAST SEED (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 3:1.

5. HECP TYPE 1 REQ'D ON ALL SLOPES 2:1 AND FLATTER. STEEP-SLOPE EROSION CONTROL (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 2:1. STEEP SLOPE EROSION CONTROL TO HALF WAY ACROSS SLOPE FACE THROUGH THE TRANSITION TO FLATTER SLOPES AND THROUGH SLOPE ROUNDING LIMITS.

⑥ PARK STRIP VARIES FROM 2 FT TO 6 FT BETWEEN 554+00.00 TO 556+80.00.

⑦ VARIES SEE TABLE ON SHEET TS-05.

⑧ REFER TO SIDE TREATMENTS ON SHEETS TS-04 AND TS-05 FOR LOCATIONS WHERE SIDE TREATMENTS DIFFER FROM THIS LOCATION.

⑨ SEE LANDSCAPING SUMMARY SHEET IN SM SERIES SHEETS FOR LANDSCAPE RESTORATION AND SLOPE STABILIZATION REQUIREMENTS.

PLAN-IN-HAND

REVISIONS | NO. | DATE | APPROVED BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV | CHECKED BY TWT | QC | APPROVED | DATE 7/11/2018

PROFESSIONAL ENGINEER

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PIN 15329

PROJECT NUMBER F-0191(152)126

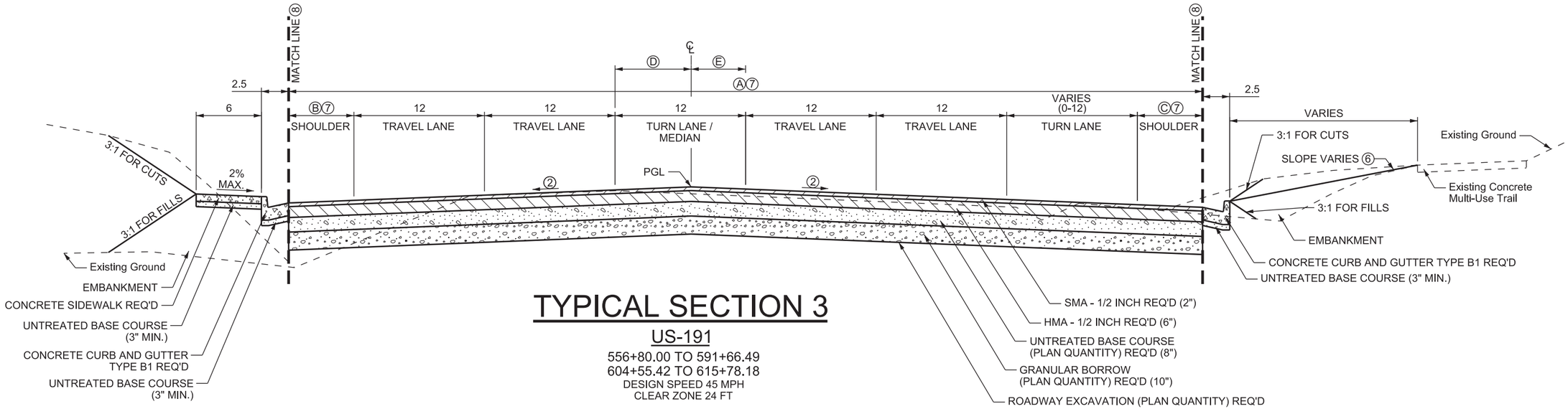
TYPICAL SECTION

PROJECT

SHEET NO. TS-02

DGN File: IP PWP:d0317820\15329_TS-02.dgn

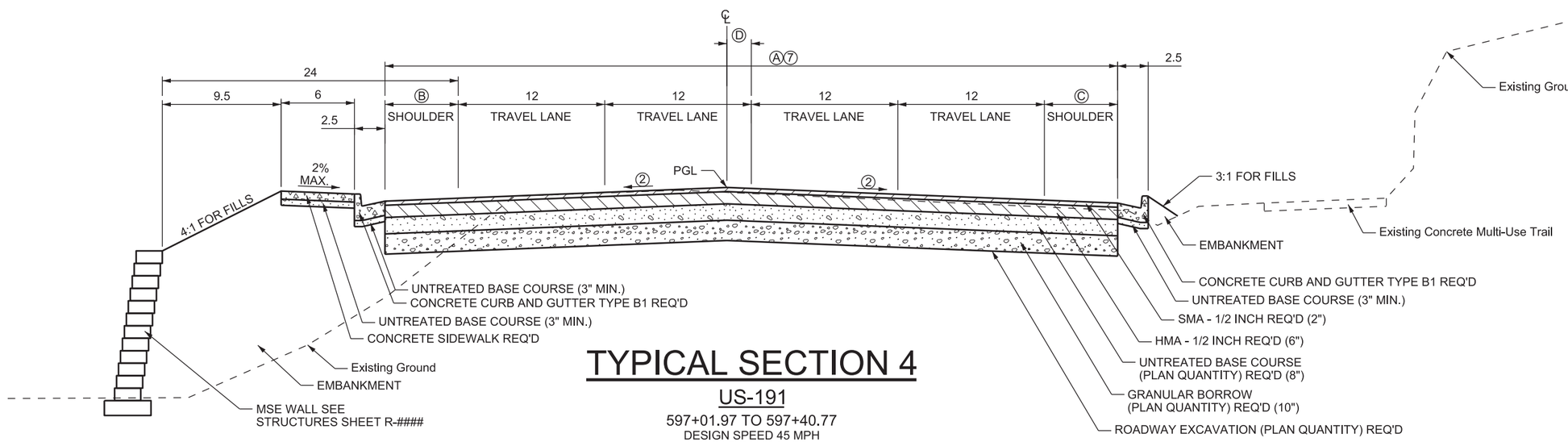
11-JUL-2018



TYPICAL SECTION 3

US-191

556+80.00 TO 591+66.49
604+55.42 TO 615+78.18
DESIGN SPEED 45 MPH
CLEAR ZONE 24 FT



TYPICAL SECTION 4

US-191

597+01.97 TO 597+40.77
DESIGN SPEED 45 MPH
CLEAR ZONE 24 FT

TYPICAL SECTION TRANSITION TABLE		
TYPICAL SECTION TRANSITION TABLE	BEGIN STA.	END STA.
TYPICAL SECTION 3 TO TYPICAL SECTION 4	591+66.49	597+01.97
TYPICAL SECTION 4 TO TYPICAL SECTION 3	597+40.77	604+55.42

NOTES:

1. EXISTING PAVEMENT DEPTH IS SHOWN FOR GRAPHICAL PURPOSES ONLY AND DOES NOT REPRESENT DEPTH OF ACTUAL PAVEMENT AND SHOULD NOT BE USED FOR CALCULATING QUANTITIES OR ESTIMATING.

② SUPERELEVATE ROADWAY ACCORDING TO SUPER ELEVATION DIAGRAM SHOWN ON RP SHEETS.

3. STRIP, STOCKPILE, AND SPREAD TOPSOIL (PLAN QUANTITY) REQ'D

   STRIP AT A 4 - INCH MINIMUM THICKNESS, TOPSOIL FROM EDGE OF EXISTING PAVEMENT TO NEW CATCH POINT, EXCEPT ON ROCK OUTCROPPINGS.

   SPREAD TOPSOIL AT A 4 - INCH MINIMUM THICKNESS ON ALL DISTURBED SLOPES UP TO THE BOTTOM OF UNTREATED BASE COURSE, EXCEPT ON ROCK OUTCROPPINGS.

4. DRILL SEED (PLAN QUANTITY) REQ'D ON ALL DISTURBED SLOPES 3:1 AND FLATTER, BROADCAST SEED (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 3:1.

5. HECP TYPE 1 REQ'D ON ALL SLOPES 2:1 AND FLATTER. STEEP-SLOPE EROSION CONTROL (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 2:1. STEEP SLOPE EROSION CONTROL TO HALF WAY ACROSS SLOPE FACE THROUGH THE TRANSITION TO FLATTER SLOPES AND THROUGH SLOPE ROUNDING LIMITS.

⑥ SLOPE VARIES WHEN CURB AND GUTTER IS WITHIN 5 FT OF EXISTING CONCRETE MULTI-USE TRAIL.

⑦ VARIES SEE TABLE ON SHEET TS-05.

⑧ REFER TO SIDE TREATMENTS ON SHEETS TS-04 AND TS-05 FOR LOCATIONS WHERE SIDE TREATMENTS DIFFER FROM THIS LOCATION.

PLAN-IN-HAND

REVISIONS | NO. | DATE | APPROVED BY | REMARKS

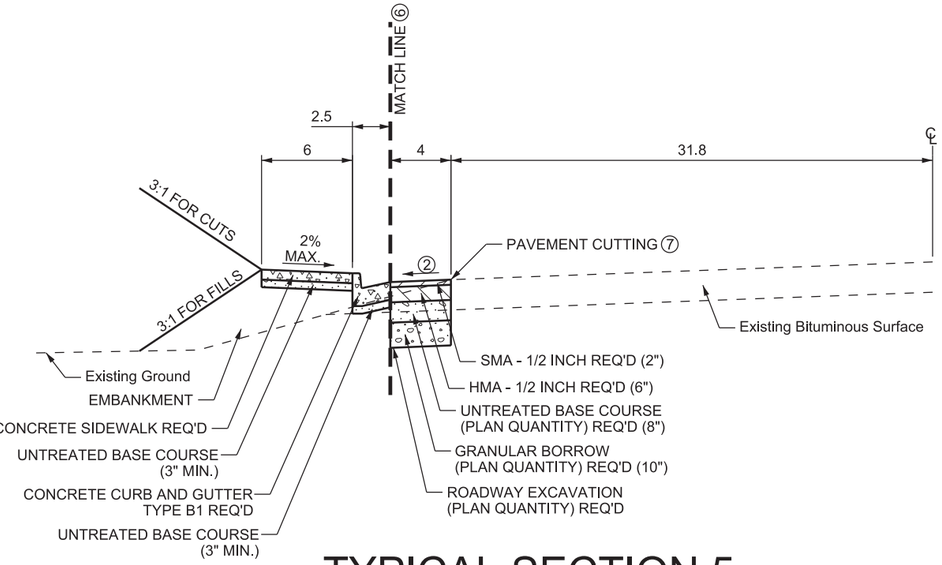
UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY | DCV
CHECKED BY | TWT
QC
DATE 7/11/2018
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PIN 15329
PROJECT NUMBER F-0191(152)126
TYPICAL SECTION

SHEET NO. TS-03

DGN File: IP_PWPw9317880\15329_TS-03.dgn
11-JUL-2018



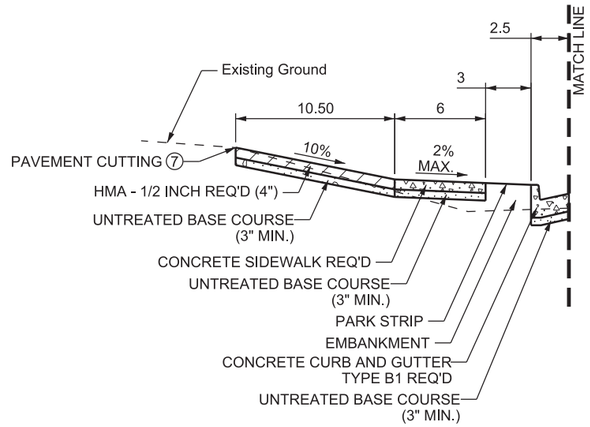
TYPICAL SECTION 5

US-191

615+78.18 TO 617+91.95

DESIGN SPEED 45 MPH

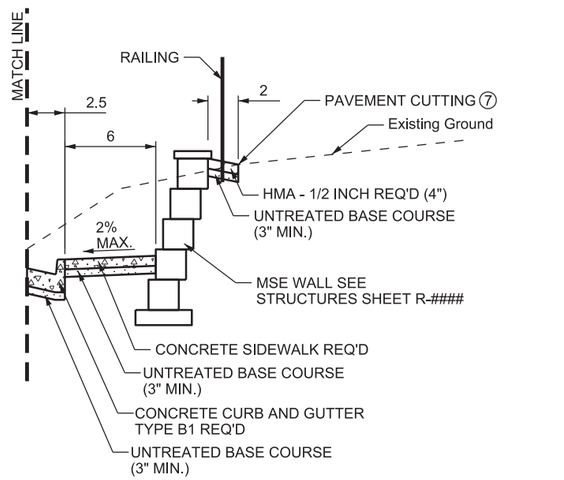
CLEAR ZONE 24 FT



SIDE TREATMENT A

US-191

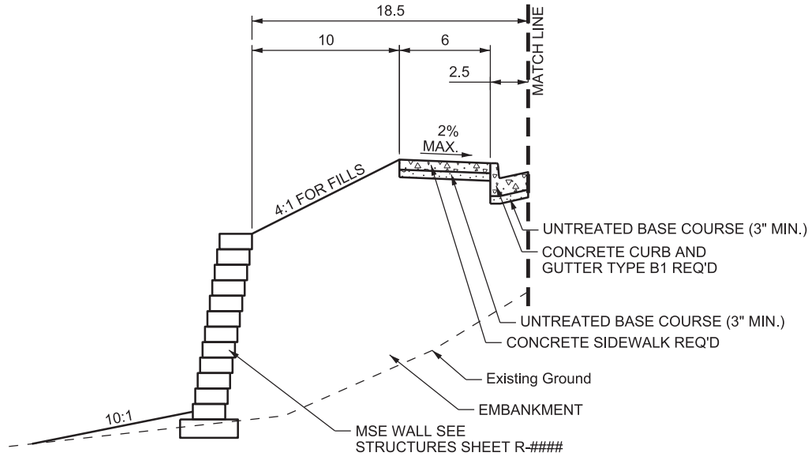
511+02.50, LT TO 513+77.55, LT



SIDE TREATMENT B

US-191

518+53.00, RT TO 520+66.25, RT



SIDE TREATMENT C

US-191

545+90.00, LT TO 548+22.00, LT

NOTES:

1. EXISTING PAVEMENT DEPTH IS SHOWN FOR GRAPHICAL PURPOSES ONLY AND DOES NOT REPRESENT DEPTH OF ACTUAL PAVEMENT AND SHOULD NOT BE USED FOR CALCULATING QUANTITIES OR ESTIMATING.

② SUPERELEVATE ROADWAY ACCORDING TO SUPER ELEVATION DIAGRAM SHOWN ON RP SHEETS.

3. STRIP, STOCKPILE, AND SPREAD TOPSOIL (PLAN QUANTITY) REQ'D

   STRIP AT A 4 - INCH MINIMUM THICKNESS, TOPSOIL FROM EDGE OF EXISTING PAVEMENT TO NEW CATCH POINT, EXCEPT ON ROCK OUTCROPPINGS.

   SPREAD TOPSOIL AT A 4 - INCH MINIMUM THICKNESS ON ALL DISTURBED SLOPES UP TO THE BOTTOM OF UNTREATED BASE COURSE, EXCEPT ON ROCK OUTCROPPINGS.

4. DRILL SEED (PLAN QUANTITY) REQ'D ON ALL DISTURBED SLOPES 3:1 AND FLATTER, BROADCAST SEED (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 3:1.

5. HECP TYPE 1 REQ'D ON ALL SLOPES 2:1 AND FLATTER. STEEP-SLOPE EROSION CONTROL (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 2:1. STEEP SLOPE EROSION CONTROL TO HALF WAY ACROSS SLOPE FACE THROUGH THE TRANSITION TO FLATTER SLOPES AND THROUGH SLOPE ROUNDING LIMITS.

⑥ REFER TO SIDE TREATMENTS ON SHEETS TS-04 AND TS-05 FOR LOCATIONS WHERE SIDE TREATMENTS DIFFER FROM THIS LOCATION.

⑦ REFER TO RD SERIES SHEETS FOR PAVEMENT CUT LOCATIONS.

PLAN-IN-HAND

REVISIONS | NO. | DATE | APPROVED BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV | CHECKED BY QC TWT | DATE 7/11/2018 | APPROVED | PROFESSIONAL ENGINEER

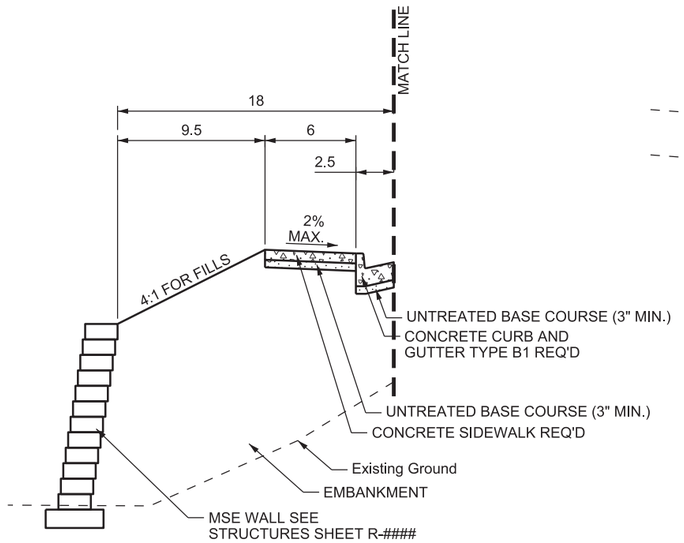
US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PIN 15329

PROJECT F-0191(152)126

TYPICAL SECTION

SHEET NO. TS-04

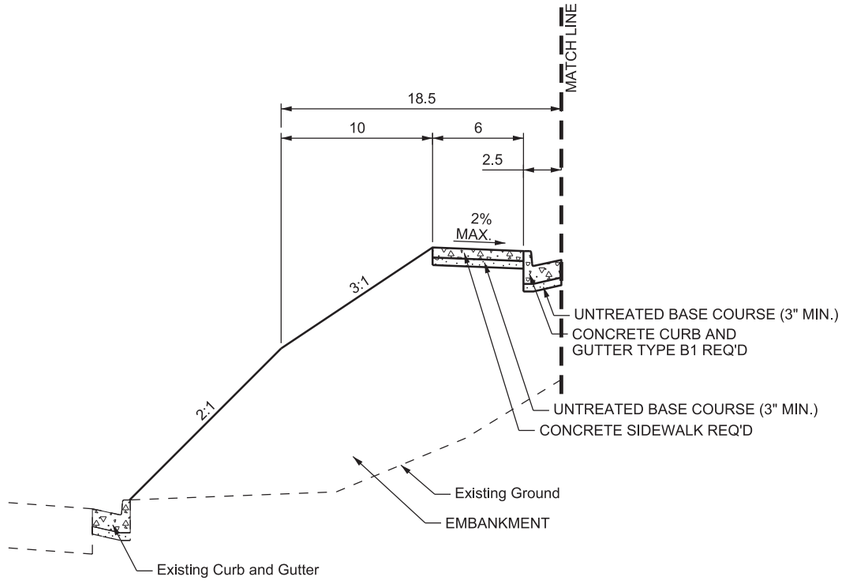


SIDE TREATMENT D

US-191

595+20.00, LT TO 597+01.97, LT
597+40.77, LT TO 608+19.35, LT

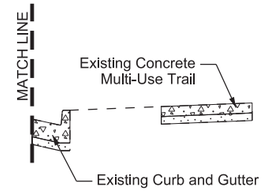
TABLE 1							
LINE	BEGIN STA.	END STA.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
US-191	508+44.00	510+25.32	73.03 - 72.00	5.97 - 6.00	7.07 - 6.00	8	4
US-191	510+25.32	530+75.74	72.00	6.00	6.00	8	4
US-191	530+75.74	531+53.17	72.00 - 74.42	6.00 - 8.38	6.00	8 - 7	4 - 5
US-191	531+53.17	532+11.73	74.42 - 74.04	8.38 - 8.04	6.00	7	5
US-191	532+11.73	534+98.41	74.04 - 74.93	8.04 - 8.93	6.00	7	5
US-191	534+98.41	539+85.19	74.93 - 74.95	8.93 - 8.95	6.00	7	5
US-191	539+85.19	544+77.76	74.95 - 78.16	8.95 - 12.16	6.00	7	5
US-191	544+77.76	552+57.92	78.16 - 82.80	12.16 - 16.80	6.00	7	5
US-191	552+57.92	554+19.33	82.80 - 83.00	16.80 - 6.00	6.00	7	5
US-191	554+19.33	557+30.52	83.00	6.00	6.00	7	5
US-191	557+30.52	559+14.00	83.00 - 72.00	6.00	6.00	7	5
US-191	559+14.00	591+66.49	72.00	6.00	6.00	7	5
US-191	591+66.49	597+01.97	72.00 - 60.00	6.00	6.00	7 - 0.93	5 - 0
US-191	597+01.97	597+40.77	60.00	6.00	6.00	0.93 - 1	0
US-191	597+40.77	604+55.42	60.00 - 72.00	6.00	6.00	1 - 6	0 - 6
US-191	604+55.42	608+19.35	72.00	6.00	6.00	6	6
US-191	608+19.35	609+00.69	72.00 - 72.91	6.00	6.00 - 4.00	6	6
US-191	609+00.69	615+78.18	72.91 - 81.56	6.00	4.00	6 - 5.8	6 - 6.2



SIDE TREATMENT E

US-191

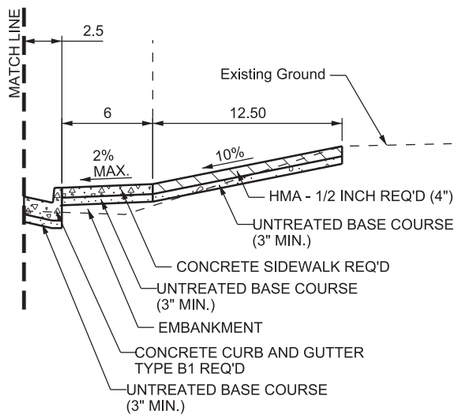
591+66.49, LT TO 595+20.00, LT



SIDE TREATMENT F

US-191

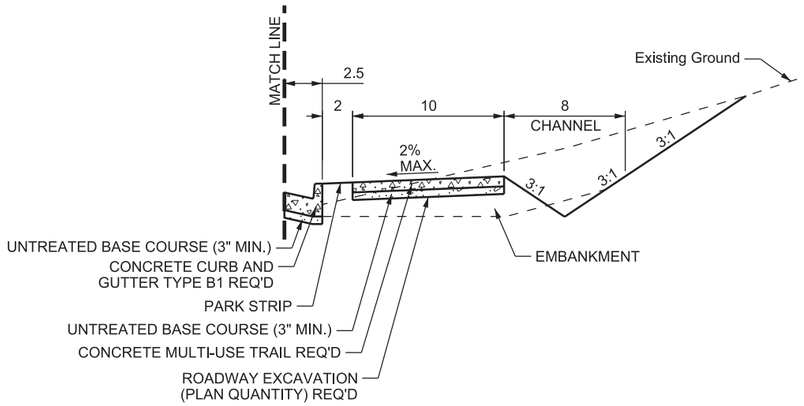
612+33.96, RT TO 615+78.18,RT



SIDE TREATMENT G

US-191

514+56.59, RT TO 517+51.51, RT



SIDE TREATMENT H

US-191

522+00.00, RT TO 527+15.00, RT
527+40.00, RT TO 530+60.00, RT
531+00.00, RT TO 537+40.00, RT
548+60.00, RT TO 551+30.00, RT

NOTES:

1. EXISTING PAVEMENT DEPTH IS SHOWN FOR GRAPHICAL PURPOSES ONLY AND DOES NOT REPRESENT DEPTH OF ACTUAL PAVEMENT AND SHOULD NOT BE USED FOR CALCULATING QUANTITIES OR ESTIMATING.

2. STRIP, STOCKPILE, AND SPREAD TOPSOIL (PLAN QUANTITY) REQ'D

   STRIP AT A 4 - INCH MINIMUM THICKNESS, TOPSOIL FROM EDGE OF EXISTING PAVEMENT TO NEW CATCH POINT, EXCEPT ON ROCK OUTCROPPINGS.

   SPREAD TOPSOIL AT A 4 - INCH MINIMUM THICKNESS ON ALL DISTURBED SLOPES UP TO THE BOTTOM OF UNTREATED BASE COURSE, EXCEPT ON ROCK OUTCROPPINGS.

3. DRILL SEED (PLAN QUANTITY) REQ'D ON ALL DISTURBED SLOPES 3:1 AND FLATTER, BROADCAST SEED (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 3:1.

4. HECP TYPE 1 REQ'D ON ALL SLOPES 2:1 AND FLATTER. STEEP-SLOPE EROSION CONTROL (PLAN QUANTITY) REQ'D ON ALL SLOPES STEEPER THAN 2:1. STEEP SLOPE EROSION CONTROL TO HALF WAY ACROSS SLOPE FACE THROUGH THE TRANSITION TO FLATTER SLOPES AND THROUGH SLOPE ROUNDING LIMITS.

PLAN-IN-HAND

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY	DCV
QC CHECKED BY	TWT
DATE	7/11/2018
APPROVED	

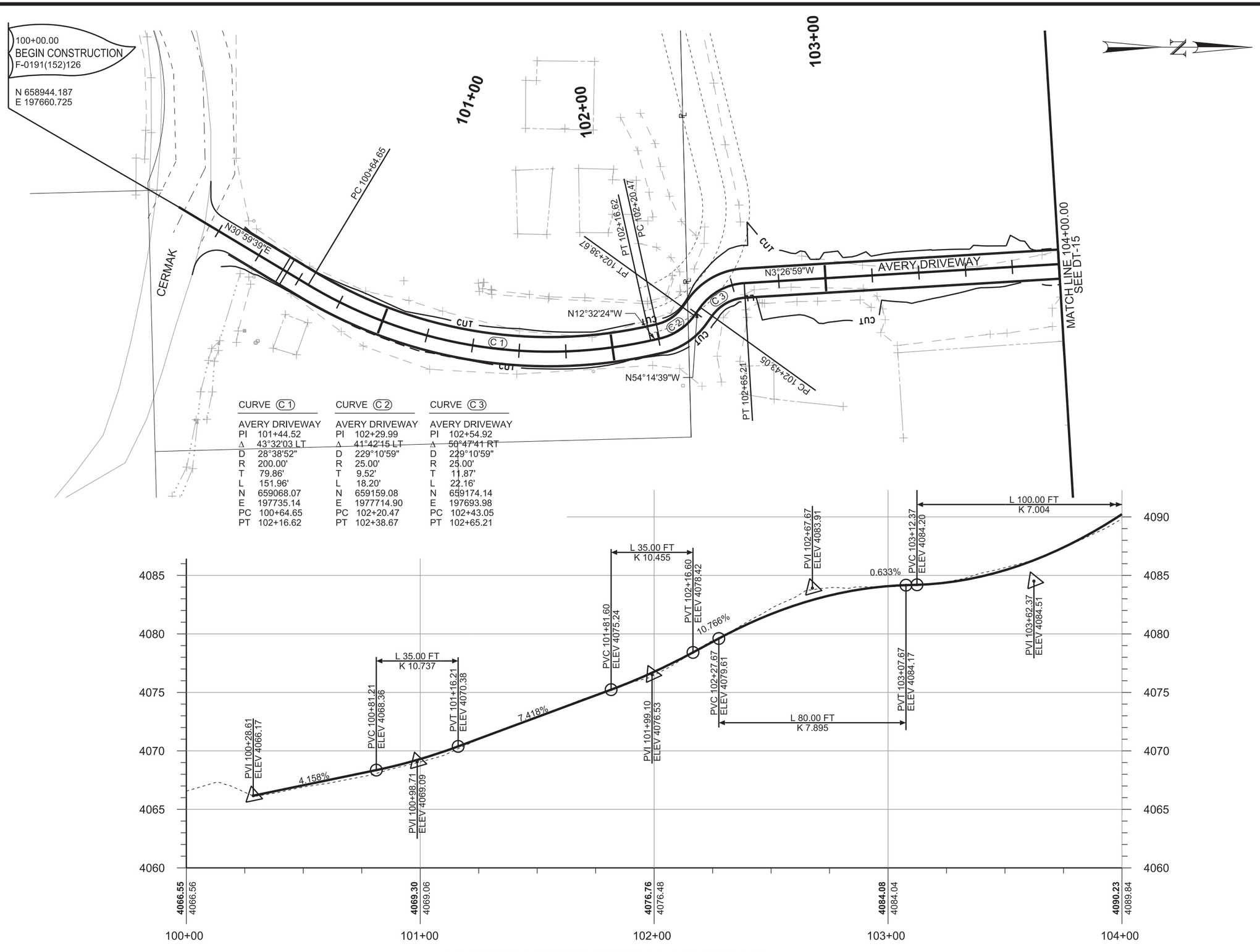
PROFESSIONAL ENGINEER

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PROJECT NUMBER	F-0191(152)126
PIN	15329

TYPICAL SECTION

SHEET NO. TS-05

DGN File: IP_PWPed03178801\15329_TS-05.dgn
11-JUL-2018



CURVE C 1		CURVE C 2		CURVE C 3	
AVERY DRIVEWAY		AVERY DRIVEWAY		AVERY DRIVEWAY	
PI	101+44.52	PI	102+29.99	PI	102+54.92
Δ	43°32'03 LT	Δ	41°42'15 LT	Δ	50°47'41 RT
D	28°38'52"	D	229°10'59"	D	229°10'59"
R	200.00'	R	25.00'	R	25.00'
T	79.86'	T	9.52'	T	11.87'
L	151.96'	L	18.20'	L	22.16'
N	659068.07	N	659159.08	N	659174.14
E	197735.14	E	1977714.90	E	197693.98
PC	100+64.65	PC	102+20.47	PC	102+43.05
PT	102+16.62	PT	102+38.67	PT	102+65.21

AVERY DRIVEWAY DETAIL

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

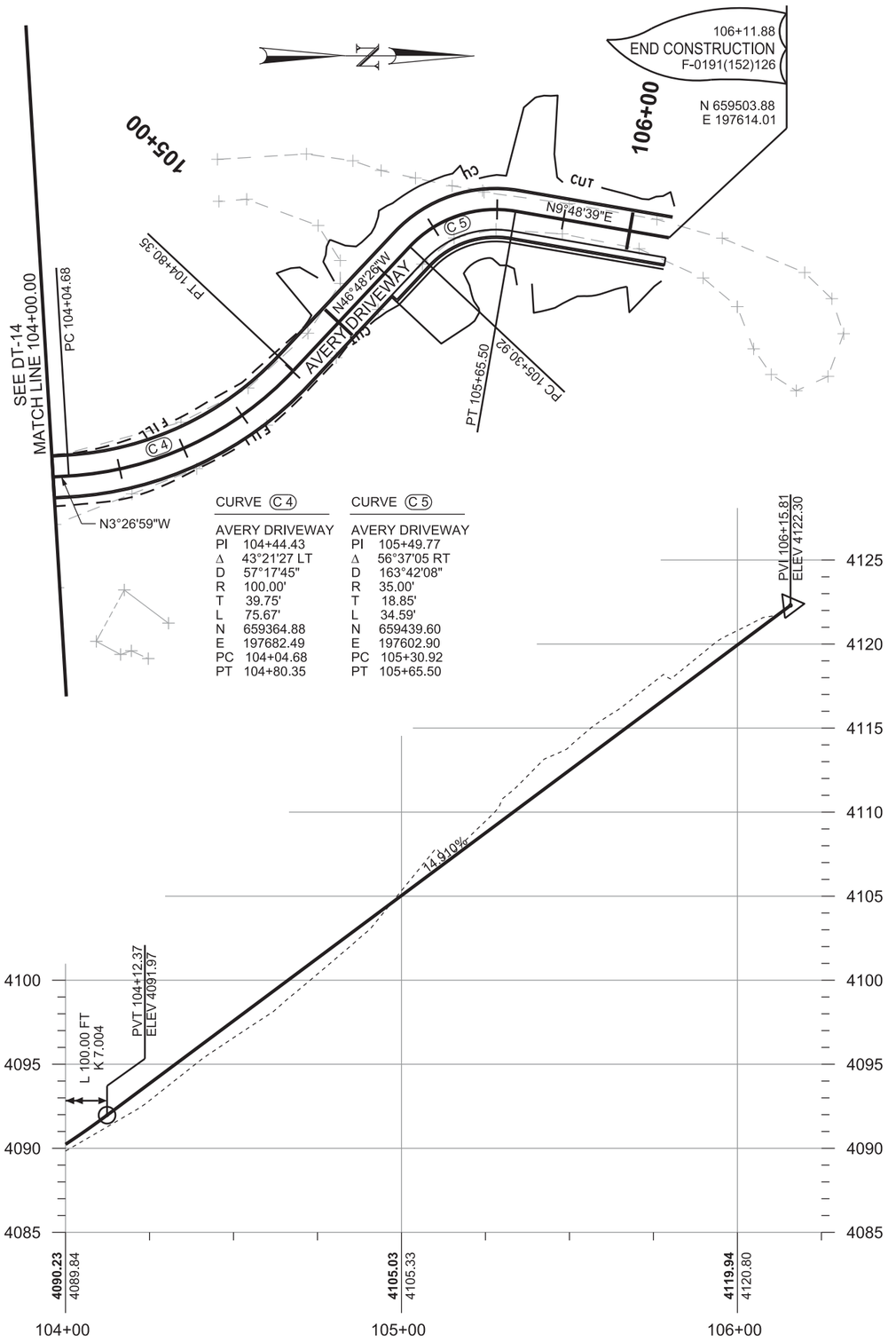
PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

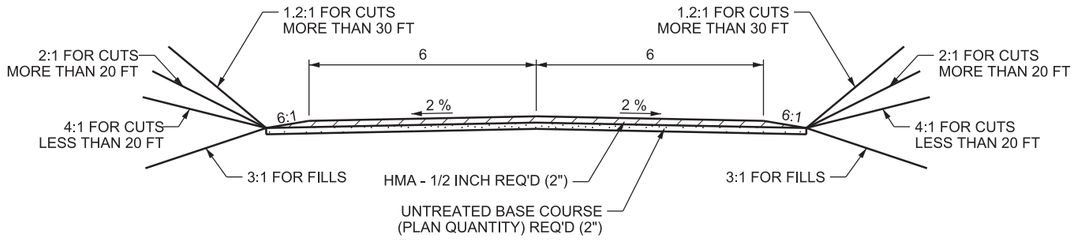
DRAWN BY DCV
QC CHECKED BY TWT
APPROVED
7/11/2018 DATE
PROFESSIONAL ENGINEER

US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PIN 15329
PROJECT NUMBER F-0191(152)126
PROJECT
DETAILS
SHEET NO. DT-14

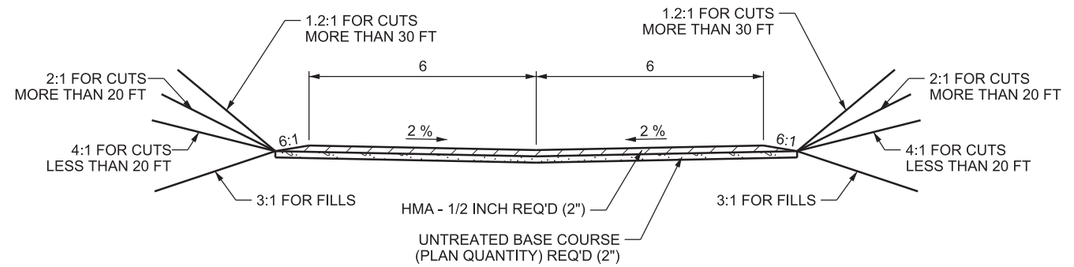
DGN File:IP_PWPod0317800\15329_DT-14.dgn
11-JUL-2018



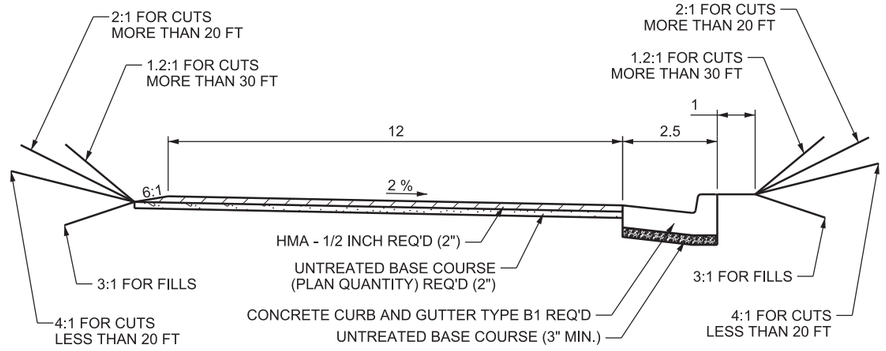
AVERY DRIVEWAY DETAIL



SECTION A
AVERY DRIVEWAY
100+00.00 TO 100+28.61



SECTION B
AVERY DRIVEWAY
100+52.03 TO 103+46.28



SECTION C
AVERY DRIVEWAY
105+16.28 TO 106+11.88

TRANSITION TABLE		
SECTION A TO SECTION B	100+28.61	100+52.03
SECTION A TO SECTION B	103+46.28	105+16.28

PLAN-IN-HAND

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV
QC CHECKED BY TWT
DATE 7/11/2018
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PIN 15329
PROJECT NUMBER F-0191(152)126
DETAILS

SHEET NO. DT-15

ODN File: IP_PWPw@0317880\15329_DT-15.dgn
11-JUL-2018

UTILITY CONTACT LIST			
UTILITY COMPANY	CONTACT	UTILITY	PHONE
BLUE STAKES		UTILITY NOTIFICATION CENTER	800-662-4111
DOMINION ENERGY	RON DICKERSON	NATURAL GAS	435-719-2490
EMERY TELCOM	JOSEPH JORGENSEN	FIBER, CATV, PHONE	435-749-1412
FRONTIER COMMUNICATIONS	RANDY FRENCH	FIBER & PHONE	435-260-2104
MOAB CITY	LEVI JONES	WATER	435-260-8046
MOAB CITY	COLBY MEANS	SEWER	435-210-4726
MOAB CITY	JEFF GALLEY	STORM SEWER & IRRIGATION	435-260-1869
ROCKY MOUNTAIN POWER	SPENCER FOWLER	POWER	888-221-7070
UDOT	GREG OGDEN	FIBER & SIGNALS	435-201-4465

CURVE ①
US-191
PI 514+78.55
Δ 35°14'39" LT
D 2°29'53"
R 2293.61'
T 728.55'
L 1410.86'
N 658364.30
E 197676.06
PC 507+50.00
PT 521+60.86

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE ASPHALT PAVEMENT REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT MANHOLE REQ'D

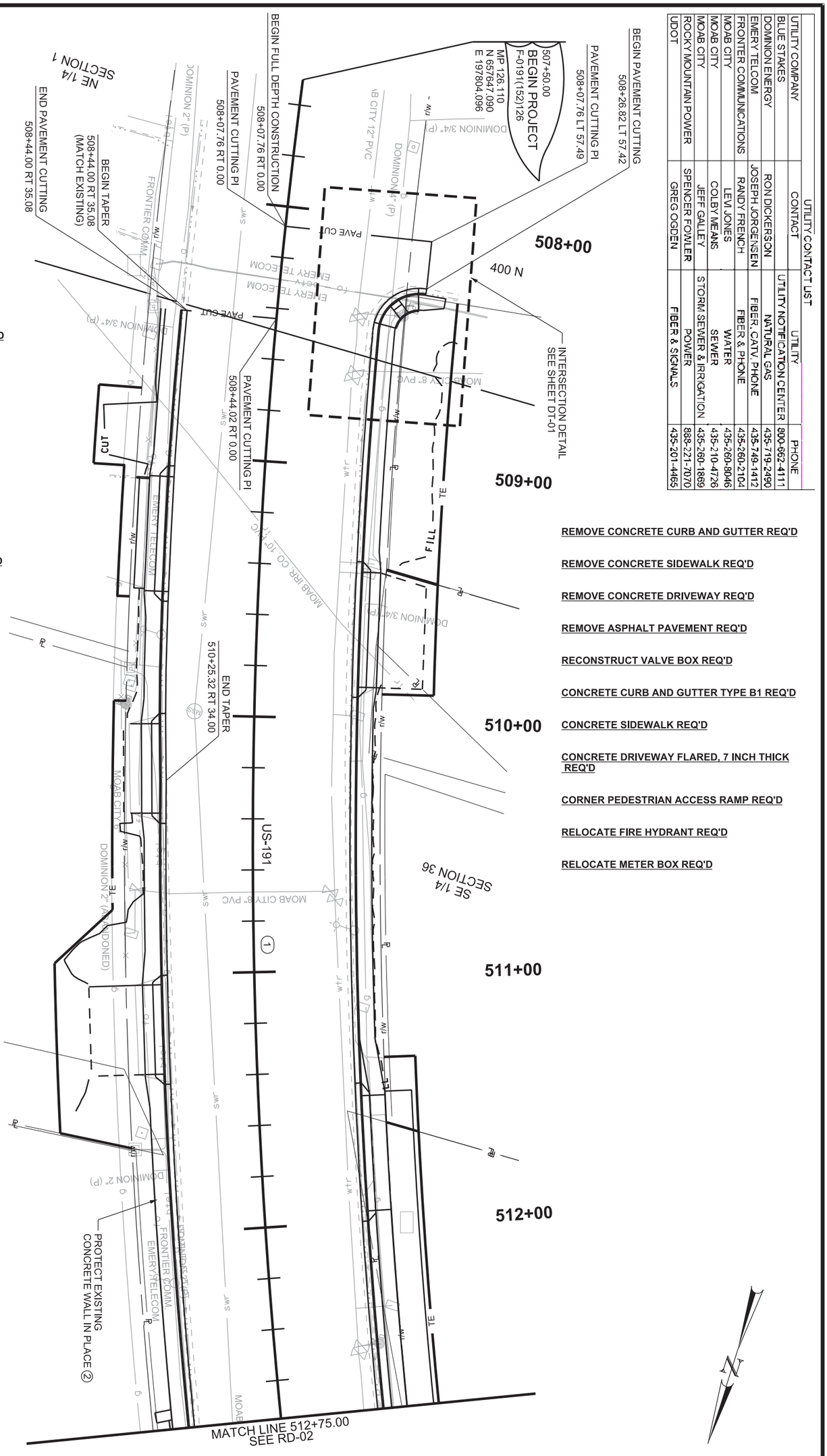
RECONSTRUCT FIRE HYDRANT

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

RELOCATE METER BOX REQ'D



REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE ASPHALT PAVEMENT REQ'D

RECONSTRUCT VALVE BOX REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

RELOCATE FIRE HYDRANT REQ'D

RELOCATE METER BOX REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.
② PLACE CONCRETE SIDEWALK REQ'D UP TO FACE OF EXISTING CONCRETE RETAINING WALL. PROTECT EXISTING CONCRETE RETAINING WALL IN PLACE. REPAIR ANY DAMAGE AT NO ADDITIONAL COST TO THE DEPARTMENT.

SHEET NO. RD-01

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE	REVISIONS
PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV
	ROADWAY	PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT

PLAN-IN-HAND

NO. DATE APPROVED BY REMARKS

CURVE (1)

US-191	
PI	514+78.55
Δ	35°14'39" LT
D	2°29'53"
R	2293.61'
T	728.55'
L	1410.86'
E	658364.30
N	1976'6.06
PC	507+50.00
PT	521+60.86

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE ASPHALT PAVEMENT REQ'D

RECONSTRUCT MANHOLE REQ'D

RELOCATE FIRE HYDRANT REQ'D

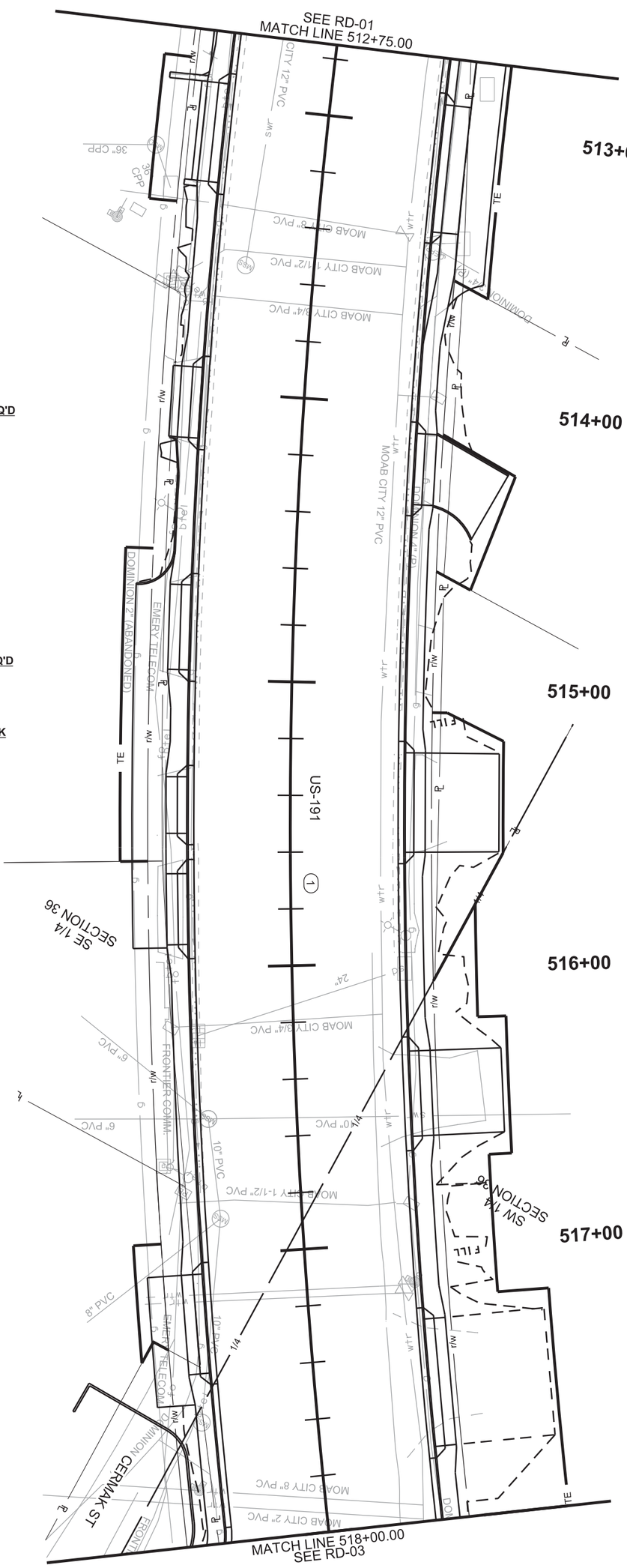
RELOCATE METER BOX REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D



REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE ASPHALT PAVEMENT REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT WATER SERVICE REQ'D

RELOCATE 8 INCH PVC WATER LINE

RELOCATE 12 INCH PVC WATER LINE

RELOCATE METER BOX REQ'D

RELOCATE FIRE HYDRANT REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

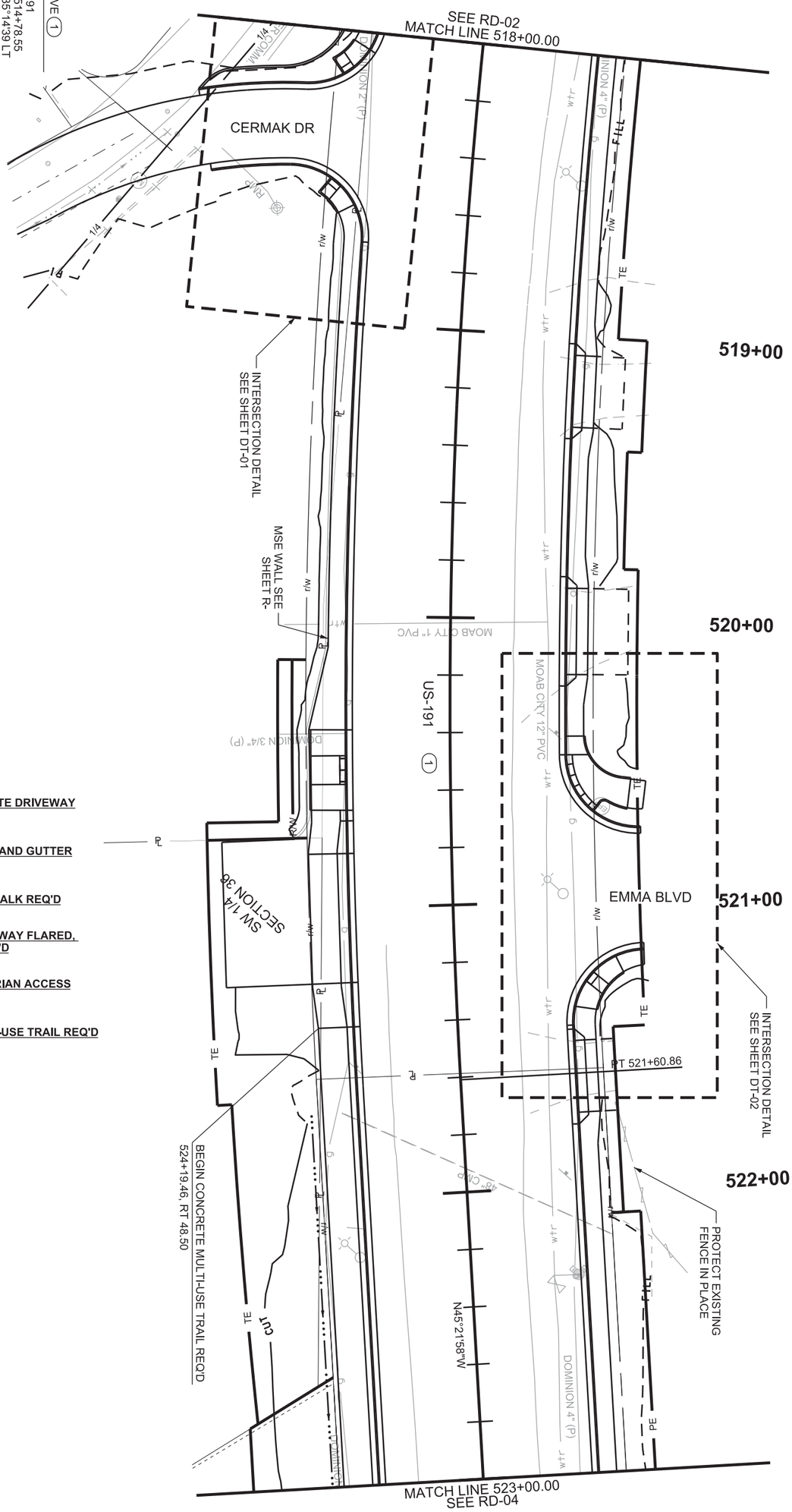
CORNER PEDESTRIAN ACCESS RAMP REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-02	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE			REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED		DRAWN BY DCV	**PLAN-IN-HAND**
	ROADWAY		PROFESSIONAL ENGINEER	7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE (1)
US-191
PI 514+78.55
Δ 35°14'39 LT
D 2°29'53"
R 2293.61'
T 728.55'
L 1410.86'
N 658364.30
E 1977676.06
PC 507+50.00
PT 521+60.86



REMOVE CONCRETE DRIVEWAY REQ'D

RECONSTRUCT VALVE BOX REQ'D

RELOCATE FIRE HYDRANT REQ'D

RELOCATE 12 INCH PVC WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

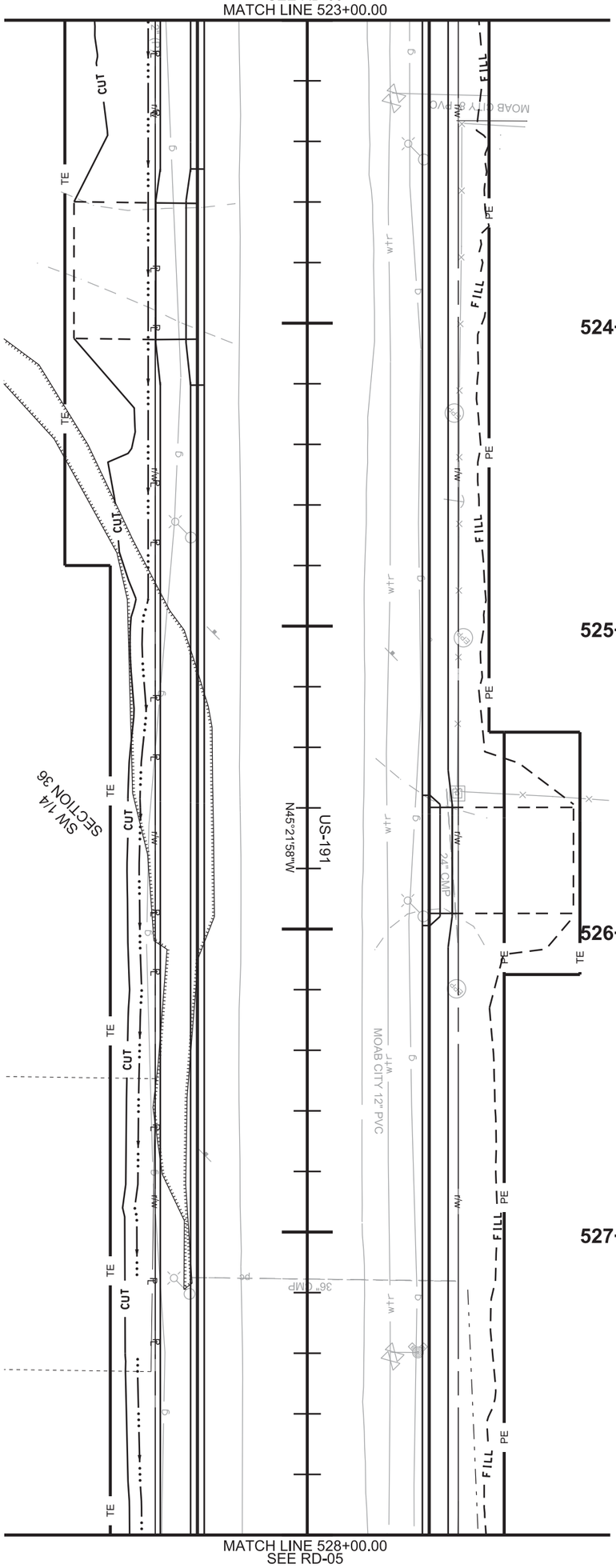
CONCRETE MULTI-USE TRAIL REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-03	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

SEE RD-03
MATCH LINE 523+00.00



MATCH LINE 528+00.00
SEE RD-05

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE FENCE REQ'D

RECONSTRUCT VALVE BOX REQ'D

RELOCATE FIRE HYDRANT REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH REQ'D

CONCRETE SIDEWALK REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-04	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE (2)

US-191	
PI	533+55.07
Δ	0°18'57" LT
D	0°06'37"
R	52000.00'
T	143.34'
L	286.68'
N	659715.18
E	196307.81
PC	532+11.73
PT	534+98.41

SEE RD-04
MATCH LINE 528+00.00

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

PERPENDICULAR/PARALLEL PEDESTRIAN ACCESS RAMP REQ'D

REMOVE FENCE REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT FIRE HYDRANT REQ'D

RECONSTRUCT 12 INCH PVC WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

529+00

530+00

531+00

532+00

MIVIDA DR

US-191
N45°21'58"W

BEGIN TAPER
530+75.74 RT 34.00

END TAPER
531+53.17 RT 35.00

EOP
531+57.55 LT 39.40

PC 532+11.73

SW 1/4 SECTION 36

CUT

FILL

TE

PE

MOAB CITY 12" PVC

MOAB CITY 8" PVC

DOMINION 2" GAS

INTERSECTION DETAIL
SEE SHEET DT-02

MATCH LINE 533+00.00
SEE RD-06

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-05

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		
PROJECT NUMBER	F-0191(152)126	PIN	15329
	ROADWAY		

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

APPROVED
PROFESSIONAL ENGINEER — 7/11/2018 DATE

DRAWN BY DCV
QC CHECKED BY TWT

REVISIONS

PLAN-IN-HAND

NO.	DATE	APPROVED BY	REMARKS

CURVE (2)

US-191
PI 533+55.07
Δ 0°18'57" LT
D 0°06'37"
R 52000.00'
T 143.34'
L 286.68'
N 6597715.18
E 1963078.81
PC 532+11.73
PT 534+98.41

SEE RD-05
MATCH LINE 533+00.00

534+00

535+00

536+00

537+00

PT 534+98.41

EOP
534+77.12 LT 39.93

US-191
N45°40'55"W

SW 1/4 SECTION 36

RECONSTRUCT MANHOLE REQ'D

RECONSTRUCT 8 INCH PVC WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

MOVE MAILBOX REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

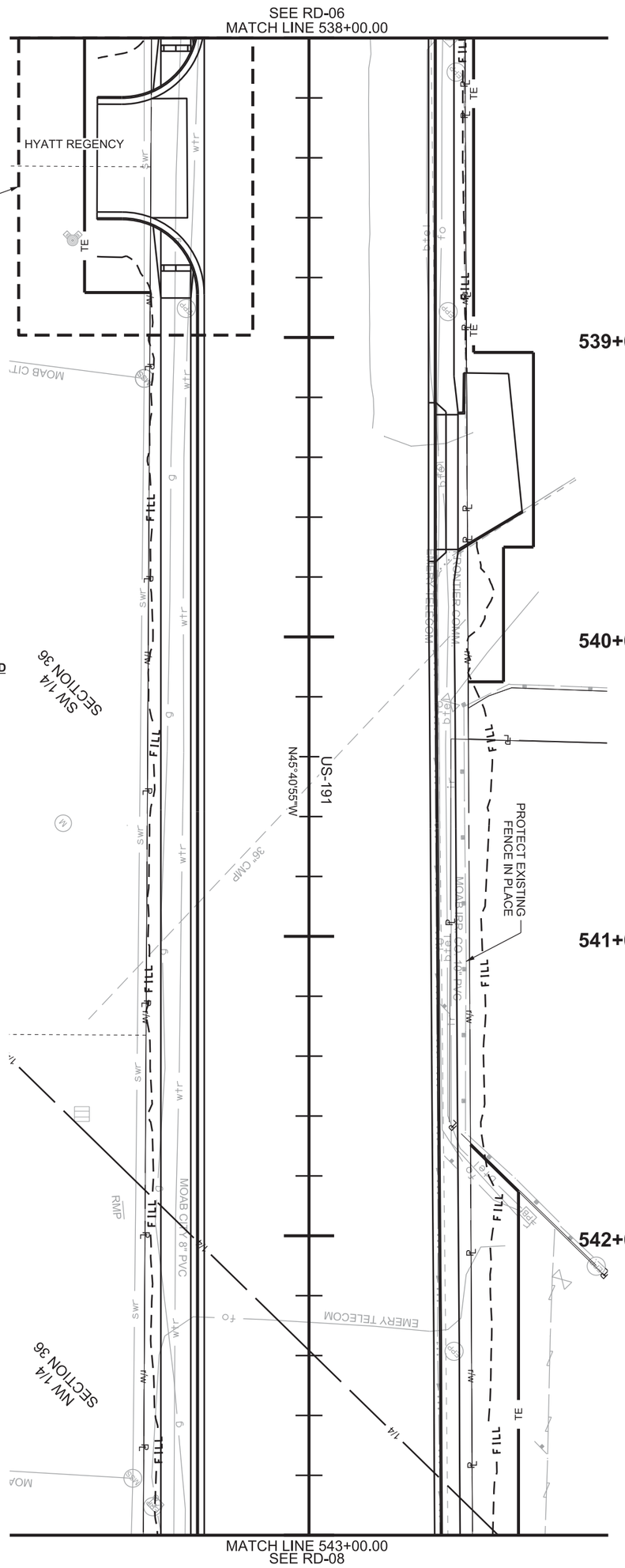
CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

MATCH LINE 538+00.00
SEE RD-07

SHEET NO. RD-06	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



RECONSTRUCT VALVE BOX REQ'D

CONCRETE SIDEWALK - THICKENED FACE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

RECONSTRUCT MANHOLE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

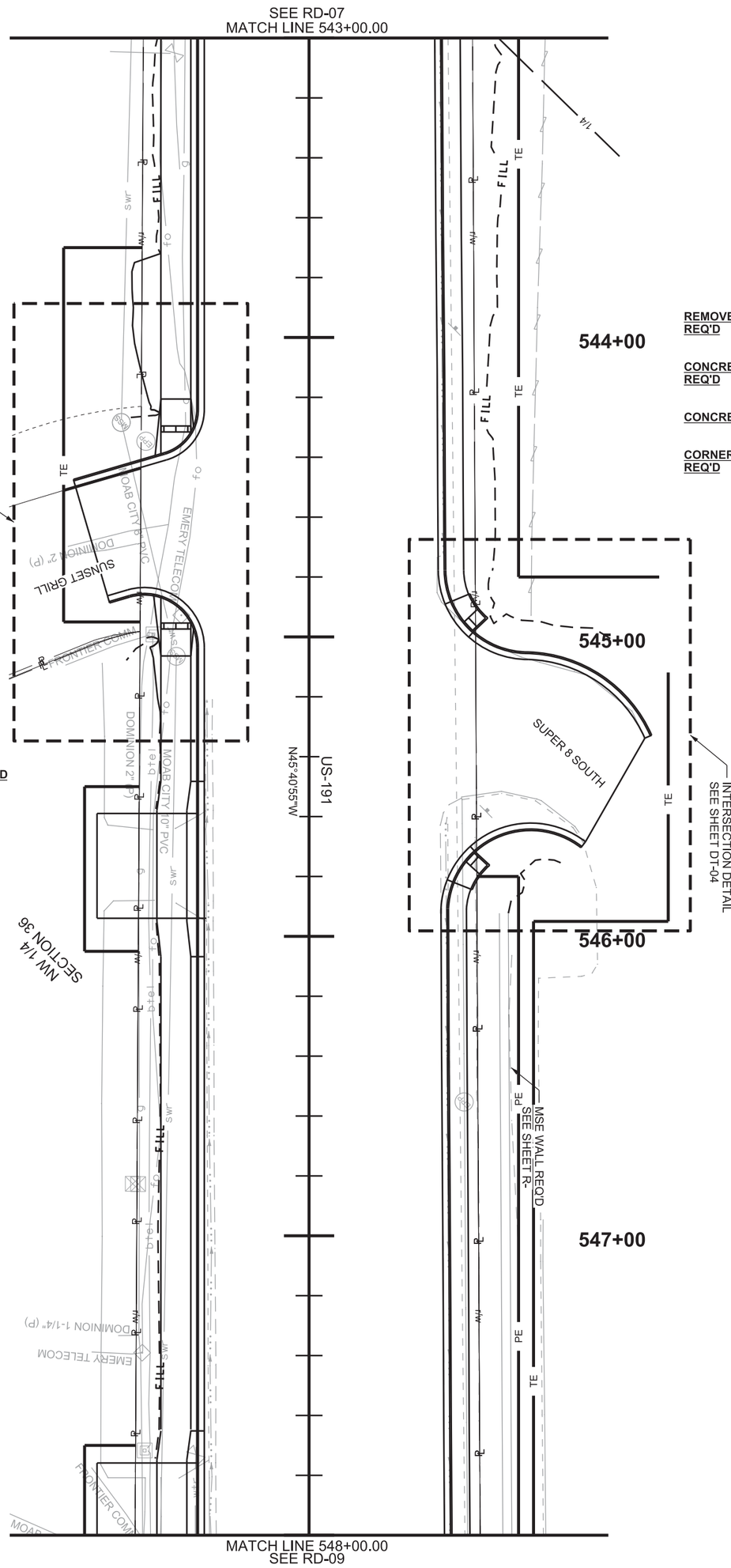
CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

PERPENDICULAR/PARALLEL PEDESTRIAN ACCESS RAMP REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-07	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



REMOVE CONCRETE CURB AND GUTTER REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT MANHOLE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

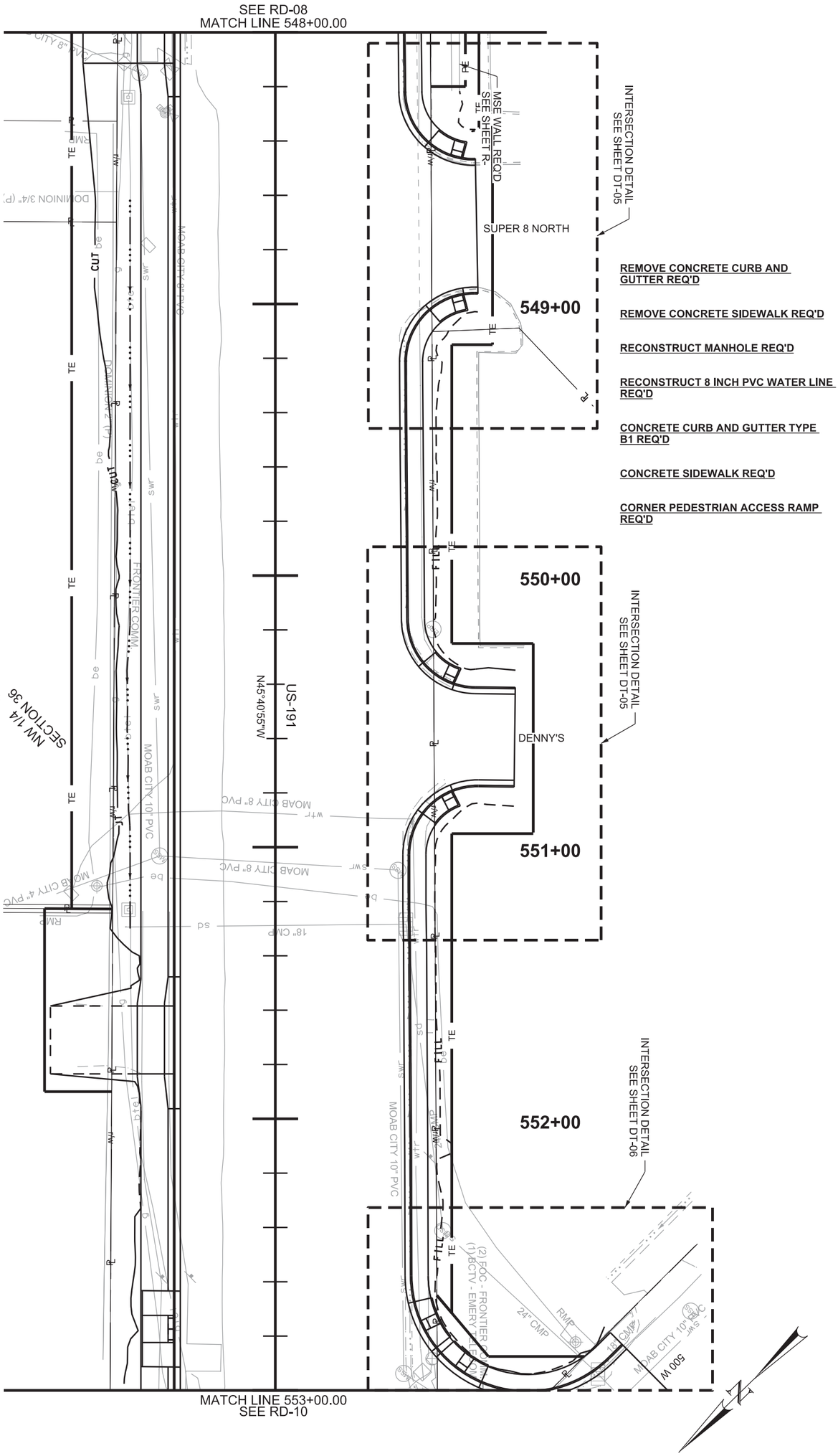
CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

PERPENDICULAR/PARALLEL PEDESTRIAN ACCESS RAMP REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-08	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
		ROADWAY	PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



REMOVE CONCRETE DRIVEWAY REQ'D

RECONSTRUCT METER BOX REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT MANHOLE REQ'D

RECONSTRUCT 8 INCH PVC WATER LINE REQ'D

RELOCATE FIRE HYDRANT REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

PERPENDICULAR/PARALLEL PEDESTRIAN ACCESS RAMP REQ'D

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

RECONSTRUCT MANHOLE REQ'D

RECONSTRUCT 8 INCH PVC WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

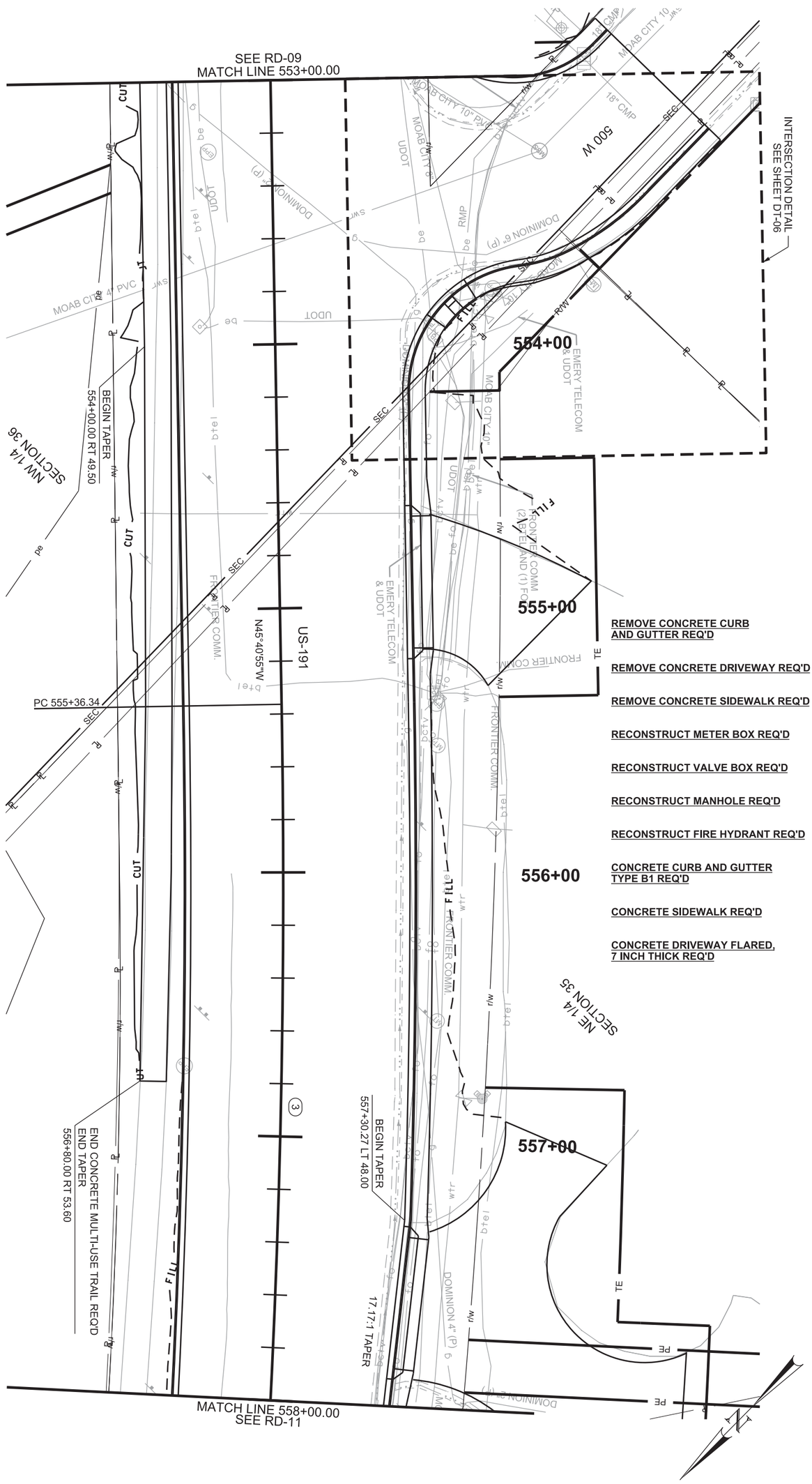
CORNER PEDESTRIAN ACCESS RAMP REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-09	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
		ROADWAY	PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

11-JUL-2018 DGN File: IP_PWPsd0317800\15329_RD-10.dgn



CURVE ③

US-191	
PI	558+22.25
Δ	8°23'09" RT
D	1°28'09"
R	3900.00'
T	285.91'
L	570.80'
N	661438.86
E	1945421.61
PC	555+36.34
PT	561+07.14

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

RECONSTRUCT METER BOX REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT MANHOLE REQ'D

RECONSTRUCT FIRE HYDRANT REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-10	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE ③	
US-191	
PI	558+22.25
Δ	8°23'09" RT
D	1°28'09"
R	3900.00'
T	285.91'
L	570.80'
N	661438.86
E	194542.61
PC	555+36.34
PT	561+07.14

SEE RD-10
MATCH LINE 558+00.00

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

17.17:1 TAPER

FRONTIER COMM.

EMERY TELECOM & UDOT

END TAPER
559+19.10 LT 37.00

559+00

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE CONCRETE SIDEWALK REQ'D

REMOVE FENCE REQ'D

RIGHT-OF-WAY FENCE TYPE D (METAL POST REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

560+00

NE 1/4 SECTION 35

PT 561+07.14

561+00

MOTEL 6

INTERSECTION DETAIL
SEE SHEET DT-07

US-191
N37°17'46"W

562+00

MATCH LINE 563+00.00
SEE RD-12

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-11	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS	
	PROJECT NUMBER	F-0191(152)126	PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND	
	ROADWAY			PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY	REMARKS

CURVE (4)

US-191	
PI	570+30.81
Δ	12°15'02" LT
D	1°26'45"
R	3963.11'
T	425.30'
L	847.36'
N	662401.10
E	193809.68
PC	566+05.51
PT	574+52.87

SEE RD-11
MATCH LINE 563+00.00

RECONSTRUCT 10 INCH WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

564+00

REMOVE FENCE REQ'D

RECONSTRUCT VALVE BOX REQ'D

RIGHT-OF-WAY FENCE TYPE D (METAL POST REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

565+00

566+00

567+00

US-191
N37°17'46"W

NE 1/4 SECTION 35

PC 566+05.51

DOMINION 2" (P)

EMERY TELECOM & UDOT

FRONTIER COMM.

MOAB CITY 10" PVC

MOAB CITY 12" PVC

32" CMP

MATCH LINE 568+00.00
SEE RD-13

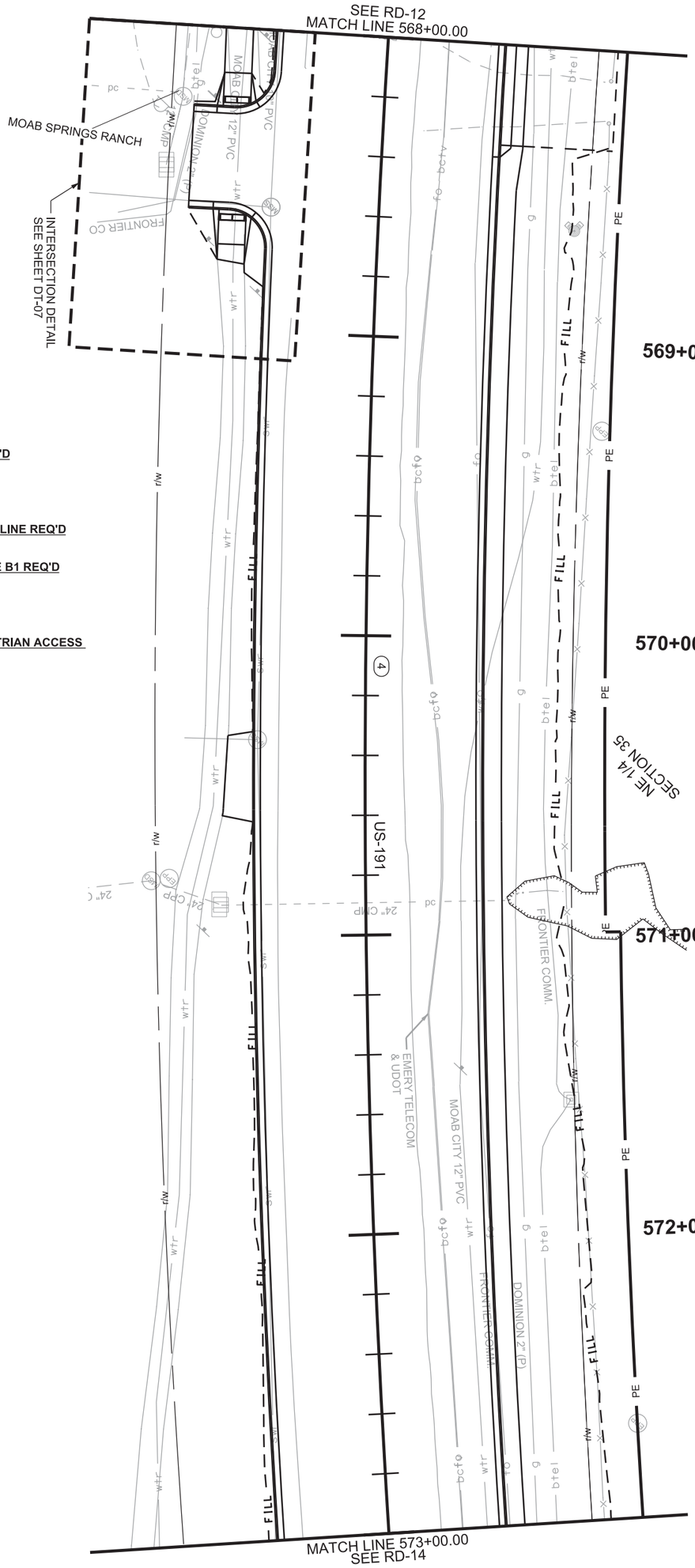
NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-12	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE (4)

US-191	
PI	570+30.81
Δ	12°15'02" LT
D	1°26'45"
R	3963.11'
T	425.30'
L	847.36'
N	662401.10
E	193809.68
PC	566+05.51
PT	574+52.87



REMOVE CONCRETE SIDEWALK REQ'D

RECONSTRUCT MANHOLE REQ'D

RECONSTRUCT 12 INCH PVC WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE MULTI-USE TRAIL REQ'D

PERPENDICULAR/PARALLEL PEDESTRIAN ACCESS RAMP REQ'D

REMOVE FENCE REQ'D

RECONSTRUCT FIRE HYDRANT REQ'D

RIGHT-OF-WAY FENCE TYPE D (METAL POST) REQ'D

RIGHT-OF-WAY GATE 6 FT REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-13

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		
PROJECT NUMBER	F-0191(152)126	PIN	15329
	ROADWAY		

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

APPROVED

PROFESSIONAL ENGINEER — 7/11/2018 DATE

DRAWN BY DCV
QC CHECKED BY TWT

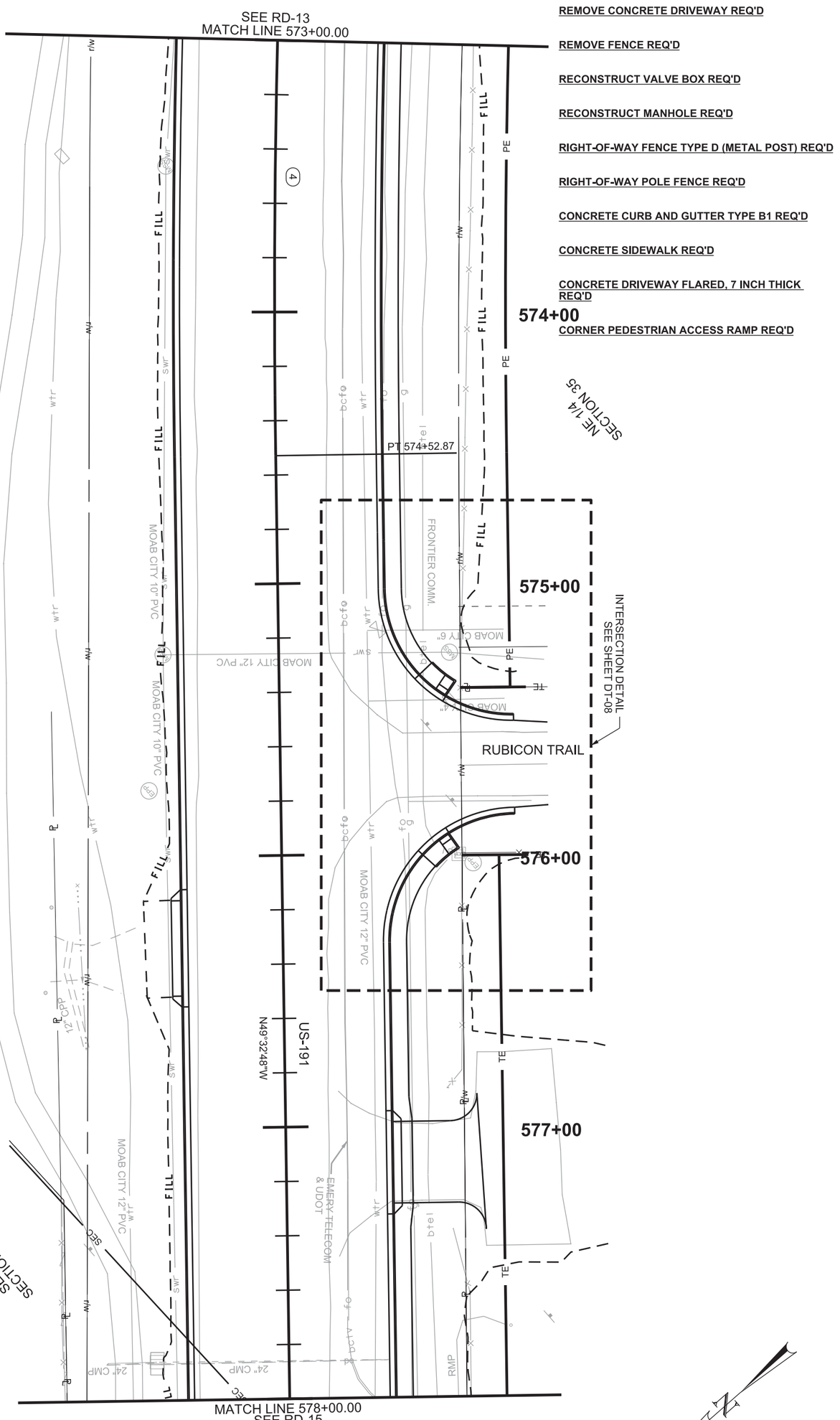
REVISIONS

PLAN-IN-HAND

NO.	DATE	APPROVED BY	REMARKS

CURVE (4)

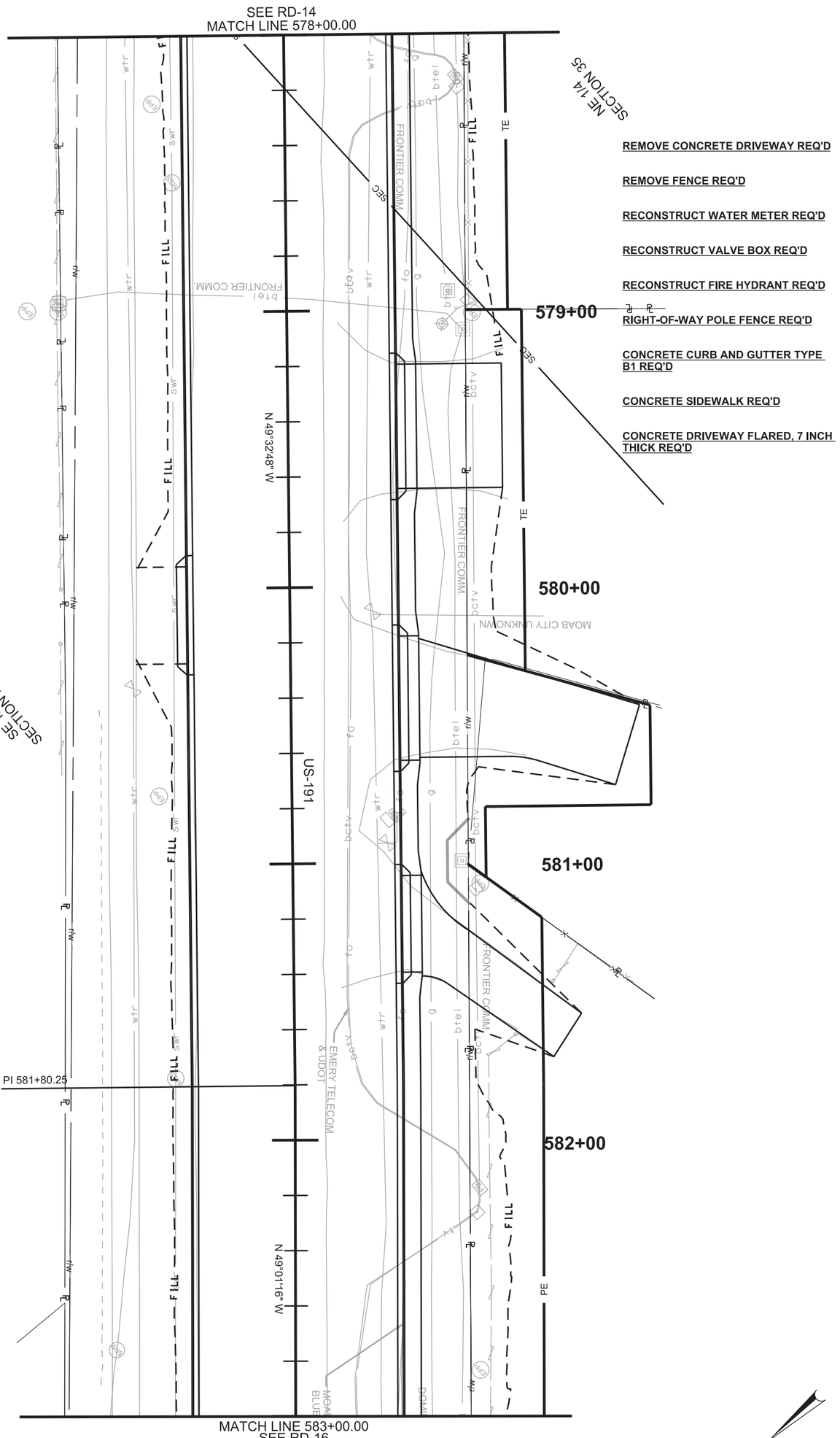
PT	574+52.87
PC	566+05.51
E	193809.68
N	662401.10
L	847.36'
T	425.30'
R	3963.11'
D	1°26'45"
Δ	12°15'02" LT
PI	570+30.81
	US-191



NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-14	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS	
	PROJECT NUMBER	F-0191(152)126	PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND	
	ROADWAY			PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS	



REMOVE CONCRETE DRIVEWAY REQ'D

REMOVE FENCE REQ'D

RECONSTRUCT WATER METER REQ'D

RECONSTRUCT VALVE BOX REQ'D

RECONSTRUCT FIRE HYDRANT REQ'D

RIGHT-OF-WAY POLE FENCE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CONCRETE DRIVEWAY FLARED, 7 INCH THICK REQ'D

RECONSTRUCT MANHOLE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-15

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		
PROJECT NUMBER	F-0191(152)126	PIN	15329
	ROADWAY		

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

APPROVED

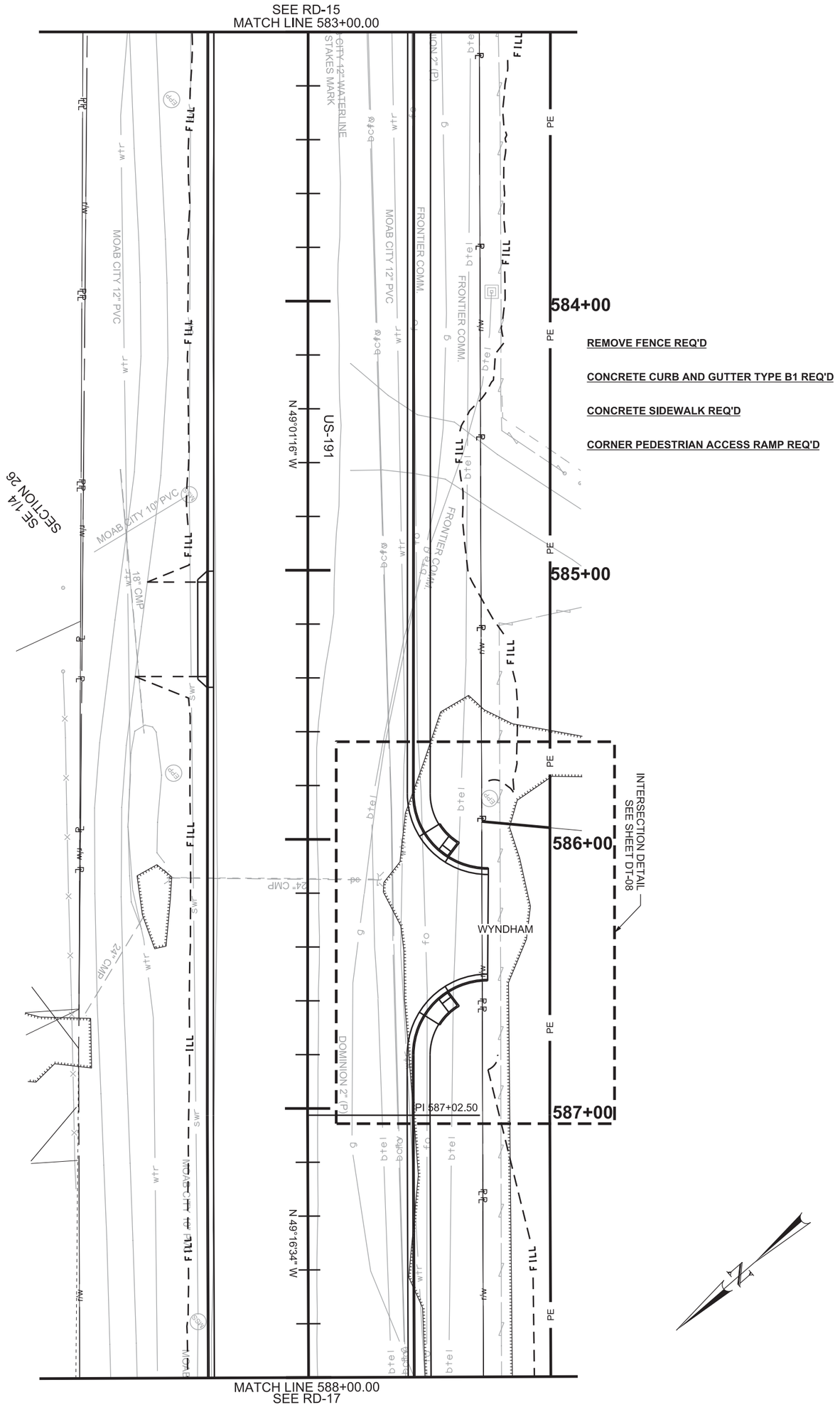
PROFESSIONAL ENGINEER — DATE: 7/11/2018

DRAWN BY: DCV
QC CHECKED BY: TWT

REVISIONS

PLAN-IN-HAND

NO.	DATE	APPROVED BY	REMARKS



RECONSTRUCT MANHOLE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

REMOVE FENCE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-16	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

SEE RD-16
MATCH LINE 588+00.00

REMOVE CONCRETE CURB AND GUTTER REQ'D

REMOVE FENCE REQ'D

RECONSTRUCT VALVE BOX REQ'D

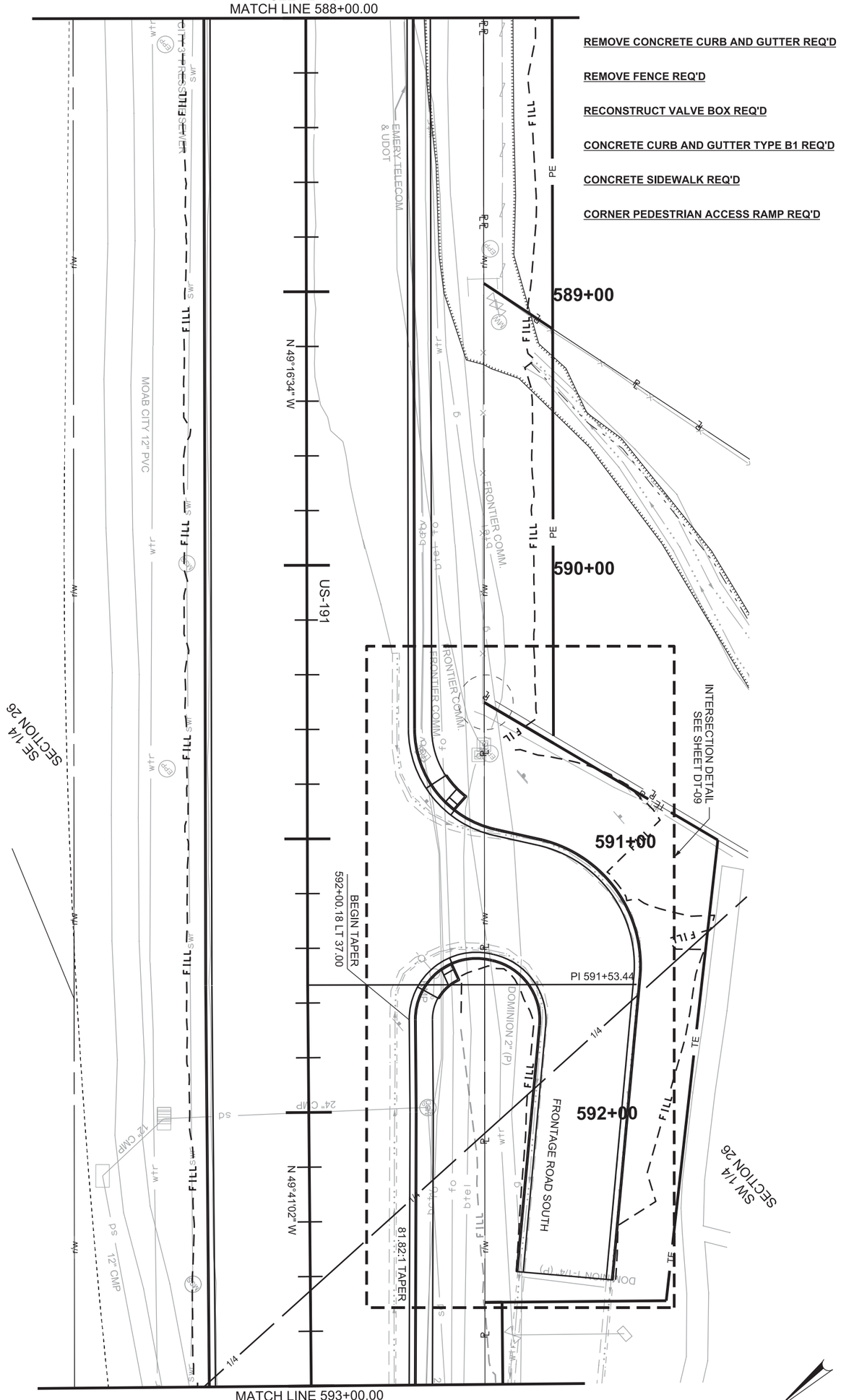
CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

CORNER PEDESTRIAN ACCESS RAMP REQ'D

RECONSTRUCT MANHOLE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

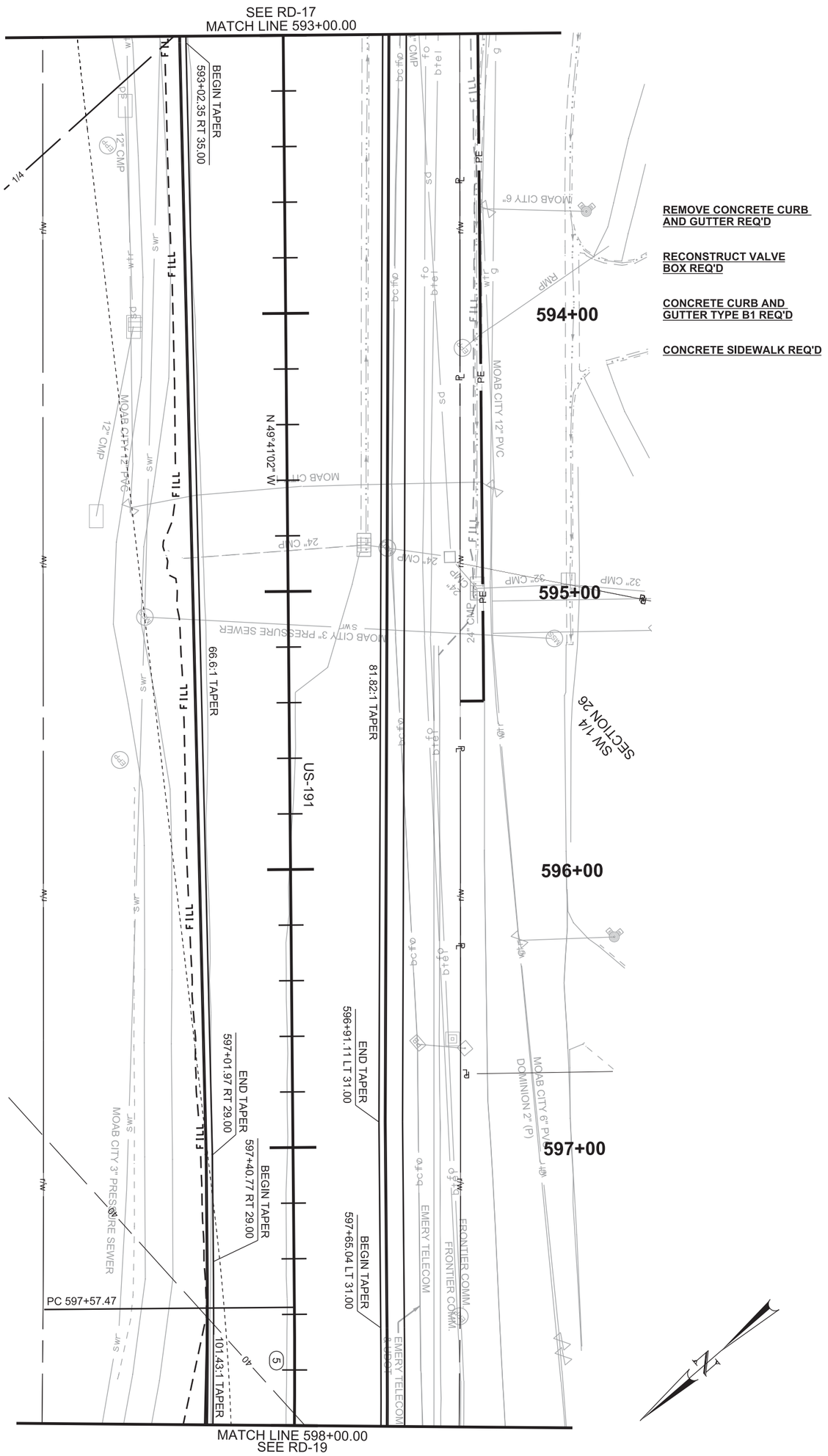


NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-17	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE (5)	
US-191	
PI	600+25.15
Δ	12°13'23" RT
D	2°17'31"
R	2500.00'
T	267.68'
L	533.33'
N	664349.67
E	1915318.88
PC	597+57.47
PT	602+90.80



REMOVE CONCRETE CURB AND GUTTER REQ'D

RECONSTRUCT VALVE BOX REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

CONCRETE SIDEWALK REQ'D

RECONSTRUCT 12 INCH WATER LINE REQ'D

CONCRETE CURB AND GUTTER TYPE B1 REQ'D

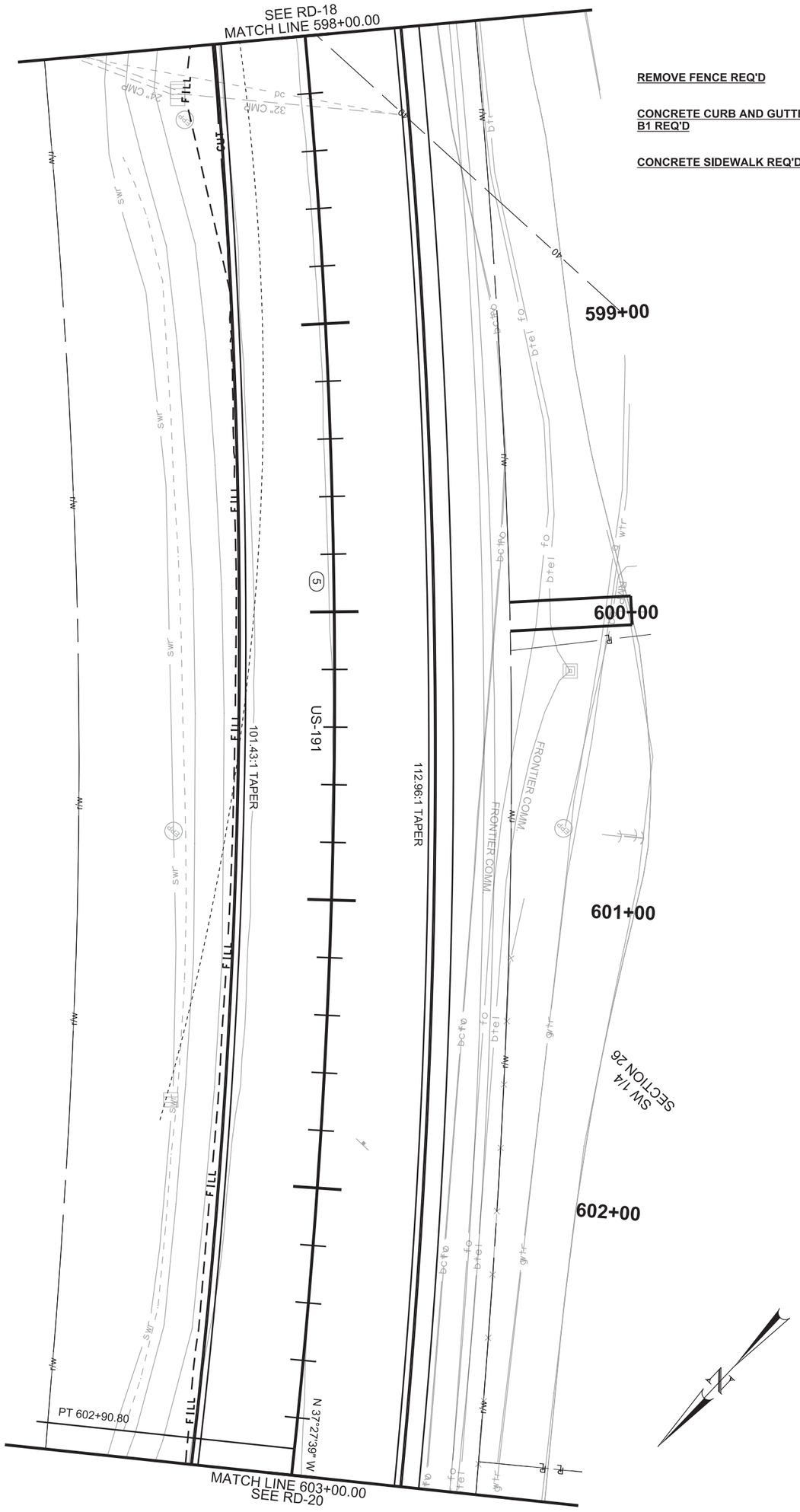
NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-18	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS

CURVE (5)

US-191	
PI	600+25.15
Δ	12°13'23" RT
D	2°17'31"
R	2500.00'
T	267.68'
L	533.33'
N	664349.67
E	191531.88
PC	597+57.47
PT	602+90.80

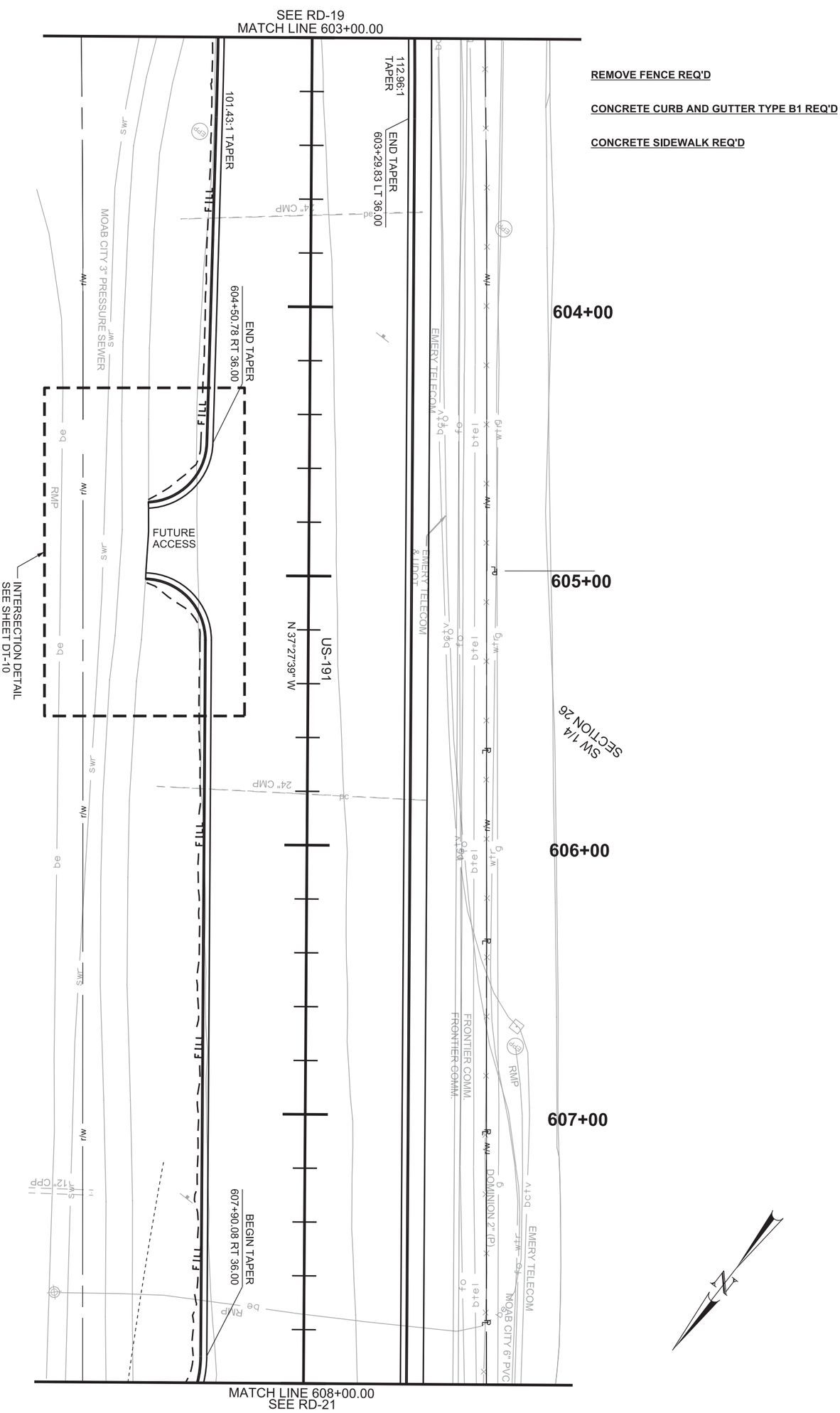


CONCRETE CURB AND GUTTER TYPE B1 REQ'D

NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

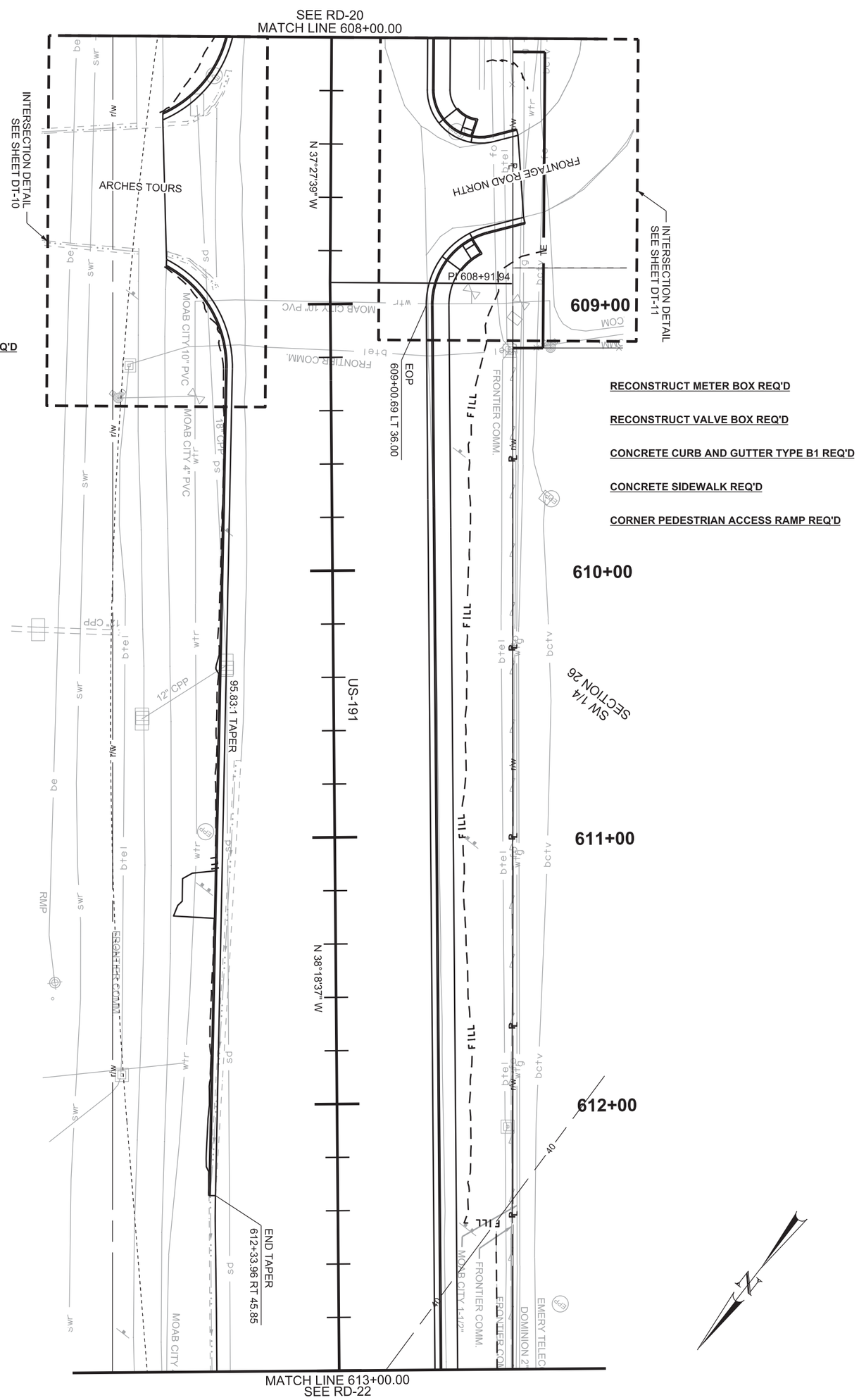
SHEET NO. RD-19	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS	
	PROJECT NUMBER	F-0191(152)126	PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND	
	ROADWAY			PROFESSIONAL ENGINEER — 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS	



NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

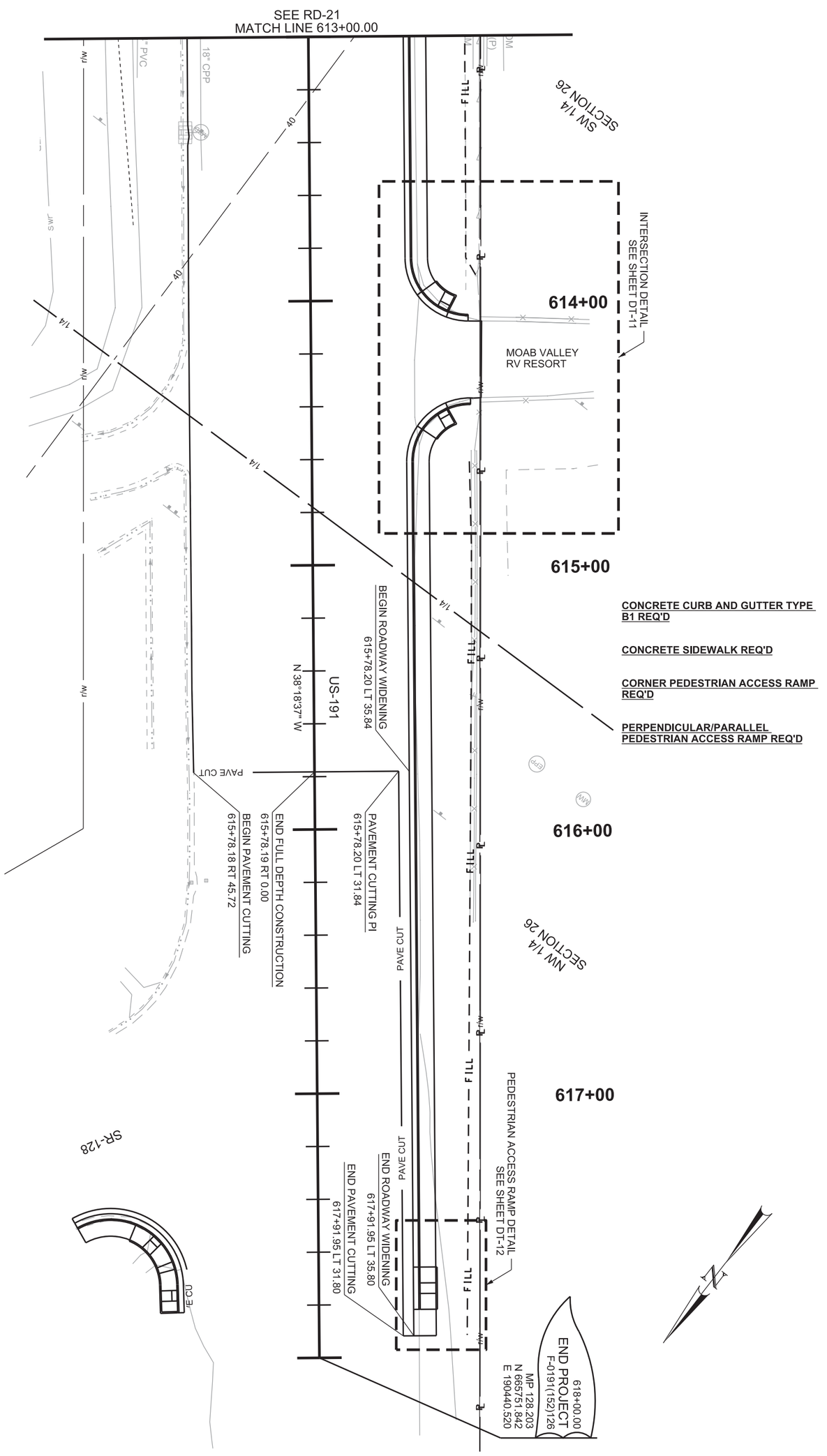
SHEET NO. RD-20	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-21	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	ROADWAY		PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



NOTES:

1. SEE DETAIL SHEET DT-13 FOR DRIVEWAY APPROACH DETAIL.

SHEET NO. RD-22	PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE			REVISIONS
	PROJECT NUMBER: F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV		**PLAN-IN-HAND**
	ROADWAY	PROFESSIONAL ENGINEER 7/11/2018 DATE	QC CHECKED BY TWT		NO. DATE APPROVED BY REMARKS

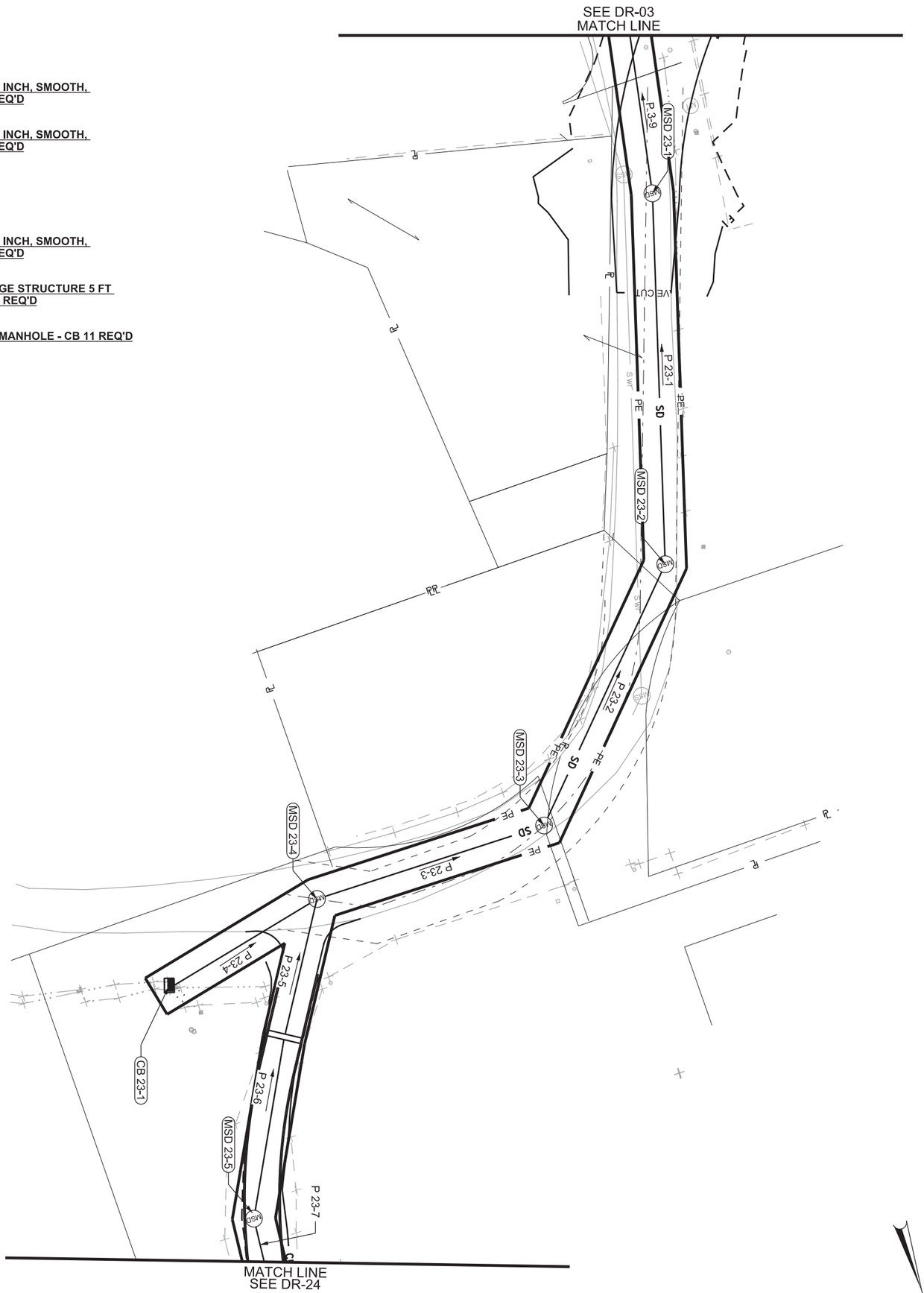
DRAINAGE PIPE - 18 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 23-4]

DRAINAGE PIPE - 30 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 23-1]
[P 23-2]
[P 23-3]
[P 23-5]
[P 23-6]
[P 23-7]

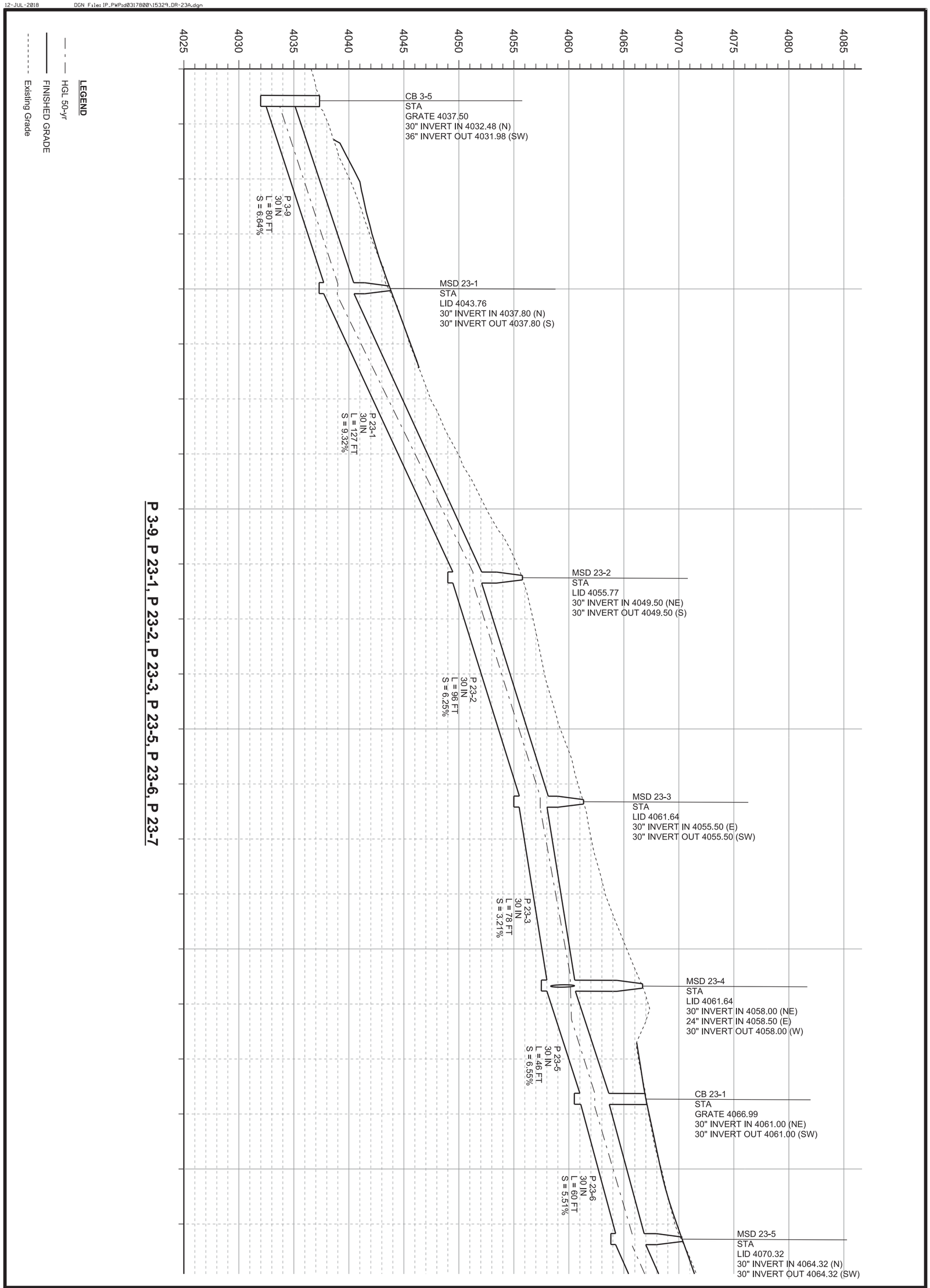
DRAINAGE PIPE - 36 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 3-9]

CONCRETE DRAINAGE STRUCTURE 5 FT TO 7 FT DEEP - CB 9 REQ'D
[CB 23-1]

5 FOOT STANDARD MANHOLE - CB 11 REQ'D
[MSD 23-1]
[MSD 23-2]
[MSD 23-3]
[MSD 23-4]
[MSD 23-5]

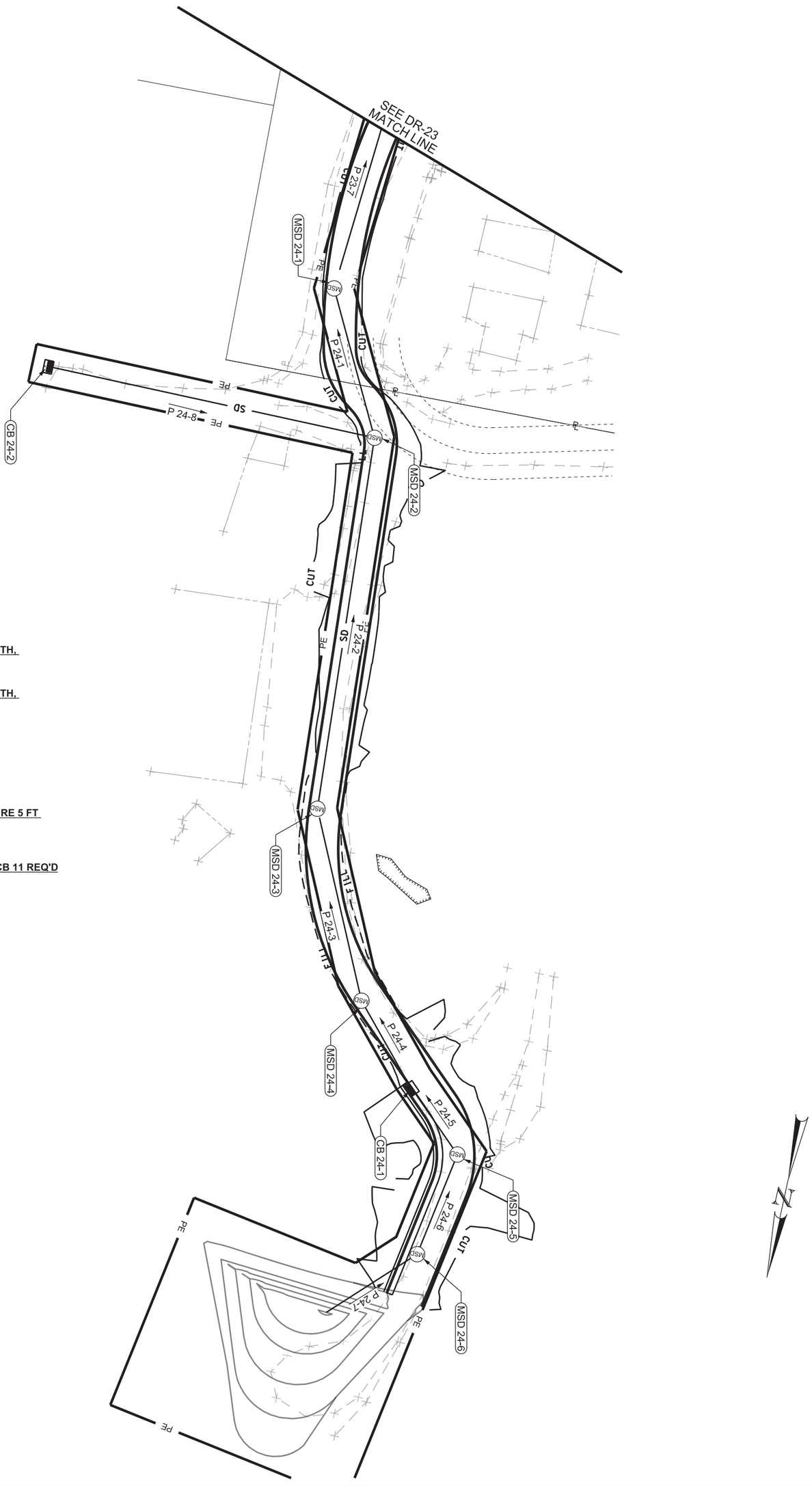


SHEET NO. DR-23	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	UTAH DEPARTMENT OF TRANSPORTATION CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	PLAN-IN-HAND
	DRAINAGE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



P 3-9, P 23-1, P 23-2, P 23-3, P 23-5, P 23-6, P 23-7

SHEET NO. DR-23A	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
	DRAINAGE PROFILE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



DRAINAGE PIPE - 24 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 24-8]

DRAINAGE PIPE - 30 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 23-7]
[P 24-1]
[P 24-2]
[P 24-3]
[P 24-4]
[P 24-5]
[P 24-6]
[P 24-7]

CONCRETE DRAINAGE STRUCTURE 5 FT TO 7 FT DEEP - CB 9 REQ'D
[CB 24-1]
[CB 24-2]

5 FOOT STANDARD MANHOLE - CB 11 REQ'D
[MSD 24-1]
[MSD 24-2]
[MSD 24-3]
[MSD 24-4]
[MSD 24-5]
[MSD 24-6]

SHEET NO. DR-24

PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE		
PROJECT NUMBER	F-0191(152)126	PIN	15329
	DRAINAGE		

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

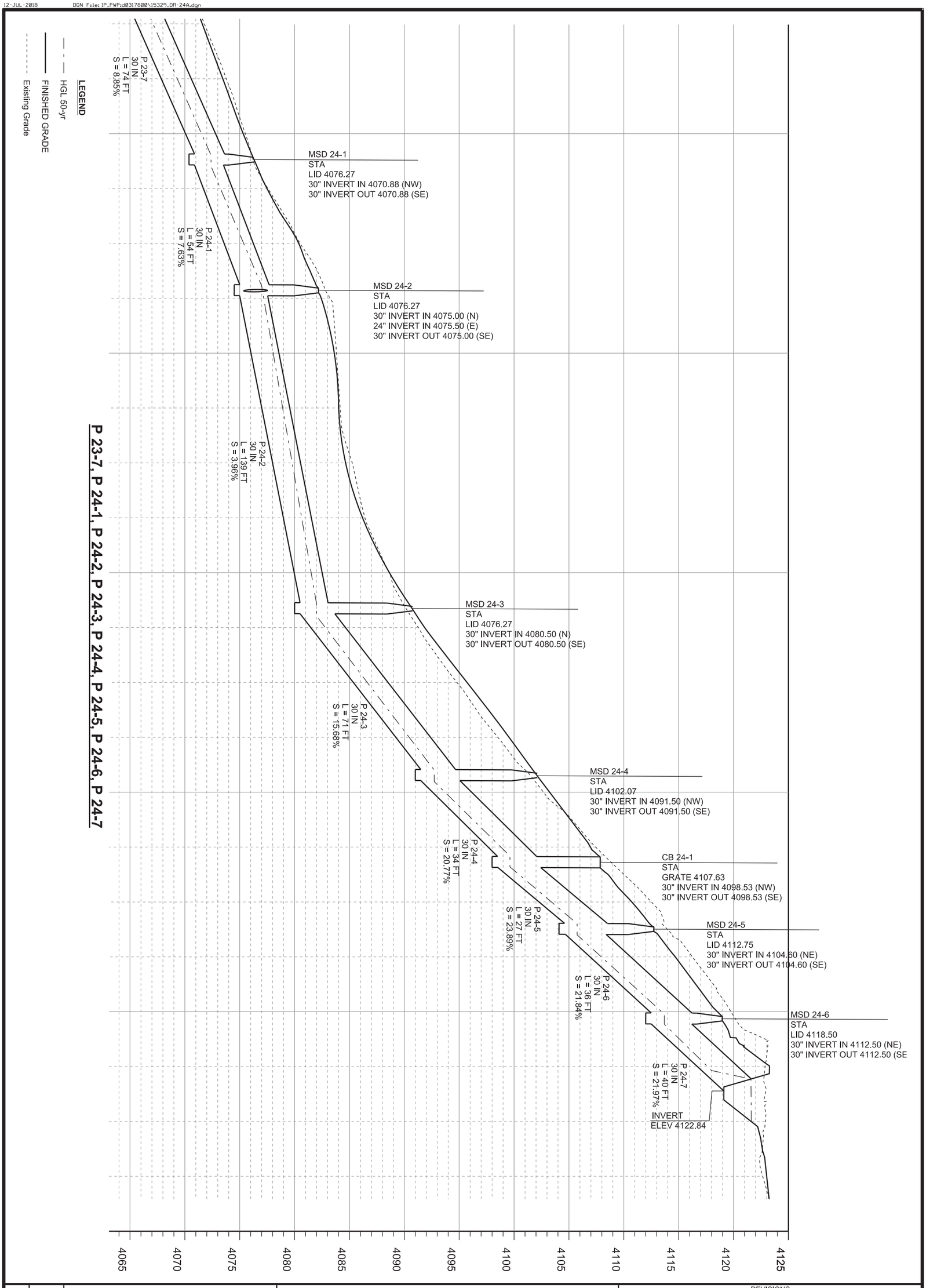
APPROVED
PROFESSIONAL ENGINEER — 7/12/2018 DATE

DRAWN BY DCV
QC CHECKED BY TWT

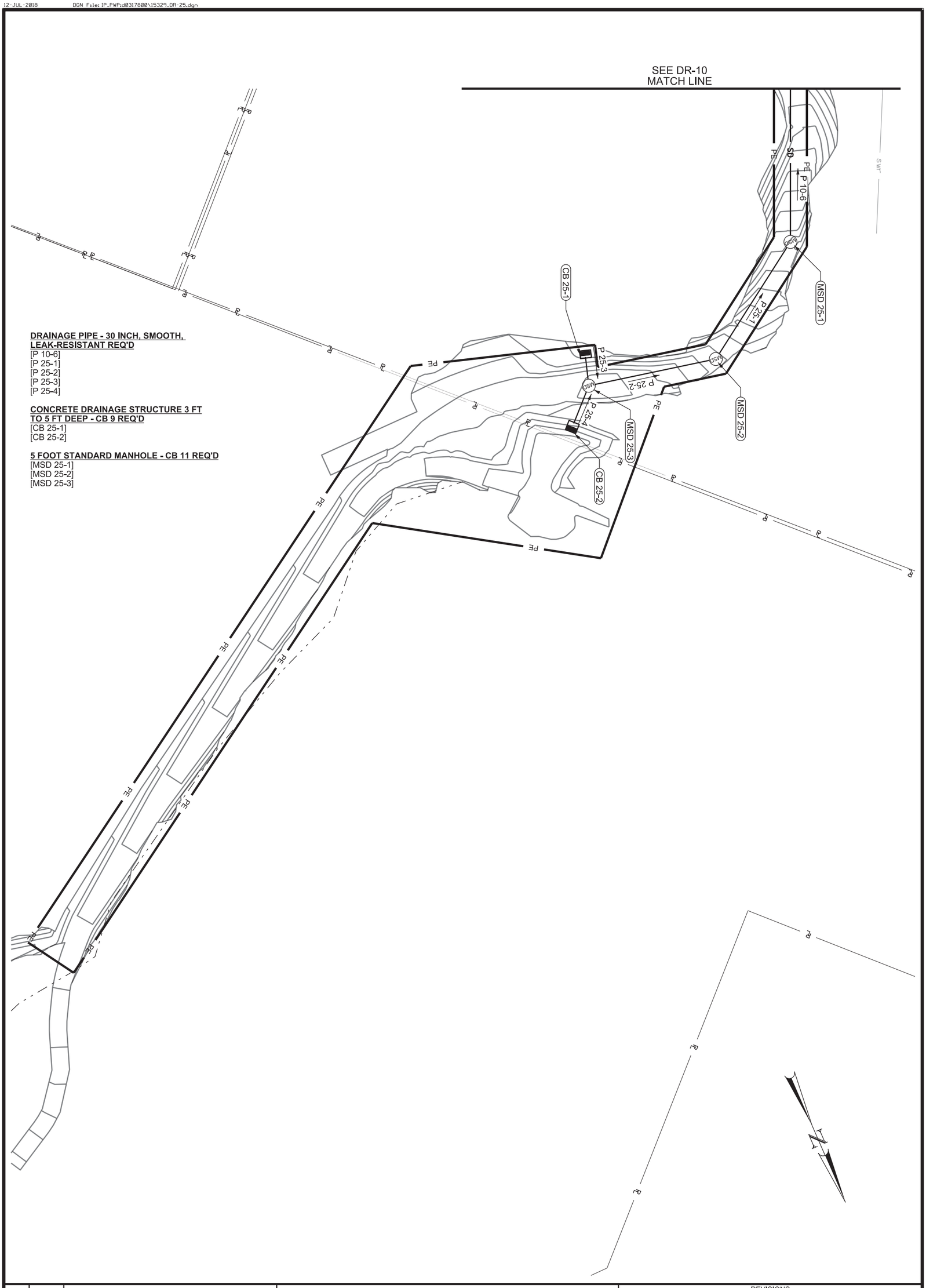
REVISIONS

PLAN-IN-HAND

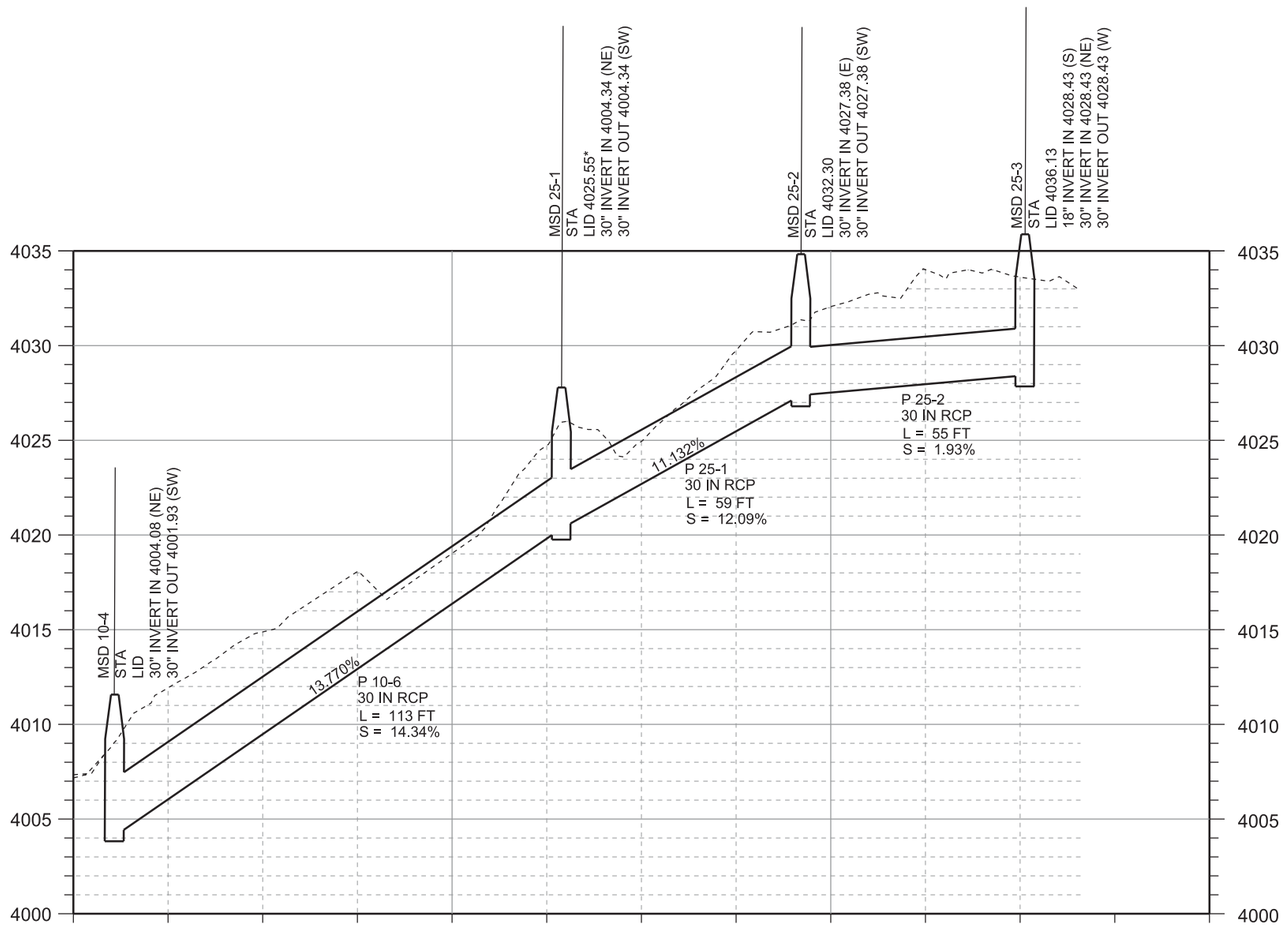
NO.	DATE	APPROVED BY	REMARKS



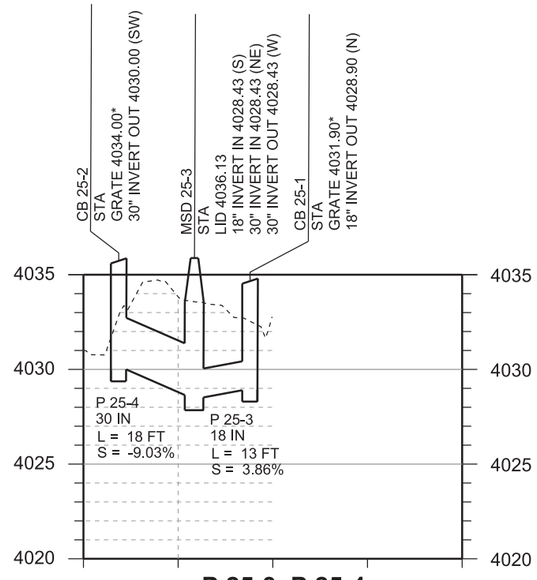
SHEET NO. DR-24A	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
	DRAINAGE PROFILE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



SHEET NO. DR-25	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE			REVISIONS	
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV		# PLAN-IN-HAND	
	DRAINAGE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT		NO. DATE APPROVED BY	REMARKS



P 10-6, P 25-1, P 25-2



P 25-3, P 25-4

LEGEND

- HGL 50-yr
- FINISHED GRADE
- Existing Grade

DGN: File:IP_PwPw#0317800\15329_DR-25A.dgn

12-JUL-2018

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

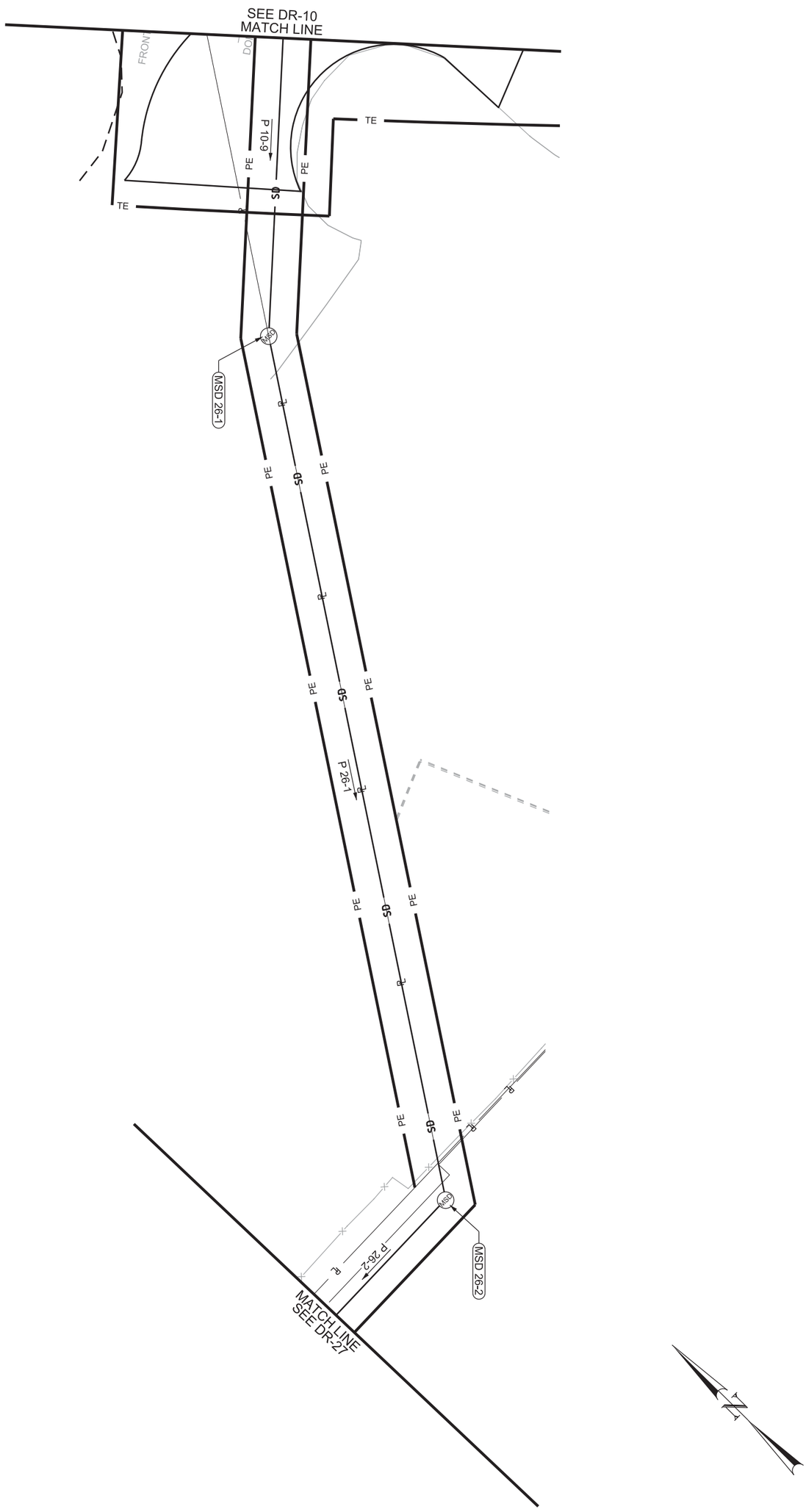
PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV
QC CHECKED BY TWT
7/12/2018 DATE
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PIN 15329
PROJECT NUMBER F-0191(152)126
DRAINAGE PROFILE

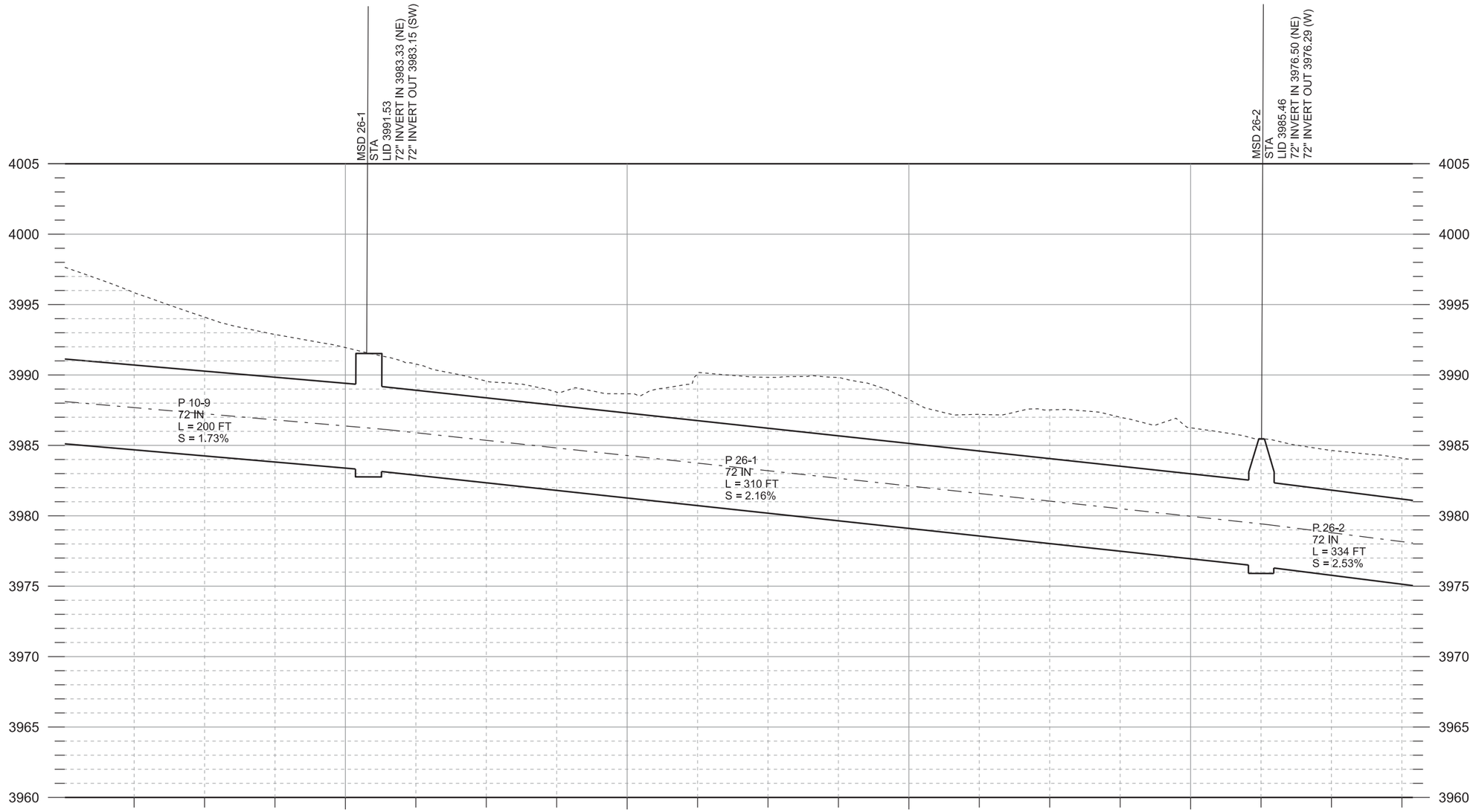
SHEET NO. DR-25A



DRAINAGE PIPE - 72 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 10-9]
[P 26-1]
[P 26-2]

9 FOOT STANDARD MANHOLE - CB 11
[MSD 26-1]
[MSD 26-2]

SHEET NO. DR-26	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
	DRAINAGE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



P 10-9, P 26-1, 26-2

LEGEND

- HGL 50-yr
- FINISHED GRADE
- Existing Grade

DGN: File:P_PwPw0317800\15329_DR-26A.dgn
12-JUL-2018

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

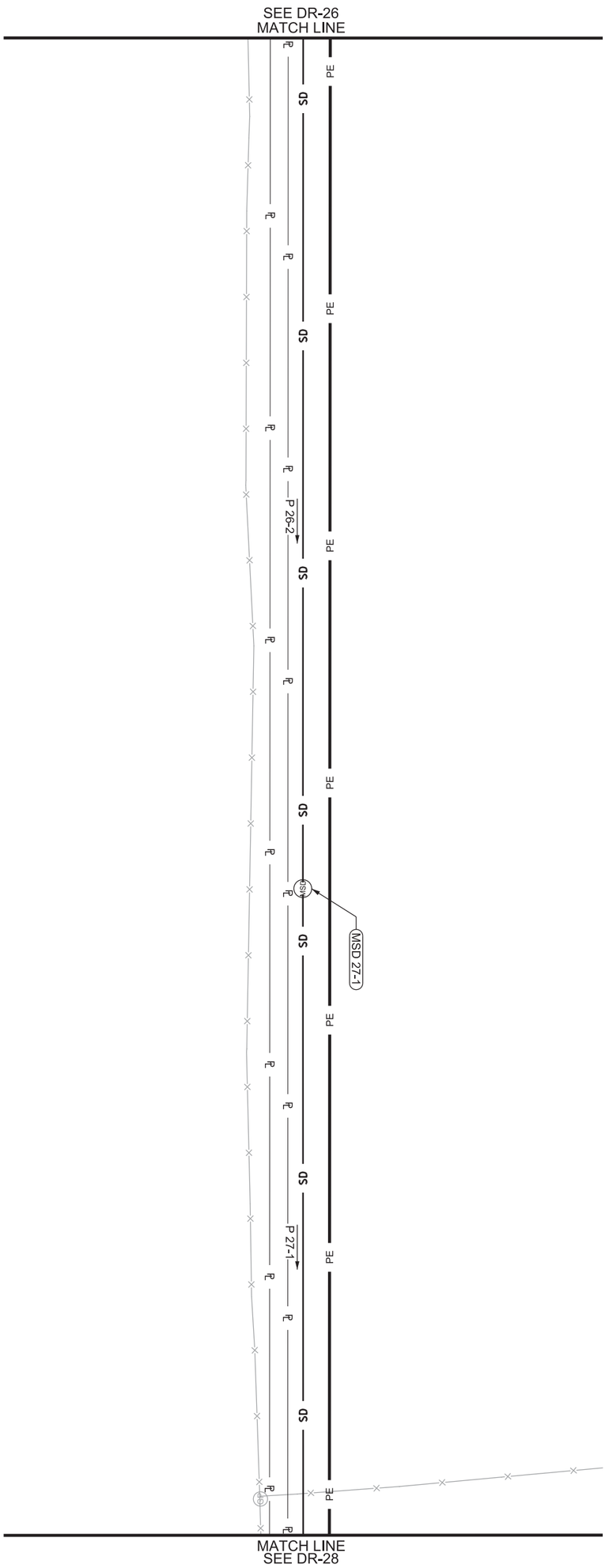
DRAWN BY DCV
QC CHECKED BY TWT
APPROVED
7/12/2018 DATE

PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PROJECT NUMBER: F-0191(152)126
PIN: 15329

DRAINAGE PROFILE

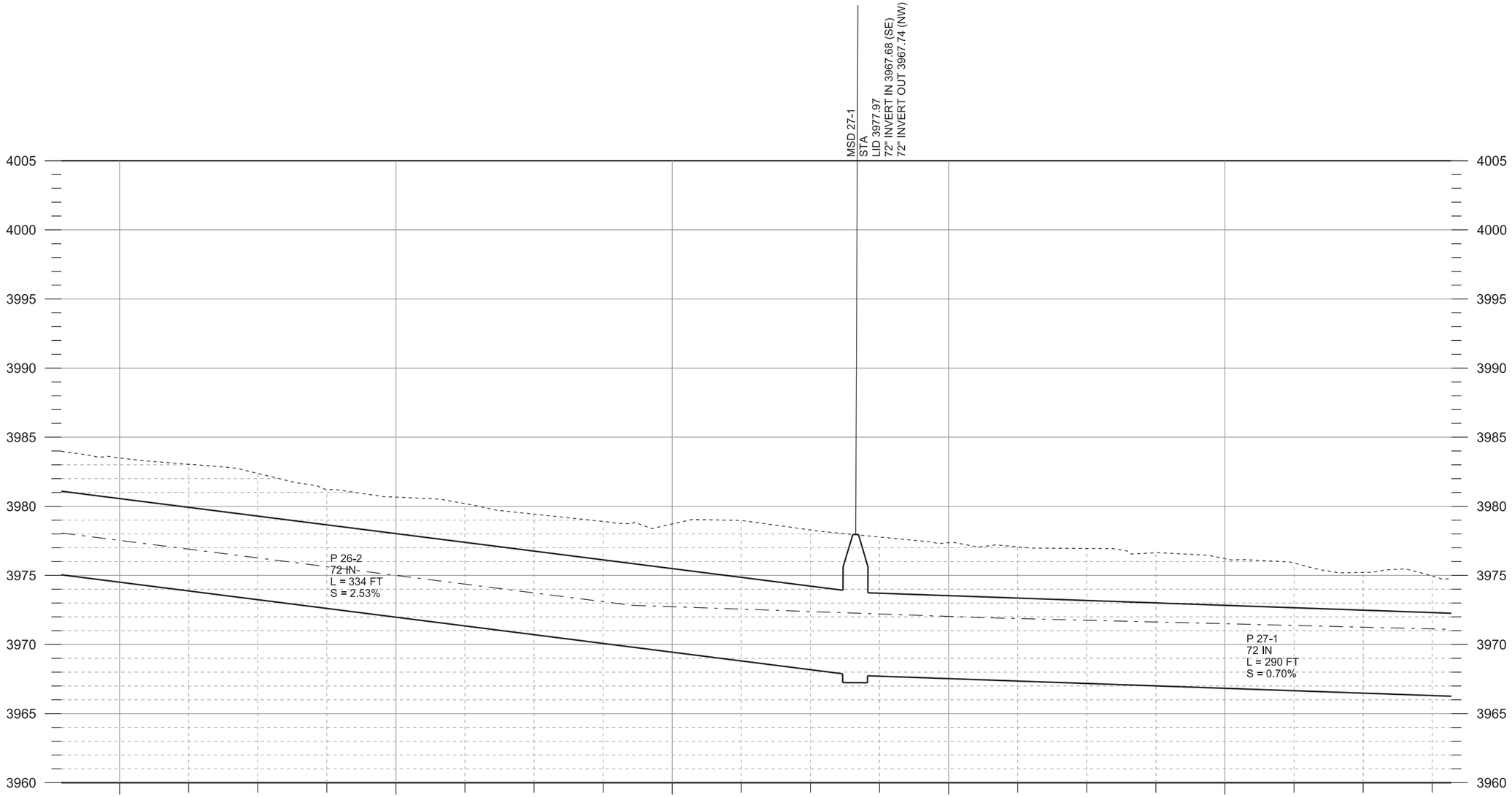
SHEET NO. DR-26A



DRAINAGE PIPE - 72 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 26-2]
[P 27-1]

9 FEET STANDARD MANHOLE - CB 11 REQ'D
[MSD 27-1]

SHEET NO. DR-27	PROJECT	US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	**UTAH DEPARTMENT OF TRANSPORTATION** CIVIL SCIENCE		REVISIONS
	PROJECT NUMBER	F-0191(152)126 PIN 15329	APPROVED	DRAWN BY DCV	**PLAN-IN-HAND**
	DRAINAGE		PROFESSIONAL ENGINEER 7/12/2018 DATE	QC CHECKED BY TWT	NO. DATE APPROVED BY REMARKS



P 26-2, P 27-1

LEGEND

- HGL 50-yr
- FINISHED GRADE
- Existing Grade

DGN File:IP_PWPed0317800\15329_DR-27A.dgn
12-JUL-2018

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

APPROVED

7/12/2018
DATE

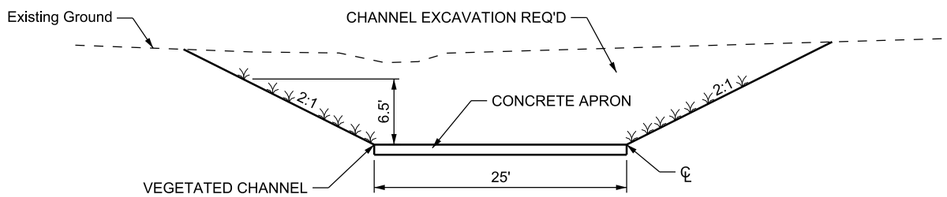
PROFESSIONAL ENGINEER

DRAWN BY DCV
QC CHECKED BY TWT

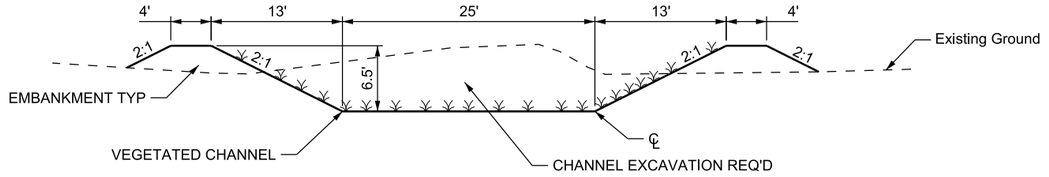
PROJECT	PROJECT NUMBER	PIN
US-191; NORTH MOAB TO COLORADO RIVER BRIDGE	F-0191(152)126	15329

DRAINAGE PROFILE

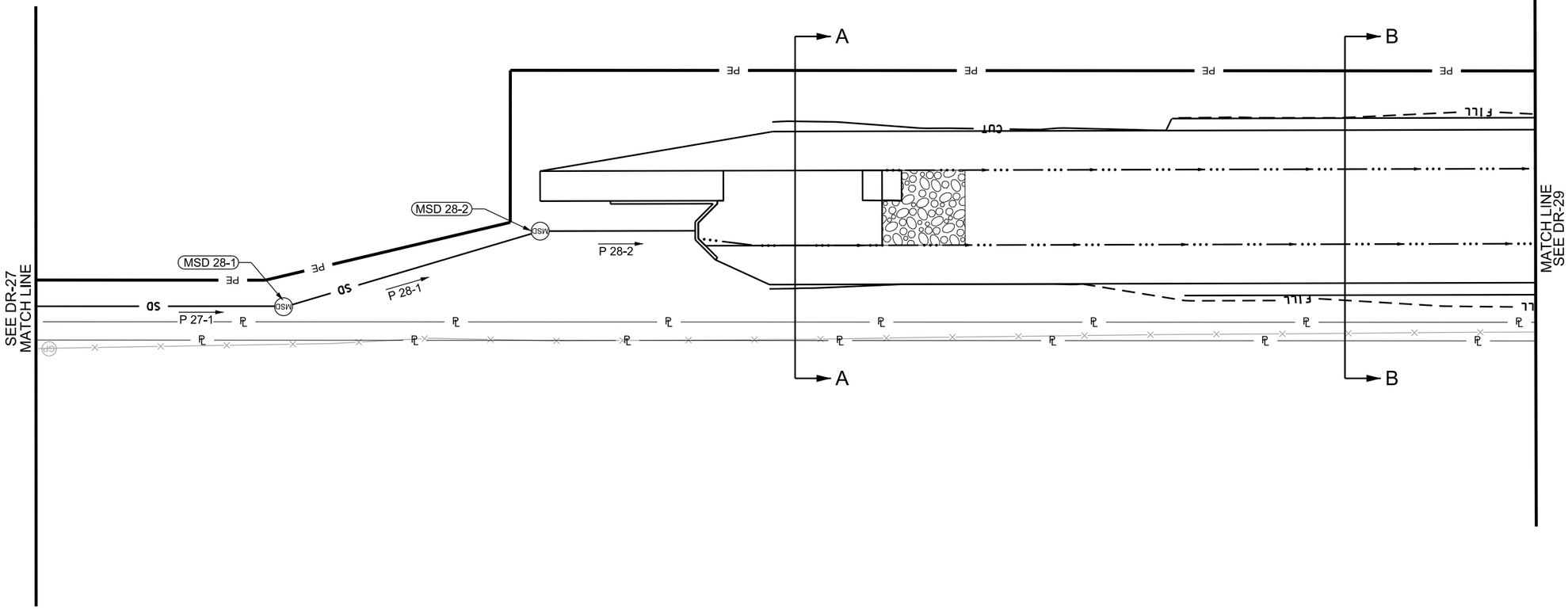
SHEET NO. DR-27A



SECTION A-A



SECTION B-B



DRAINAGE PIPE - 72 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 27-1]
[P 28-1]
[P 28-2]

9 FOOT STANDARD MANHOLE - CB 11
[MSD 28-1]
[MSD 28-2]

72 INCH REINFORCED CONCRETE HEADWALL (EST STRUCTURAL CONCRETE QTY ___ YD3)
(SEE STRUCTURES SHEETS)

REVISIONS

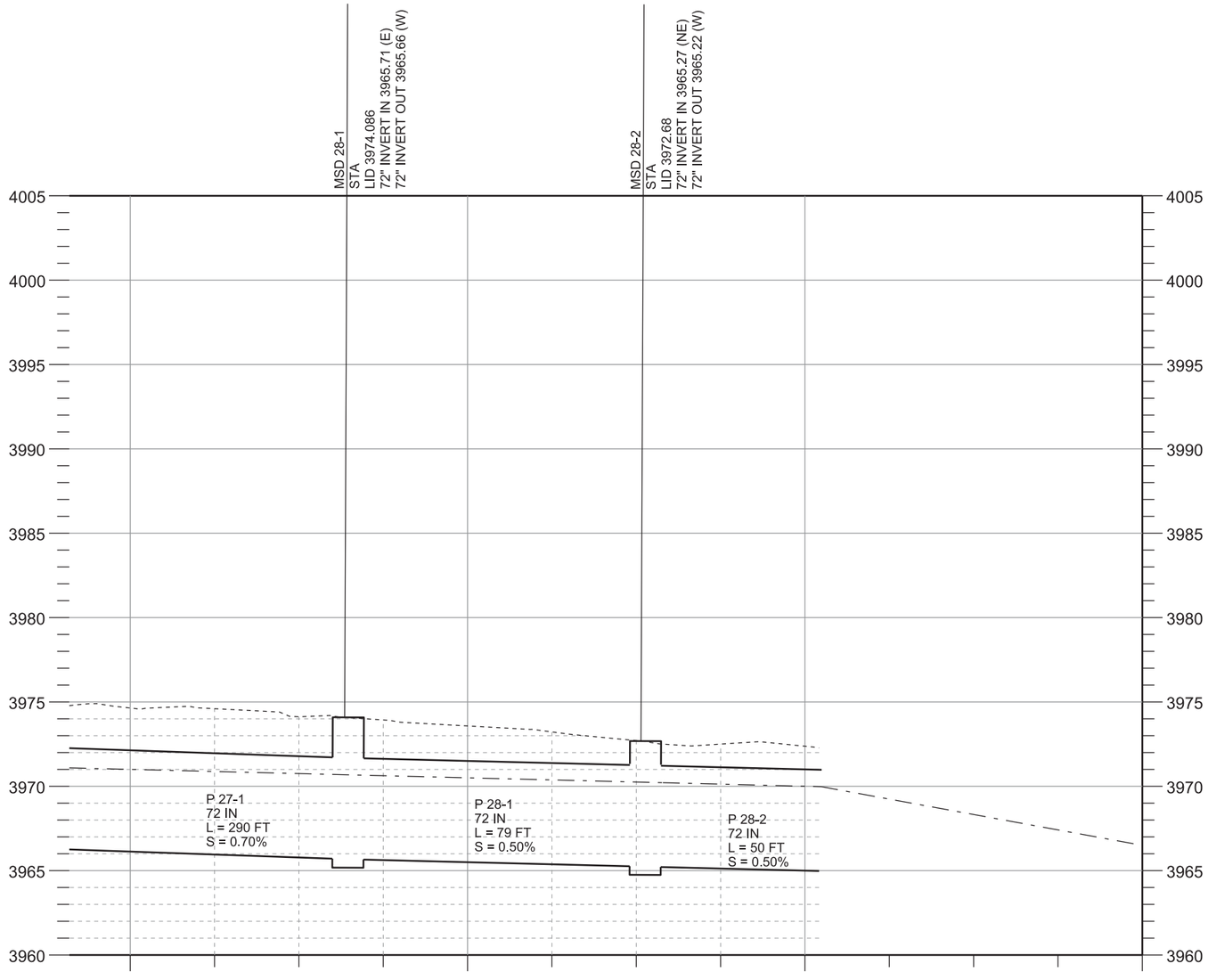
NO.	DATE	APPROVED BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY DCV
QC CHECKED BY TWT
DATE 9/13/2018
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PROJECT NUMBER: F-0191(152)126 PIN 15329
DRAINAGE
SHEET NO. DR-28

13-SEP-2018 DGN File: IP_PWPw@317880\15329_DR-28.dgn



P 27-1, P 28-1, P 28-2

LEGEND

- HGL 50-yr
- FINISHED GRADE
- Existing Grade

DGN File:IP_PWP=d0317880\15329_DR-28A.dgn
12-JUL-2018

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

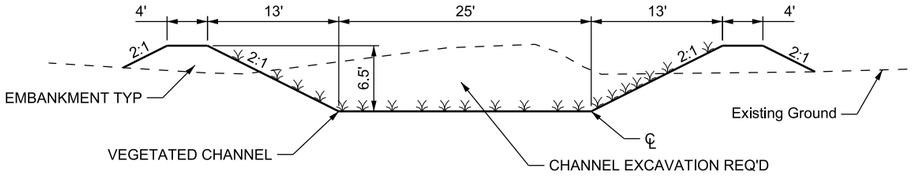
PLAN-IN-HAND

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

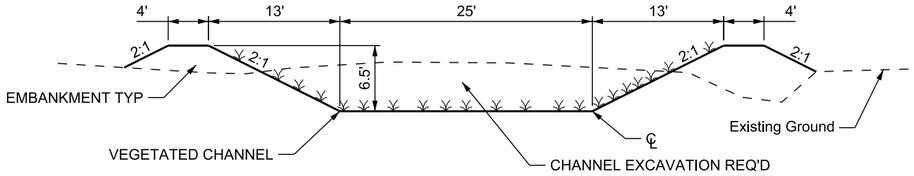
DRAWN BY DCV
QC CHECKED BY TWT
DATE 7/12/2018
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PIN 15329
PROJECT NUMBER F-0191(152)126
DRAINAGE PROFILE

SHEET NO. DR-28A



SECTION B-B



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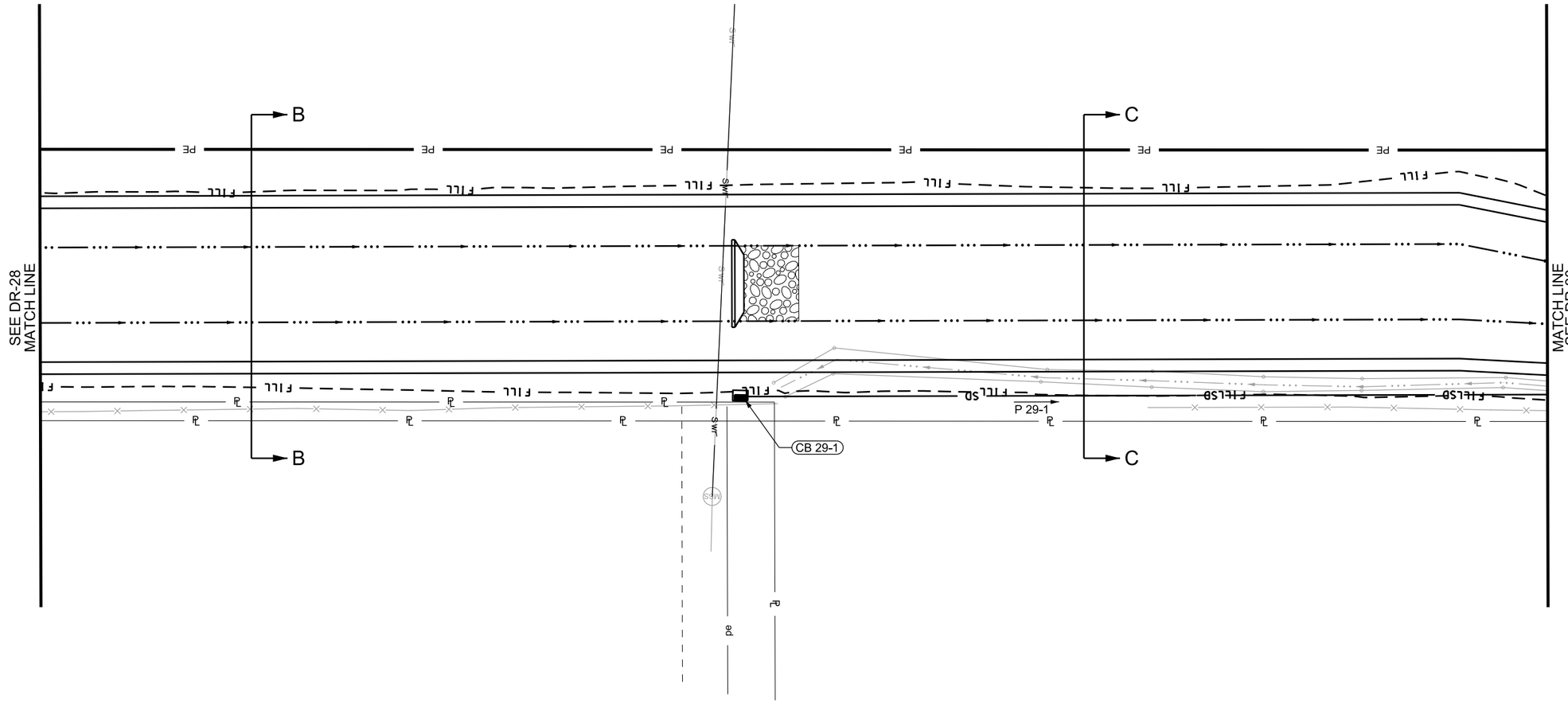


DRAINAGE PIPE - 24 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 29-1]

CONCRETE DRAINAGE STRUCTURE 3 FT TO 5 FT DEEP REQ'D
[CB 29-1]

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

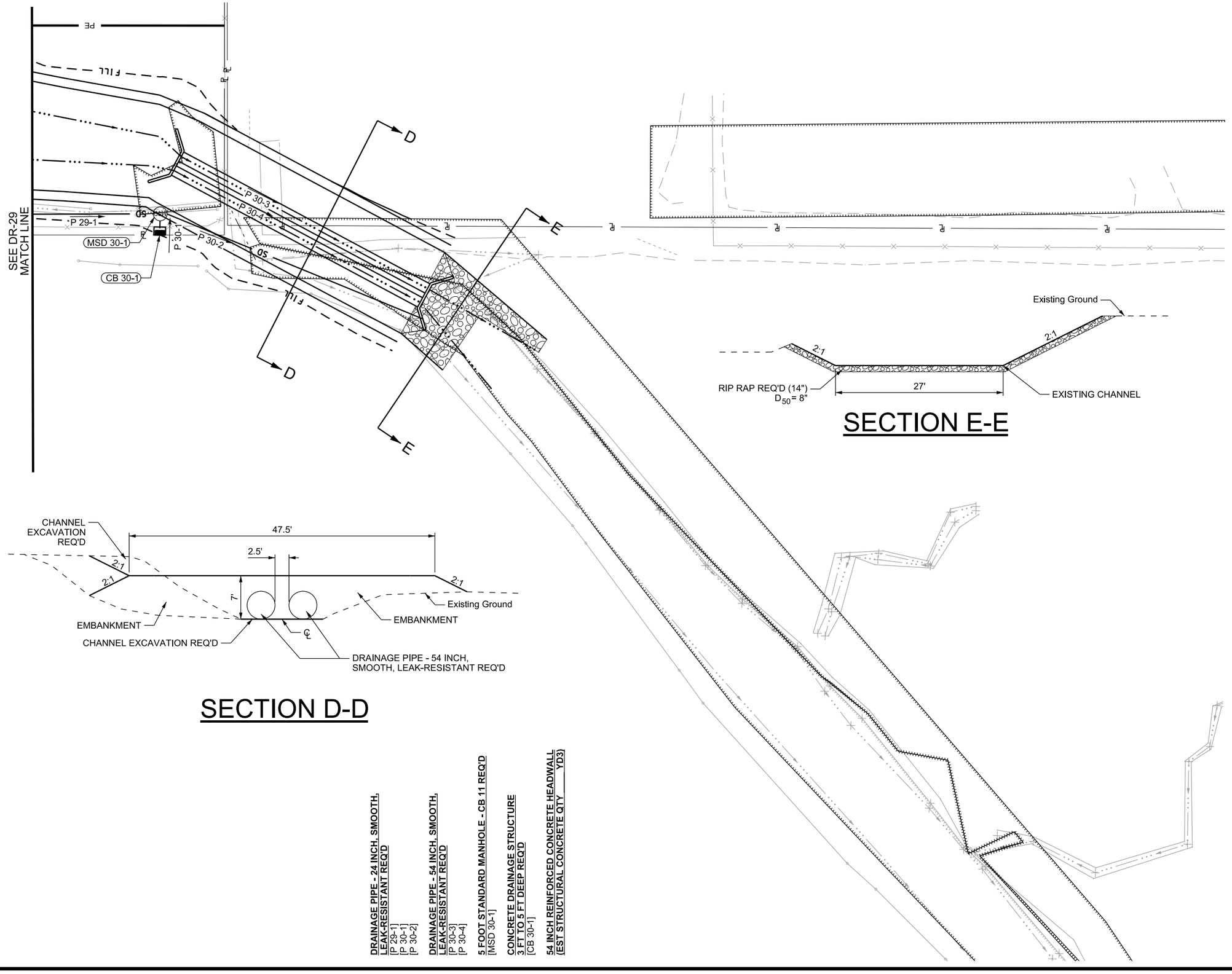
UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY: DCV
QC CHECKED BY: TWT
DATE: 9/13/2018
APPROVED
PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE
PROJECT NUMBER: F-0191(152)126 PIN 15329
DRAINAGE

SHEET NO. DR-29

13-SEP-2018 DGN File:IP_PWPod0317800\15329_DR-29.dgn



SECTION E-E

SECTION D-D

DRAINAGE PIPE - 24 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 29-1]
[P 30-1]
[P 30-2]

DRAINAGE PIPE - 54 INCH, SMOOTH, LEAK-RESISTANT REQ'D
[P 30-3]
[P 30-4]

5 FOOT STANDARD MANHOLE - CB 11 REQ'D
[MSD 30-1]

CONCRETE DRAINAGE STRUCTURE
3 FT TO 5 FT DEEP REQ'D
[CB 30-1]

54 INCH REINFORCED CONCRETE HEADWALL
(EST STRUCTURAL CONCRETE QTY _____ YD3)

REVISIONS

NO.	DATE	APPROVED BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
CIVIL SCIENCE

DRAWN BY	DCV
QC CHECKED BY	TWT

9/13/2018
DATE

APPROVED

PROFESSIONAL ENGINEER

PROJECT: US-191; NORTH MOAB TO COLORADO RIVER BRIDGE

PROJECT NUMBER: F-0191(152)126 | PIN 15329

DRAINAGE

SHEET NO. DR-30

13-SEP-2018 DGN File: IP_PWPrd@317@20\15329_DR-30.dgn

Appendix B

U.S. Fish and Wildlife Information, Planning, and Conservation Database
Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
Phone: (801) 975-3330 Fax: (801) 975-3331
http://www.fws.gov
http://www.fws.gov/utahfieldoffice/

In Reply Refer To: September 12, 2018
Consultation Code: 06E23000-2018-SLI-0253
Event Code: 06E23000-2018-E-01721
Project Name: US-191: North Moab to Colorado Bridge

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
(801) 975-3330

Project Summary

Consultation Code: 06E23000-2018-SLI-0253

Event Code: 06E23000-2018-E-01721

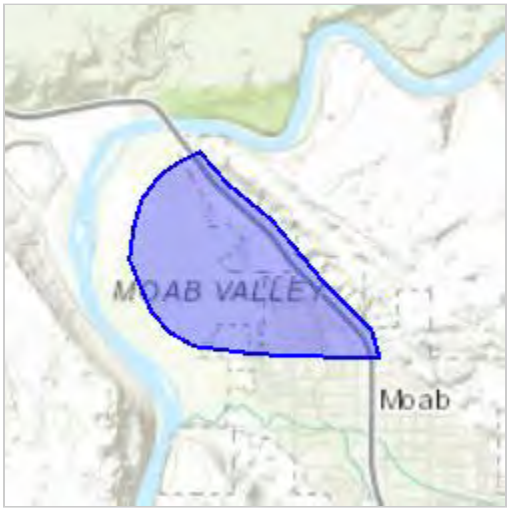
Project Name: US-191: North Moab to Colorado Bridge

Project Type: TRANSPORTATION

Project Description: UDOT Region 1 proposes roadway improvements to US-191 in Moab between SR-128 (Colorado River Bridge) to 400 North. Improvements include widening to 4 lanes, shoulders, curb and gutter, and sidewalk in some locations. AECOM is performing a re-evaluation of the 2007 EA.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/38.590190487054706N109.57207567605155W



Counties: Grand, UT

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
California Condor *Gymnogyps californianus* Population: U.S.A. (specific portions of Arizona, Nevada, and Utah) There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8193	Experimental Population, Non-Essential
California Condor *Gymnogyps californianus* Population: U.S.A. only, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8193	Endangered
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bonytail Chub *Gila elegans* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1377	Endangered
Colorado Pikeminnow (=squawfish) *Ptychocheilus lucius* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3531	Endangered
Humpback Chub *Gila cypha* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3930	Endangered
Razorback Sucker *Xyrauchen texanus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/530	Endangered

Flowering Plants

NAME	STATUS
Jones Cycladenia *Cycladenia humilis var. jonesii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3336	Threatened
Navajo Sedge *Carex specuicola* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8579	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Appendix E

Determination of Eligibility and Finding of Effect

A Selective Reconnaissance-Level Historic Structures Assessment for the US-191 Moab to the Colorado River Bridge, Moab, Grand county, Utah

US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

SHANE M. MARSHALL, P.E.
Deputy Director of Engineering and Operations

TERIANNE S. NEWELL, P.E.
Deputy Director of Planning and Investment

October 22, 2018

Mr. Cory Jensen
Senior Historic Preservation Specialist
Utah Division of State History
300 Rio Grande
Salt Lake City, UT 84101-1182

RE: UDOT Project No. F-0191(152)126; US-191, North Moab to Colorado River Bridge, Moab, Grand County, Utah (PIN 15329).
Determination of Eligibility and Finding of No Adverse Effect.

Dear Mr. Jensen:

The Utah Department of Transportation (UDOT) is preparing to undertake the subject federal-aid project. UDOT intends to prepare an environmental assessment (EA) re-evaluation to determine potential impacts of newly added areas and revised project design. In accordance with Parts 3.1.1 and 3.2 of the *Memorandum of Understanding Between the Federal Highway Administration and the Utah Department of Transportation Concerning State of Utah's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 USC §327* (executed January 17, 2017), the UDOT assumes responsibility, assigned by the Federal Highway Administration (FHWA), for ensuring compliance with Section 106 of the NHPA and with Section 4(f) of the DOT Act of 1966, as amended. Also in accordance with the *Third Amended Programmatic Agreement among the FHWA, the Utah State Historic Preservation Officer, the Advisory Council on Historic Preservation, the USACE Sacramento District, and the UDOT Regarding Section 106 Implementation for Federal-Aid Transportation Projects in the State of Utah* (executed August 23, 2017), Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 et seq.), and U.C.A.9-8-404, the UDOT has taken into account the effects of this undertaking on historic properties, and is affording the Utah State Historic Preservation Officer (SHPO) an opportunity to comment on the undertaking. Additionally, this submission is in compliance with Section 4(f) of the Department of Transportation Act of 1966, 23 U.S.C. § 138 (as amended) and 49 U.S.C. § 303 (as amended).

PROJECT DESCRIPTION

The original EA proposed replacement of the existing Colorado River Bridge and expansion of US-191 within the project area to a 4-lane facility with accommodations for bicycle/pedestrian traffic in Moab, Utah. The original EA was completed in 2007 (UDSH Case No. 06-1421), and now that the project is funded, additional areas have been added to the APE for improvements to drainage systems. The proposed project area extends along US-191 from 400 North to SR-279 (Potash Rd.) as well as adjacent areas as necessary for drainage improvements. Transportation improvements are needed to address structural deficiencies in the Colorado River Bridge, meet existing and projected travel demands, and facilitate bicycle and pedestrian traffic along US-191.

The area of potential affects (APE) has been defined as the linear 200-foot-wide corridor along US-191 as well as the additional drainage areas, comprising approximately 103 acres. The APE for architecture extended to all parcels adjoining the APE.

The APE has been surveyed for archaeology by AECOM, under State Antiquities Project Number U18OM144, and the results are reported in *US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey* (see enclosed report). An intensive level pedestrian survey was conducted using 15 meter transects to identify archaeological resources in undeveloped areas. Any previously documented sites were revisited. A selective-reconnaissance level survey was conducted to record architectural properties, and the results are reported in *A Selective Reconnaissance-Level Historic Structures Assessment for the US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah* (see enclosed report). This survey updated documentation on buildings that were recorded during the original EA, noted those that had since been demolished, and documented any building that had become historic since 2006.

The surveys have resulted in the identification of 9 archaeological sites and 16 architectural properties. All of the archaeological sites and nine of the architectural properties are previously documented. In total, 2 archaeological sites and 5 architectural properties are eligible to the National Register of Historic Places (NRHP). No known traditional cultural properties or paleontological resources are located in the APE. The Determinations of Eligibility and Findings of Effects (for both Section 106 and Section 4(f)) are provided in Table 1 for archaeological resources and in Table 2 for architectural properties. Please see attached notification letter regarding Section 4(f) *de minimis* impacts.

ARCHAEOLOGICAL RESOURCES

Table 1. Determinations of Eligibility and Findings of Effect for Archaeological Resources.

Site	Name or Description	NRHP Eligibility	Finding of Effect	Section 4(f) Use	Section 4(f) Impact
42GR2813	Moab-Thompson Wagon Road	Eligible (Criteria A, D)	No Historic Properties Affected	No	No
42GR3622	Historic Ditch	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3623	Historic Ditch	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3625	Historic Ditch	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3626	Prehistoric Lithic Scatter	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3627	Prehistoric Lithic Scatter	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3628	Prehistoric Lithic Scatter	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR3629	Historic Debris Scatter	Not Eligible	No Historic Properties Affected	N/A	N/A
42GR5569	Elk Mountain Mission Fort	NRHP Listed	No Historic Properties Affected	No	No

Description of Effect to Site 42GR5569: All archaeological sites will be avoided by this project. The project is acquiring a 30 foot-wide perpetual storm drain easement for the construction and maintenance of the storm drain system. The location of the storm drain will be approximately 15 feet south of the fence and property line which forms the southern boundary of the Elk Mountain Mission Fort site. The drain will include a 72" wide pipe buried in a shallow trench until it reaches the detention basin outfall.

The construction specifications will limit construction methods within this easement. Limitations for this construction will include stockpiling all materials south of the proposed storm drain alignment, which will limit the

potential for accidental impacts to the Elk Mountain Mission Fort site. Vibrations will be minimized in this area by the use of flowable fill or other static compaction methods, and this method will be applied to 100 feet either side of the site boundary. Temporary environmental fencing will also be installed along the fenceline for additional visibility, and an archaeological monitor will be present during all ground disturbing and compaction activities. Although historic activity south of the fort ruins is not clear, this area has a moderate likelihood of artifact or feature discovery during construction. The area has previously been disturbed by landowner activity.

ARCHITECTURAL PROPERTIES

Table 2. Determinations of Eligibility and Findings of Effect for Architectural Properties.

Address	Date	Style	NRHP Eligibility/ SHPO Rating	Finding of Effect	Section 4(f) Use	Section 4(f) Impact
452 N. Main St., Moab	1940	Hall and Parlor	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
505 N. Main St., Moab	1967, 1994	Commercial	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
512 N. Main St., Moab	1951	Motel	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
543 N. Main St., Moab	1951	Hall and Parlor	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
550 N. Main St., Moab	1951	Commercial	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
570 N. Main St., Moab	1954	Motel	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
602 N. Cermak St., Moab	1957	Split level, Ranch Style	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
611 N. Cermak St., Moab	1953	Meeting Hall	Eligible /EC	No Historic Properties Affected	No	No
643 Stewart Canyon	1955	Ranch	Eligible/EC	No Adverse Effect (21,895 sq ft perpetual easement)	Yes	de minimis
600 N. Main St., Moab	1955	Ranch	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
3 Rosalie Ct., Moab	1953	Ranch	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
350 Marcus Ct., Moab	1971	Ranch	Eligible/EC	No Historic Properties Affected	No	No
510 Westwood Ave., Moab	1970	Ranch	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
963 N. 500 West	1954, 1960	Other Residential	Not Eligible/NC	No Historic Properties Affected	N/A	N/A
995 N. Main St., Moab	1965	Commercial	Eligible/EC	No Adverse Effect (8,226 sq ft perpetual easement, 9,035 sq ft temporary construction easement)	Yes	de minimis
1266 N. Main St., Moab	1894	Cross-wing	Listed/ES	No Historic Properties Affected	No	No

Description of Effects: All architectural properties eligible for the NRHP will be avoided during this project. Two properties (995 N. Main St. and 643 Stewart Canyon) will have perpetual easements and temporary construction

easements to blend landscaping and property access with the new road alignment. These features do not impact any features that contribute to the significance of the properties and therefore the project will result in No Adverse Effect and a *de minimis* Section 4(f) impact.

The following properties were reported in the 2007 EA but have subsequently been demolished:

Address	**Date**	**Style**	**Previous NRHP Eligibility/ SHPO Rating**
400 N. Main St., Moab	1900	Other Residential	Not Eligible/NC
401 N. Main St., Moab	1902	Vernacular	Eligible/EC
415 N. Main St., Moab	1910	Vernacular	Not Eligible/NC
423 N. Main St., Moab	1920	Bungalow	Not Eligible/NC
424 N. Main St., Moab	1940	Other Residential	Not Eligible/NC
488 N. Main St., Moab	1940	Vernacular	Not Eligible/NC
592 N. Main St., Moab	1940	Other Residential	Not Eligible/NC
600 N. Main St., Moab	1880	Hall and Parlor	Not Eligible/NC
615 N. Cermak St., Moab	1940	Other	Not Eligible/NC
2 Rosalie Ct., Moab	1960	Modern Contemporary	Not Eligible/NC
1001 N. 500 West	1940	Vernacular Cottage	Not Eligible/NC

CONSULTATION EFFORTS

Native American consultation of those tribes that expressed interest in this project during the 2007 EA. Notifications of the re-evaluation were sent to the Hopi Tribe and the Paiute Indian Tribe of Utah, (sent March 27, 2018). The Hopi Tribe requested continued consultation on this project.

SUMMARY

To summarize, the project will result in a finding of **No Adverse Effect** for 2 architectural properties and 2 Section 4(f) *de minimis* impacts, and a finding of **No Historic Properties Affected** for all remaining architectural properties and archaeological sites. Therefore, the Finding of Effect for the proposed UDOT Project No. F-0191(152)126; US-191, North Moab to Colorado River Bridge, Moab, Grand County, Utah, is **No Adverse Effect**.

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by UDOT pursuant to 23 *USC §327* and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

Please review this document and, providing you agree with the findings contained herein, provide written concurrence. Should you have any questions or need additional information, please feel free to contact Liz Robinson at 801-910-2035 or lizrobinson@utah.gov; or Elizabeth Giraud at 801-965-4917 or egiraud@utah.gov.

Sincerely,

Liz Robinson

Liz Robinson, M.A., RPA
Cultural Resources Program Manager
UDOT Environmental Services

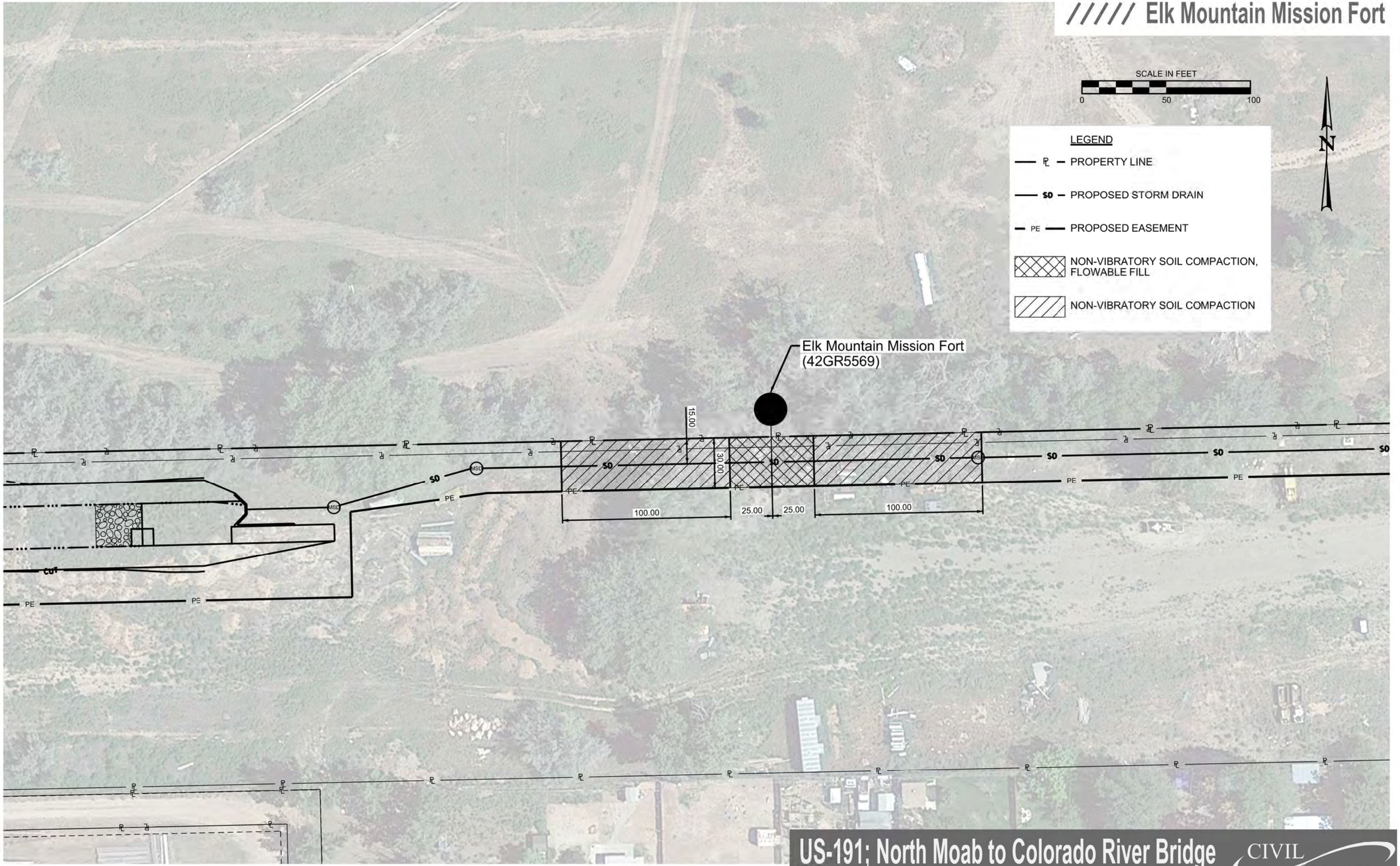
Elizabeth Giraud

Elizabeth Giraud, AICP
Architectural Historian
UDOT Environmental Services

Enclosures

cc: Ryan Anderson, Project Manager
Naomi Kissen, Environmental Manager

///// Elk Mountain Mission Fort



US-191; North Moab to Colorado River Bridge

PIN 15329 | F-0191(152)126

CIVIL SCIENCE

OCTOBER 5, 2018

///// 643 Stewart Canyon

643 Stewart Canyon
TOTAL TRACT: 39.34 ac.
PE: 16,226 sq. ft.
TCE: 18,241 sq. ft.

N

SCALE IN FEET
0 40 80

STEWART CANYON

LEGEND

- PROPERTY LINE
- PROPOSED EASEMENT
- PROPOSED TEMPORARY CONSTRUCTION EASEMENT

SEPTEMBER 26, 2018

US-191; North Moab to Colorado River Bridge

PIN 15329 | F-0191(152)126

CIVIL SCIENCE

SEPTEMBER 25, 2018

US-191; North Moab to Colorado River Bridge

PIN 15329 | F-0191(152)126

CIVIL SCIENCE

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Jill Remington Love
Executive Director
Department of
Heritage & Arts

Utah Division of State History

Don Hartley
Director
State Historic Preservation Officer

October 24, 2018

Liz Robinson
Cultural Resources Program Manager
Utah Dept of Transportation (UDOT)
4501 Constitution Blvd
Salt Lake City, UT 84119

RE: PIN 15329_US-191, North Moab to Colorado River Bridge_F-0191(152)126

For future correspondence, please reference Case No. 18-2377

Dear Ms Robinson,

The Utah State Historic Preservation Office received your submission and request for our comment on the above-referenced project on October 22, 2018. Based on the information provided to our office, we concur with your determination of eligibility and finding of No Adverse Effect for the proposed undertaking.

This information is provided to assist with Section 106 responsibilities as per §36CFR800. If you have questions, please contact me at (801) 245-7242 or by email at coryjensen@utah.gov.

Sincerely,

Cory Jensen
National Register & Survey Coordinator

PROJECT DATA SUMMARY

Report Title: *A Selective Reconnaissance-Level Historic Structures Assessment for the US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah*

Report Author: Kirsten Johnson

Field Surveyor: Gordon C. Tucker Jr.

Report Date: May 4, 2018

Utah State Project Number: U18OM0144

UDOT Project Number and PIN: F-I15-1(116)11, PIN 15329

Consultant Project Number: 60565564

Project Description: In 2007, the Utah Department of Transportation (UDOT), in cooperation with the Federal Highway Administration (FHWA), completed an environmental assessment (EA) for the US-191 Colorado River Bridge project [Project No.: BHF-0191(27)129E]. The project involved the replacement of the US-191 bridge over the Colorado River and widening of the roadway within a 3.7-mile-long segment of US-191 from 400 North in Moab to State Route (SR) 279 (Potash Road). FHWA signed the Finding of No Significant Impact for the project in May 2007, and UDOT subsequently completed Phase 1 of the project, which included the construction of the bridge and roadway improvements within an approximately 1.7-mile-long segment of US-191 from SR-279 to SR-128.

UDOT and FHWA are now planning to complete the last two miles of the project south of the Colorado River from SR-128 to 400 North in Moab. The project may include the widening of the roadway to include four 12-foot-wide lanes with a 12-foot median and 8-foot shoulders. The proposed alignment would typically follow the centerline of the existing road. Sedimentation basins would be constructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. A detention basin with associated pipes and ditches would be constructed on the west side of the roadway north of Westwood Avenue. This study was conducted as part of an environmental re-evaluation required by UDOT because the 2007 EA is more than 10 years old and the growth of the population, tourism, and development within the corridor have exceeded the projections described in the 2007 EA.

Survey Area: The area of potential effects (APE) was defined as a linear corridor, generally 2 miles long and 200 feet wide. At several locations along the corridor, the APE boundary was pushed out for varying distances to the west and east to include the three proposed sedimentation basins and the detention basin and the potential locations for associated pipes and ditches. The APE encompasses a total of 103 acres.

Agencies: FHWA, UDOT

Location: Moab, Grand County, Utah

Land Ownership: Private; State

Date(s) of Fieldwork: April 9 through April 12, 2018

Methods: Selective reconnaissance-level building inventory

Historic Structures Recorded: 16

NRHP Eligible Buildings: 5

Table S1. Summary of Historic Structures and National Register of Historic Places Eligibility Recommendations

Listed or Eligible for the National Register of Historic Places	
611 N. Cermak St. (Eligible)	643 Stewart Canyon (Eligible)
350 Marcus Ct. (Eligible)	995 N. Main St. (Eligible)
1266 N. Main St. (Highway 191) (Listed)	
Not Eligible for the National Register of Historic Places	
452 N. Main St.	505 N. Main St.
512 N. Main St.	543 N. Main St.
550 N. Main St.	570 N. Main St.
600 N. Main St.	602 N. Cermak St.[1]
3 Rosalie Ct.	510 Westwood Ave.[2]
963 N 500W	

NOTES: [1] The Grand County Assessor designates this property as 602 N. Cermak Street but it is referred to as 610 N. Cermak Street in Whitfield and others 2006.
[2] The Grand County Assessor designates this property as 536 Westwood Avenue, but its street address is 510 Westwood Avenue.

INTRODUCTION AND BACKGROUND

In 2007, the Utah Department of Transportation (UDOT), in cooperation with the Federal Highway Administration (FHWA), completed an environmental assessment (EA) for the US-191 Colorado River Bridge project [Project No.: BHF-0191(27)129E]. The project involved the replacement of the US-191 bridge over the Colorado River and widening of the roadway within a 3.7-mile-long segment of US-191 from 400 North in Moab to State Route (SR) 279 (Potash Road). FHWA signed the Finding of No Significant Impact for the project in May 2007, and UDOT subsequently completed Phase 1 of the project, which included the construction of the bridge and roadway improvements within an approximately 1.7-mile-long segment of US-191 from SR-279 to SR-128.

UDOT and FHWA are now planning to complete the last two miles of the project south of the Colorado River from SR-128 to 400 North in Moab. The project may include the widening of the roadway to include four 12-foot-wide lanes with a 12-foot median and 8-foot shoulders. The proposed alignment would typically follow the centerline of the existing road. Sedimentation basins would be constructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. A detention basin with associated pipes and ditches would be constructed on the west side of the roadway north of Westwood Avenue.

This study was conducted as part of an environmental re-evaluation required by UDOT because the 2007 EA is more than 10 years old and the growth of the population, tourism, and development within the corridor have exceeded the projections described in the 2007 EA. The information below summarizes the findings of a historical structures inventory conducted by AECOM archaeologist Gordon C. Tucker, Jr. between April 9 and 12, 2018 for the proposed undertaking. The fieldwork was completed under the supervision of AECOM architectural historian, Kirsten Johnson, who meets the Secretary of the Interior's Professional Qualification Standards for architectural history.

The area of potential effects (APE) was defined as a linear corridor, generally 2 miles long and 200 feet wide (**Figure 1**). At several locations along the corridor, the APE boundary was pushed out for varying distances to the west and east to include the three proposed sedimentation basins and the detention basin and the potential locations for associated pipes and ditches. The APE encompasses a total of 103 acres.

HISTORICAL OVERVIEW

Mormon settlement of present-day Moab began with the establishment of the Elk Mountain Mission in June 1855. However, conflicts with the Ute Indians resulted in Mormon abandonment of the mission just three months later. The mission remained standing and cattle ranchers who arrived in the Moab area in the late 1870s and 1880s occupied the mission until new homes were constructed. Other early Moab settlers planted fruit orchards and vineyards, but agriculture did not flourish in the region due to unpredictable freezes and the prohibitive expense of pumping irrigation water (City of Moab 2002; Whitfield and others 2006).

The community, which was initially known as Mormon Fort and subsequently as Grand Valley, was renamed Moab in March 1880 when the local post office was established and designated under that name. In 1883, the Denver & Rio Grande narrow gauge rail line was constructed between Denver, Colorado, and Salt Lake City. A railhead was established about 25 miles north of Moab at Thompson Springs, which became the shipping and transportation point for goods and people traveling to and from Moab. The Utah Legislature created Grand County in 1890

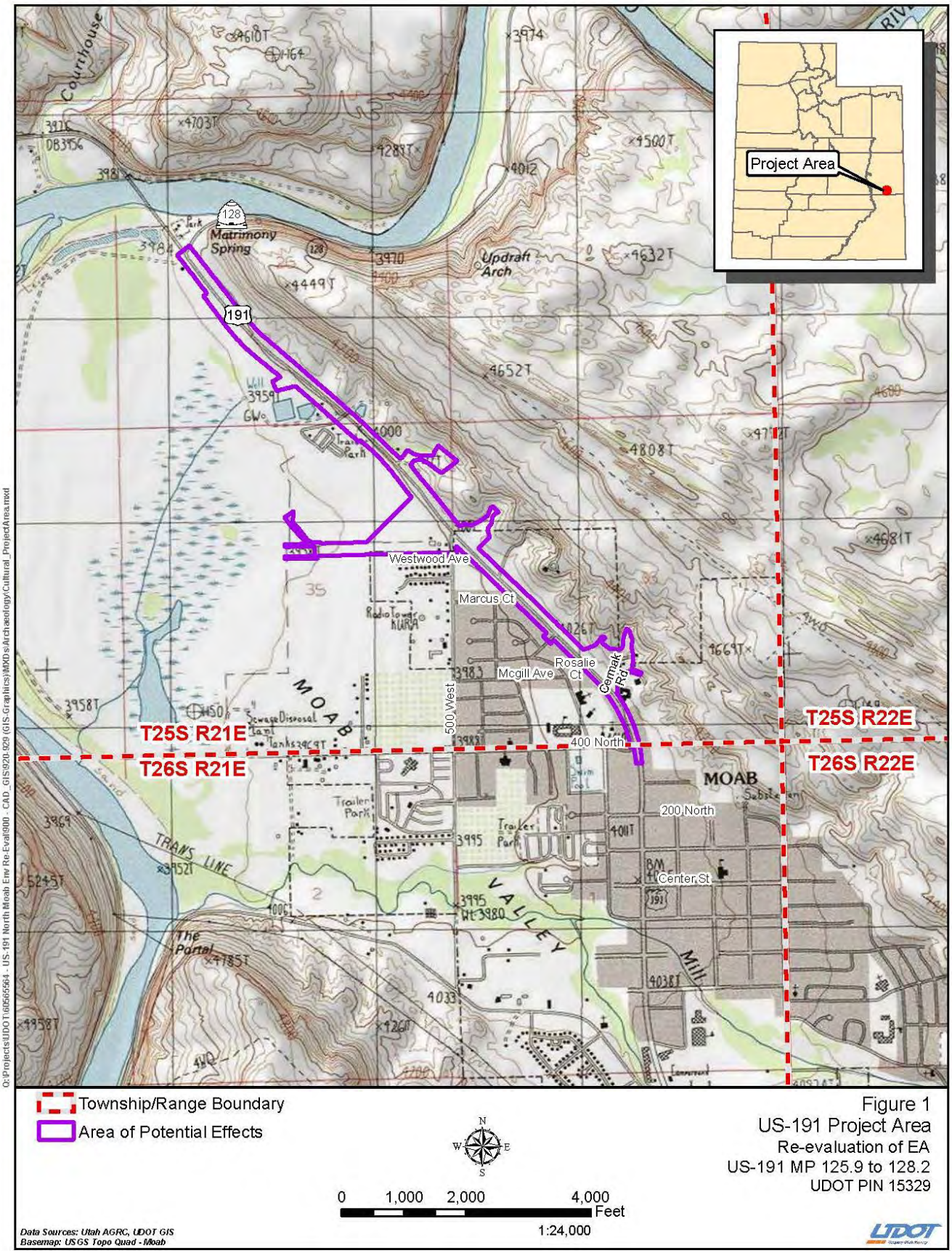


Figure 1
US-191 Project Area
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

and Moab was incorporated as a town on December 20, 1902 (City of Moab 2002; Whitfield and others 2006).

Beginning in the 1880s, mining began to dominate the local economy. Between the 1890s and 1920s, coal, copper, and gold was mined, and in 1912 vanadium was discovered in the area. By 1920, up to $2.5 million in uranium had been produced in southeastern Utah, and potash and manganese mining played a prominent role in Moab's economy. During the Cold War, uranium was in high demand, and when the mineral was discovered south of Moab, the town's economy boomed. The community experienced dramatic growth until 1957, when the Atomic Energy Commission announced that its uranium supply had reached saturation. The U.S. government continued to purchase uranium into the 1960s and the processing mill continued as the community's major employer until it closed in the early 1980s (City of Moab 2002; Whitfield and others 2006).

Tourism, which began to impact Moab's economy in the post-World War II era, rescued the local economy after the decline of the mining industry. The Canyonlands National Park and the Arches National Park were established in 1964 and 1971, respectively, and today the local economy is predominately based on tourism (City of Moab 2002; Whitfield and others 2006).

PREVIOUSLY DOCUMENTED PROPERTIES

AECOM conducted a file search of the Utah Division of State History's PreservationPro database on March 15, 2018. The database identified 12 previously documented properties in the survey area. The Arthur Taylor House was recorded in 1979 (Taniguchi 1979) and listed in the National Register of Historic Places (NRHP) in 1980, the King World Sandstone Carving was recorded by an intensive survey in 1997, and the other 10 properties were documented by a reconnaissance survey conducted in 1992. AECOM also reviewed the historic structure report completed to support the 2007 EA (Whitfield and others 2006), which documented nine properties in the survey area.

The 21 previously documented properties are listed in **Table 1**. Eleven properties have been demolished since they were last recorded and one has been relocated outside of the survey area. The nine extant properties were re-evaluated as part of the current study.

Table 1. Previously Documented Properties in the Survey Area

	Address/Description	SHPO Rating[1]/NRHP Eligibility Documentation	Current Status
1	400 N. Main Street[(2)]	NC/Ineligible	Demolished
2	401 N. Main Street[(2)]	ES/Eligible	Demolished
3	415 N. Main Street	NC/Ineligible	Demolished
4	423 N. Main Street[(2)]	NC/Ineligible	Demolished
5	424 N. Main Street[(2)]	NC/Ineligible	Demolished
6	452 N. Main Street[(2)]	NC/Ineligible	Present
7	488 N. Main Street[(2)]	NC/Ineligible	Demolished
8	512 N. Main Street	NC/Ineligible	Present
9	543 N. Main Street	NC/Ineligible	Present
10	570 N. Main Street	NC/Ineligible	Present
11	592 N. Main Street[(2)]	NC/Ineligible	Demolished
12	600 N. Main Street[(2)]	NC/Ineligible	Demolished
13	602 N. Cermak Street[(3)]	NC/Ineligible	Present
14	611 N. Cermak Street	ES/Eligible	Present
15	615 N. Cermak Street[(2)]	NC/Ineligible	Demolished

	Address/Description	SHPO Rating[1]/NRHP Eligibility Documentation	Current Status
16	3 Rosalie Court	NC/Ineligible	Present
17	2 Rosalie Court	NC/Ineligible	Demolished
18	1001 N. 500 West[(2)]	NC/Ineligible	Demolished
19	963/999 N. 500 West	ES/Eligible	Present
20	Arthur Taylor House[(2)]	ES/Listed	Present
21	King World Sandstone Carving[(2)]	ES/Eligible	Relocated

NOTES: SHPO = Utah State Historic Preservation Office; NRHP = National Register of Historic Places
[(1)]ES = Eligible/Significant; EC = Eligible; NC = Ineligible;
[(2)]Properties identified by the PreservationPro database.
[(3)]The Grand County Assessor designates this property as 602 N. Cermak Street but it is referred to as 610 N. Cermak Street in Whitfield and others 2006.

FINDINGS

Sixteen properties that are 45 years old or older (constructed prior to 1974) were identified within the survey area. Nine of those were previously documented and seven were identified by reviewing Grand County Assessor's records and historic aerial photography. One property was listed in the NRHP in 1980, four properties are recommended eligible for listing in the NRHP, and 11 properties are recommended ineligible. The properties are summarized in **Table 2** and their locations depicted in **Figure 2**.

Listed Property

The Arthur Taylor House is a brick farmhouse constructed between 1894 and 1896 and is representative of Moab's early ranching history. The Taylor House was listed in the NRHP under Criterion A in 1980 (Taniguchi 1979). When the property was listed in the NRHP, it had already been converted to commercial use as the Grand Old Ranch House Restaurant, but many of the original ranch outbuildings remained extant. In the late 1990s or early 2000s, the property became the Moab Springs Ranch, and new lodging units were constructed north and east of the ranch house. Most of the historic outbuildings mapped in the NRHP nomination form appear to have been removed to accommodate the new lodging units, but the house itself retains sufficient historic integrity and significance to meet the criteria for listing in the NRHP and SHPO rating "ES."

Eligible Properties

The property at 611 N. Cermak Street is the former Moab Elks Lodge No. 2021. The original building was constructed in 1953 as the Uranium Club, a short-lived dance hall and social club that provided entertainment to workers and local residents during the uranium boom. The Moab Elks Lodge, which was established in 1956, purchased the building in 1959 and it became the first permanent home for the lodge (Moab Times-Independent 1956). In 1962, the Moab Elks completed a major remodeling project, including interior improvements such as installation of suspended grid ceilings with acoustic tile, new paint and paneling on the interior walls, and new lighting and carpeting (Moab Times-Independent 1962). Historic aerial photographs indicate that a one-story addition was constructed on east side of the building in late 1950s/early 1960s; a one-story rectangular addition and two-story triangular addition were built in late 1960s/early 1970s on the north and west elevations, respectively; and an outdoor patio was added to the south elevation in 1970s/early 1980s. The Moab Elks Club recently closed on March 30, 2018 and the building will be sold (Knight 2018). The building, which possesses design elements of Modernism, has been altered since construction, but overall retains sufficient integrity and is recommended eligible for listing in the NRHP with a SHPO rating of "EC."

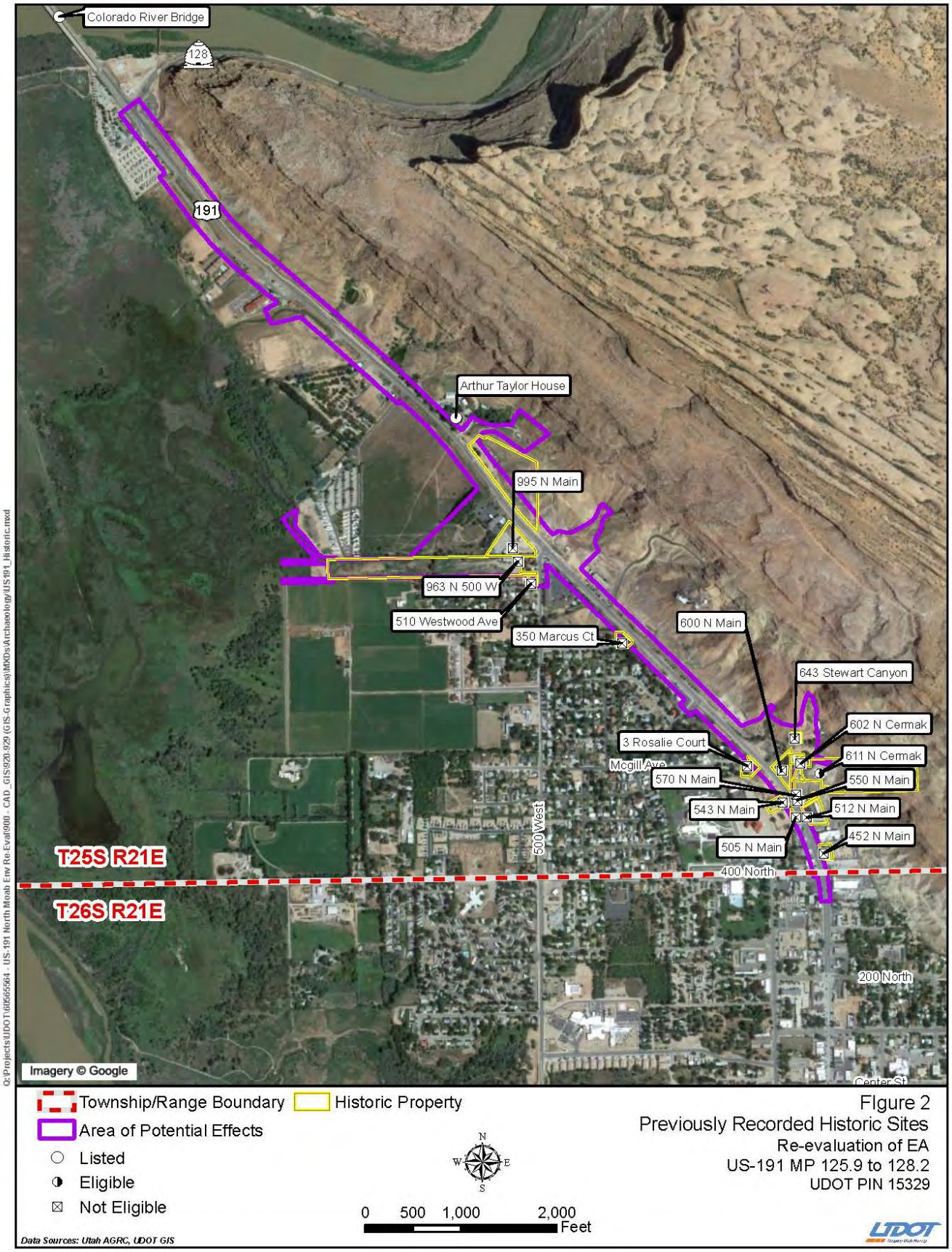


Figure 2
Previously Recorded Historic Sites
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
452 N. Main St. / 01-0036-0007	1940	One-story hall and parlor residence converted to commercial use; board-and-batten exterior walls; side gable roof is clad with wood shingles. Notable alterations: additions to the side and rear elevations, replacement windows, stone wainscoting panels beneath the porch and bottom half of exterior walls, and a modern roof-mounted air conditioning unit. Three prefabricated metal outbuildings were observed behind the building. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
505 N. Main St. / 01-0036-0016	1967, 1994	Residence converted to commercial use; one-story portion constructed in 1967 has a front gable roof; L-shaped two-story portion is 1994 addition, has a cross gable roof and shed-roof overhang shading the front entrance. Stucco exterior walls; standing-seam metal roof cladding; boxed eaves; vinyl sliding windows. Notable alterations: two-story addition and replacement windows in the 1967 portion. No outbuildings were observed. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
512 N. Main St. / 01-0036-0004	1951	One-story motor court with 3 buildings; north building built c. 1955; flat roofs with Mission-style parapets; slump-block wainscot on office front façade; stucco exterior walls; shed roof porches/awnings with tile roofs. Notable alterations: additions to north and south buildings, replacement windows; Mission Revival-style elements may not be original. No outbuildings were observed. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
543 N. Main St. / 01-0MUT-0095	1951	One-story hall and parlor residence converted to commercial use; side gable roof clad with asphalt singles; exterior walls clad with half-log siding; windows are 1/1 double-hung; front porch has a shed roof. Notable alterations: enclosed porch on rear, replacement windows, and porch/deck extension to the south. A prefabricated metal outbuilding was observed behind the building. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
550 N. Main St. / 01-0036-0041	1951	One-story commercial building; flat roof with parapets; stucco and corrugated metal exterior walls; windows are vinyl fixed and sliding windows; doors are single-leaf wood with one light; entries on west elevation shaded by wood awnings with metal roofs; wood shade awning on south elevation. Notable alterations: additions on west elevation that conceals original front of building; addition on north elevation; non-original exterior wall cladding, doors, and windows. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
570 N. Main St. / 01-0036-0005	1954	One-story U-shaped motor court with 3 buildings; hipped and gable roofs with asphalt shingles; roof eaves extend to shade entrances to units; stucco exterior walls; aluminum sliding windows and fixed plate glass windows; north building occupied by restaurant, has Santa Fe-style roof parapet and porch supports. Notable alterations: window replacement, new stucco, restaurant exterior remodel. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
602 N. Cermak St. / 03-0036-0069	1957	Contemporary Ranch-style split-level single-family (SF) residence converted to commercial use; gable roof clad with metal; exterior walls clad with plywood siding; sliding aluminum windows with faux shutters. Notable alterations: lean-to entrance attached to north elevation; replacement windows. A storage shed and garage were observed east and south of the building. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
611 N. Cermak St. / 01-0036-0040	1953	Meeting hall (Elks Lodge) with design elements of Modernism; concrete block; flat roof with parapet. Original structure: 2-story central rectangular block, main entrance on clipped northwest (NW) corner. One-story addition constructed on east in late 1950s/early 1960s; 1-story rectangular addition on north and 2-story triangular addition on west built in late 1960s/early 1970s; outdoor patio on south built in 1970s/early 1980s. No outbuildings observed. **Historic Boundary:** Current parcel boundary.	EC/Eligible	
643 Stewart Canyon / 03-0036-0071	1955	One-story Ranch-style residence; side gable roof; constructed of concrete masonry units (CMU); vinyl or aluminum sliding and fixed windows with CMU sills. Notable alternations: cross-gable addition on the north elevation; replacement windows. Adjacent garage appears to have been constructed in the 1990s. **Historic Boundary:** Current parcel boundary.	EC/Eligible	

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
600 N. Main St. / 01-0036-0021	c. 1955	One-story Ranch-style building; likely constructed as SF residence and converted to commercial use. Corrugated metal on west and north exterior walls and on roof; brick applied below window level on west elevation. Windows are aluminum-framed fixed/sliding windows; main entry on west is an anodized aluminum storefront door. Storage sheds observed east of building; 1880 residence recorded on parcel in 1992 not relocated. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
3 Rosalie Ct. / 01-0MUT-0080	1953	One-story, L-shaped Ranch-style SF residence; central hexagonal hub with side wings; hipped roof clad with asphalt shingles; boxed, overhanging eaves; brick construction; tripartite sliding windows; central entrance with multi-light sidelights; interior brick chimney; enclosed garage/carport has vinyl siding and aluminum sliding windows; open shed-roof porch on back of west wing; open aluminum storage shed south of home. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
350 Marcus Ct. / 01-0MUT-0060	1971	One-story, Ranch-style SF residence; side gable roof clad with asphalt shingles; boxed, overhanging eaves; slump block construction; 2-light and tripartite aluminum sliding windows; recessed front entry shaded by roof overhang supported by wrought iron post; attached garage with non-original door; wide interior chimney; flat or shed roof porch on rear elevation; original opening on NW elevation infilled with wood siding and window; shed NW of residence. **Historic Boundary:** Current parcel boundary.	EC/Eligible	

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
510 Westwood Ave. / 01-0MPA-0001	1970	One-story Ranch-style SF residence; side gable roof clad with standing seam metal; cross gable roof extension shades main entrance and wood porch; 2-light and tripartite aluminum-framed windows with pop-out surrounds; roof extended to the east to form open carport; cross-gable addition on west end of south elevation; shed north of residence. Stucco, window surrounds, cross-gable addition, and carport added in the last 6 years. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	
963 N 500W / 03-0035-0028	c. 1954; 1960	One-story wood-framed SF residence; CMU foundation; gable roof clad with standing seam metal; three vents on ridge line; wood siding; brick wainscoting; double-hung and fixed plate glass vinyl windows with wood surrounds; bay window on south elevation; flat-roofed addition on west with sliding aluminum window and wood siding. Exterior remodeled after 2006, including bay window and wood siding. There is a small, prefabricated metal shed on a concrete slab to the south and two portable metal carports to the west. A larger, rectangular outbuilding is west of the SF residence and the portable carports. The exterior walls and roof are corrugated metal the foundation is concrete slab. Windows are steel-frame, 6-light combination fixed/awning windows; there is a single-leaf entrance on the south elevation inset into one leaf of a larger two-leaf sliding door; metal roll-up door has replaced original sliding door on west elevation; 1-story corrugated metal shed attached to west elevation. **Historic Boundary:** Current parcel boundary.	NC/Ineligible (loss of historic integrity)	 

Table 2. Historical Structures Documented in the Survey Area

Address / Parcel Number	Year Built	Description and Historic Boundary	SHPO Rating[(1)] & NRHP Eligibility	Photo[(2)]
995 N. Main St. / 01-0035-0031	c. 1965	One-story corrugated metal warehouse on raised concrete foundation; corrugated metal gable roof; sliding aluminum-framed windows and single-leaf metal door on northeast (NE) elevation; metal single-leaf doors and loading dock on NE elevation; shed-roofed building attached to NW elevation with sliding door; 2-bay wood frame and corrugated metal garage west of warehouse. Round fuel tanks observed to the NW; self-serve gas station to the east. **Historic Boundary:** Current parcel boundary.	EC/Eligible	
1266 N. Main St. (Highway 191) / 01-0035-0036	1894-1896	Two-story T-plan brick farmhouse with design elements of the Stick/Eastlake styles; cross gable roof clad with wood shingles; double-hung, wood-framed windows with brick segmental arches and sandstone sills. The original rear porch was enclosed and a kitchen was added to the rear to connecting the house to a smaller residential structure. When the property was listed in the NRHP in 1980, many original associated outbuildings remained extant, but most have been replaced with modern structures reflecting the property's current use as a resort. **Historic Boundary:** Current parcel boundary.	ES/Listed	

NOTES: SHPO = Utah State Historic Preservation Office; NRHP = National Register of Historic Places
[(1)]ES = Eligible/Significant; EC = Eligible; NC = Ineligible;
[(2)]The following photographs were obtained from the following sources:
512 N. Main Street: Google Images;
550 N. Main Street: Google images;
570 N. Main Street: Inca Inn & Motel, 2017 (http://www.incainn.com/Gallery.aspx);
610 N. Cermak Street: Whitfield and others 2006;
611 N. Cermak Street: Knight, Greg, 2018, The End of an Era: Moab Elks Lodge Closes, *The Moab Times-Independent*, April 5;
643 Stewart Canyon: Moab Realty, 2018 (http://moabrealty.com/listing/11560-sweet-deal/)

Two eligible properties are residential and reflect the post-World War II period of Moab's history. One residence is located at 643 Stewart Canyon on a rural lot northeast of SR-191/Main Street and was constructed in 1955. The residence is a modest, Ranch-style home with replacement windows, an addition on the rear (secondary) elevation, and new stucco. The other residence is a one-story Ranch-style home located at 350 Marcus Court. The residence was constructed in 1971 and is within a residential subdivision of one-story, two-story, and split-level Ranch-style homes. Both residences have been altered since construction, but overall they retain sufficient integrity and are recommended eligible for listing in the NRHP with a SHPO rating of "EC."

The fourth eligible property is a commercial property located at 995 N. Main Street. The property is occupied by the Kellerstrass Oil Company and is associated with oil and gas sales. The parcel includes a corrugated metal warehouse with an attached shed roofed garage and a detached wood-frame and corrugated metal garage constructed circa 1965. Six round fuel tanks are northwest of the buildings, and a self-serve gas station that appears to have been constructed in the 1990s is east of the buildings adjacent to US-191/Main Street. The warehouse and associated free-standing garage constructed circa 1965 do not appear to have been substantially altered since construction. The property is recommended eligible for the NRHP with a SHPO rating of "EC."

Ineligible Properties

The other 11 properties within the survey area are recommended ineligible for listing in the NRHP. All were constructed between 1940 and 1970 and reflect the post-World War II period of Moab's development.

Eight properties are commercial properties associated with the tourism industry. Five are former residences converted to commercial use [452, 505, 543, and 600 N. Main Street and 602 N. Cermak Street[1]]; two are motor court/motel properties (512 and 570 N. Main Street); and the other is a strip commercial property that provides space to multiple tenants (550 N. Main Street).

Two properties are residential. The property at 3 Rosalie Court is an L-shaped, brick, Ranch-style house constructed in 1953. The original carport or garage has been converted to residential use and clad with vinyl siding, and a new carport was constructed in the driveway. The residence is within a residential subdivision that includes other homes similar in style. The property at 510 Westwood Avenue[2] a modest Ranch-style home built in 1970 that was remodeled within the last six years. The remodel included stucco exterior wall cladding, a cross-gable addition to the rear (secondary) elevation, pop-out window surrounds, and the addition of an open carport.

The property at 963 N. 500 W is on a large, rural lot and includes a vernacular, gable-roofed residential structure with exterior renovations completed within the last 10 to 15 years, including the addition of a bay window and wood siding. The parcel also includes a large, corrugated metal outbuilding with an attached metal shed. An original sliding door on the west elevation has been replaced with a roll-up door and a single-leaf door has been inserted into the sliding door on the south elevation.

All 11 properties have been altered since their original construction, have lost integrity, and are recommended ineligible for listing in the NRHP with a SHPO rating of "NC."

[1] The Grand County Assessor designates this property as 602 N. Cermak Street but it is referred to as 610 N. Cermak Street in Whitfield and others 2006.
[2] The Grand County Assessor designates this property as 536 Westwood Avenue, but its street address is 510 Westwood Avenue.

REFERENCES

City of Moab
2002 City of Moab General Plan. Electronic document, https://moabcity.org/DocumentCenter/View/68, accessed April 2018.

Knight, Greg
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Utah Division of State History

COVER PAGE
Must Accompany All Project Reports Submitted to the Utah SHPO

Case No.

State Project No. U18OM0144

Report Title: US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey

State Project No.: U18OM0144 **Organization Project No.:** 60565564

Report Date: May 2018 **County(ies):** Grand

Report Author(s): Gordon C. Tucker Jr.

Principal Investigator: Gordon C. Tucker Jr. **Field Supervisor(s):** Gordon C. Tucker Jr.

Records search date(s): March 29, 2018 **Preservation Pro Used?** (•) Yes ( ) No

Acres Surveyed: Intensive *(≤15 m intervals)*: 103 **Recon/Intuitive** *(>15 m intervals)*:

USGS 7.5' Series Moab, UT (1985)
Map Reference(s):

SITES REPORTED	COUNT	SMITHSONIAN SITE NUMBERS
Revisits (no site form updates)		
Updates (updated site forms attached)	8	42GR2813, 42GR3622, 42GR3623, 42GR3625, 42GR3626, 42GR3627, 42GR3628, 42GR3629
New recordings (site forms attached)	1	42GR5569, Elk Mountain Mission Fort Site
Total Count of Archaeological Sites in APE	9	42GR2813, 42GR3622, 42GR3623, 42GR3625, 42GR3626, 42GR3627, 42GR3628, 42GR3629, 42GR5699
Historic Structures (structure forms attached)		
Total National Register Eligible Sites	1	42GR5569

CHECKLIST OF REQUIRED ITEMS FOR SUBMITTAL TO SHPO

1. [X] Copy of the final report
2. [X] Copy of USGS 7.5' Series basemap with investigated area clearly identified
3. [X] Completed site forms
   - [ ] IMACS Encoding Form
   - [ ] Site Sketch Map
   - [X] Photographs adhering to UDSH standards
   - [X] Copy of USGS 7.5' Series basemap with site location and Smithsonian site number clearly labeled
4. [X] CD of digital report and site documents, including shapefiles (optional)
5. [X] Completed "Cover Page" accompanying final report and form

For UDSH office use only

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US-191 Moab to the Colorado River Bridge Project, Moab, Grand County, Utah: Results of an Intensive Archaeological Survey

Prepared for:

Utah Department of Transportation
4501 South 2700 West
P.O. Box 148450
Salt Lake City, UT 84114

Prepared by:

Gordon C. Tucker Jr., Ph.D., Principal Investigator

AECOM

6200 South Quebec Street
Greenwood Village, Colorado 80111
(303) 740-3850

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Abstract

An intensive cultural resource survey was completed for the proposed expansion of U.S. Route 191 (US-191), from 400 North in Moab to the Colorado River Bridge. The project area of potential effects (APE) was generally defined as a 200-foot-wide corridor, 100 feet on either side of the centerline of the existing highway. At several locations along the corridor, the APE boundary was pushed out for varying distances to the west and east to include three proposed sedimentation basins, a proposed detention basin, and potential locations for associated pipes and ditches. Nine previously recorded sites, including three prehistoric lithic scatters, one historic debris scatter, three irrigation ditches, a historic wagon road, and a historic fort, were identified within the APE. Each of these sites was relocated, their current condition was assessed, and their National Register of Historic Places (NRHP) eligibility was re-evaluated.

The Elk Mountain Mission Fort (42GR5569) was listed in the NRHP in 1978 and it is still likely to yield archaeological data that will contribute to a better understanding of the fort's role and influence in the regional history. Two short segments of the Moab-Thompson Wagon Road (42GR2813) were previously identified within the APE, but both segments have been destroyed by modern developments. A third segment of the wagon road was discovered during the current survey and is distinguished by a short section of a rock retaining wall and the possible remnants of a roadbed. However, this segment lacks sufficient integrity to support the eligibility of the larger linear resource. The three irrigation ditches (42GR3622, 42GR3623, and 42GR3625) have been determined not eligible for listing in the NRHP and that finding has not changed. The three prehistoric lithic scatters (42GR3626, 42GR3627, and 42GR3628) were previously determined eligible for listing in the NRHP because it was believed that they may contain buried cultural materials. However, since their original recording, excavations for a utility pipeline near all three sites discovered no buried materials in the excavation trench walls or back dirt piles. Consequently, this study recommends that these three sites be considered not eligible for listing in the NRHP. In addition, because the lithic assemblages for all three sites are so similar in material types and function, it is suggested that they be combined as a single locus of short-term lithic manufacturing activity. A scatter of historic debris (42GR3629) has been determined not eligible for listing in the NRHP and no evidence was observed that would contradict this finding.

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by UDOT pursuant to 23 USC §327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

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List of Acronyms

A.D.	anno Domini
AECOM	AECOM Technical Services, Inc.
APE	area of potential effects
B.C.	before Christ
ca.	circa
CFR	Code of Federal Regulations
EA	Environmental Assessment
FHWA	Federal Highway Administration
GPS	Global Positioning System
NRHP	National Register of Historic Places
PVC	polyvinyl chloride
ROW	right-of-way
SR	State Route
UDOT	Utah Department of Transportation
US-191	U.S. Route 191

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SECTION 1 INTRODUCTION

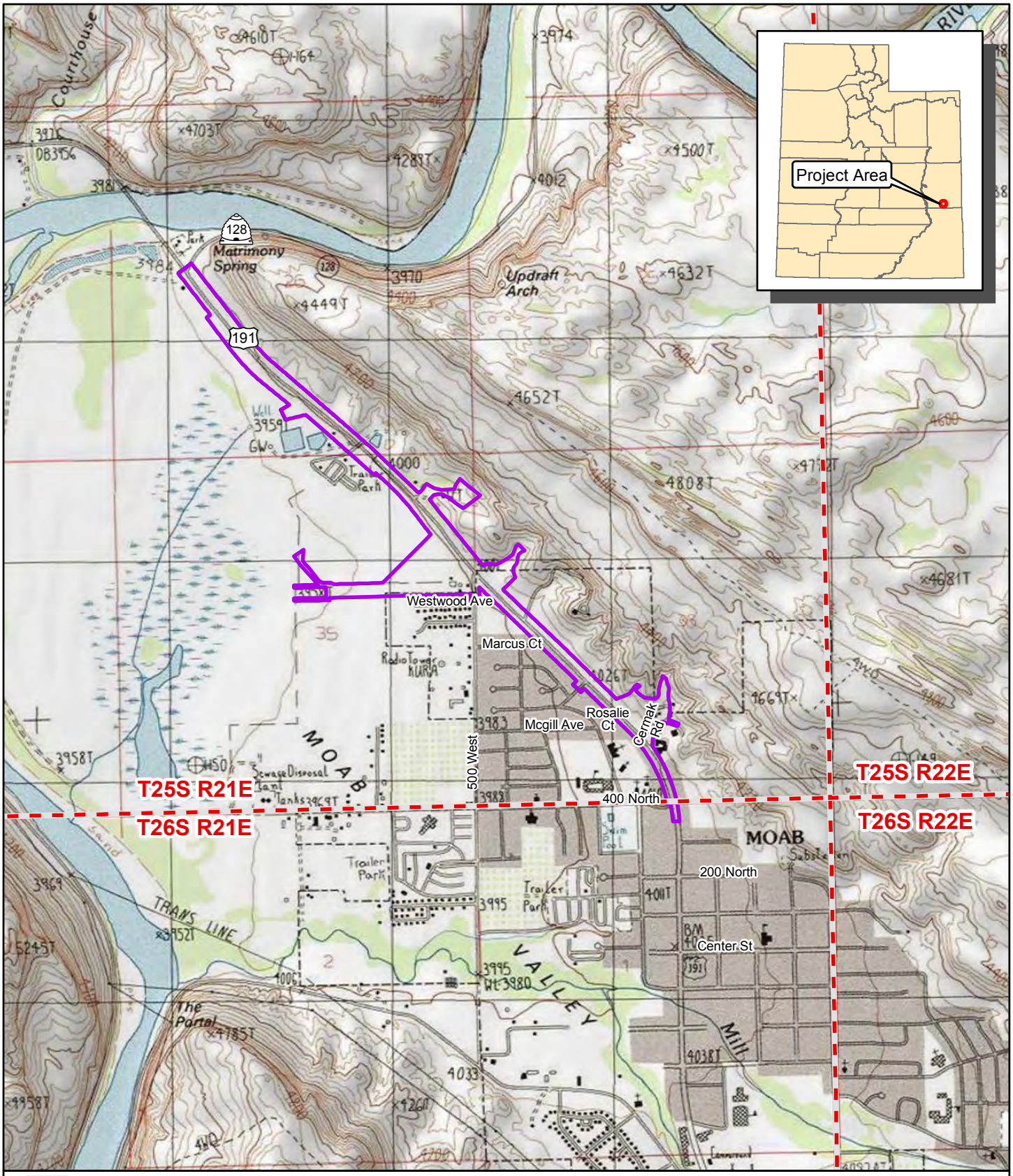
In 2007, the Utah Department of Transportation (UDOT), in cooperation with the Federal Highway Administration (FHWA), completed an environmental assessment (EA) for the U.S. Route 191 (US-191) Colorado River Bridge Project [Project No.: BHF-0191(27)129E]. The project involved the replacement of the US-191 bridge over the Colorado River and widening of the roadway within a 3.7-mile-long segment of US-191 from 400 North in Moab to State Route (SR)-279 (Potash Road). FHWA signed the Finding of No Significant Impact for the project in May 2007, and UDOT subsequently completed Phase 1 of the project, which included the construction of the bridge and roadway improvements within an approximately 1.7-mile-long segment of US-191 from SR-279 to SR-128.

UDOT and FHWA are now planning to complete the last two miles of the project south of the Colorado River from SR-128 to 400 North in Moab. The project may involve widening of the roadway to include four 12-foot-wide lanes with a 12-foot median and 8-foot shoulders. The proposed alignment would typically follow the centerline of the existing road. Sedimentation basins would be constructed in three locations on the east side of the roadway to collect runoff from the adjacent cliffs and remove sediment and other debris to prevent clogging of the storm drain system. A detention basin with associated pipes and ditches would be constructed on the west side of the roadway north of Westwood Avenue. This study was conducted as part of an environmental re-evaluation required by UDOT, because the 2007 EA is more than 10 years old and the growth of the population, tourism, and development within the corridor has exceeded the projections described in the 2007 EA.

The project area was previously surveyed for cultural and fossil resources in 2006 by Montgomery Archaeological Consultants to support the 2007 EA (Whitfield et al. 2006a). The 2006 survey encompassed 154 acres and documented 23 sites, including 15 newly recorded sites and 8 previously recorded sites. Thirteen sites were evaluated as eligible for listing in the National Register of Historic Places (NRHP). Two previously documented fossil localities were also documented.

The purpose of this study is to complete a pedestrian survey of the area of potential effects (APE) to document and evaluate the NRHP eligibility of any previously unrecorded sites, and revisit all known archaeological sites (prehistoric or historic), assess their condition, and re-evaluate their NRHP eligibility. This report summarizes the findings of the intensive archaeological pedestrian survey conducted by AECOM Technical Services, Inc. (AECOM) Principal Investigator, Gordon C. Tucker Jr., Ph.D., between April 9 and 11, 2018. This archaeological assessment complements a similar effort to assess historic structures within the APE (Johnson 2018).

The APE was defined as a linear corridor, generally 2 miles long and 200 feet wide (**Figure 1-1**). At several locations along the corridor, the APE boundary was pushed out for varying distances to the west and east to include the three proposed sedimentation basins, the detention basin, and the potential locations for associated pipes and ditches. The APE encompasses a total of 103 acres.



Township/Range Boundary

Area of Potential Effects

N W E S

0 1,000 2,000 4,000 Feet

1:24,000

Figure 1-1
US-191 Project Area
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS
Basemap: USGS Topo Quad - Moab

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SECTION 2 ENVIRONMENTAL SETTING

Montgomery Archaeological Consultants capably described the environmental setting in their description of the Phase I survey (Whitfield et al. 2006a). This information is summarized below. General overview photos of the project area are provided in **Figures 2-1** and **2-2**.

Figure 2-1. General overview of the project area facing south.

Figure 2-2. General overview of the project area, looking southeast. La Sal Mountains in the distance.

The project area is located in the Salt Anticline section of the Colorado Plateau physiographic province. The area is generally described as elongated valleys surrounded by distinctive vermillion-colored sandstone cliffs. The Colorado River meanders across the faulted salt anticline of the Spanish (Moab) Valley. The broad valley resulted from salt intrusion during the Paleozoic and Mesozoic eras and subsequent collapse of a salt cap by groundwater (Baars and Doelling 1987:276). The valley is enclosed to the northeast and southwest by Mesozoic-era sandstone formations that have been eroded over the eons to form regionally distinctive bluffs and stone arches, for which the nearby Arches National Park is justly famous. The valley is now covered by Quaternary alluvium and aeolian sediments deposited by the Colorado River and Pack Creek, which presently flows down the middle of the valley to its confluence with the Colorado River west of Moab. The La Sal Mountains, approximately 15 miles southeast of Moab, are a Tertiary period intrusion of igneous rocks and subsequent erosion of overlying less-resistant sedimentary rocks (Baars and Doelling 1987).

The underlying soils are generally described as fine sands and fine sandy loam on shallow slopes (NRCS 2017), which were deposited as alluvium, colluvium, or residuum. Several springs are found in the area, including Matrimony Spring at the north end of the project area along SR-128 and Moab Spring at the historic Arthur Taylor House. Major vegetation in the area includes riparian wetlands, salt desert scrub, and agricultural fields.

SECTION 3 CULTURAL HISTORICAL OVERVIEW

3.1 REGIONAL CULTURE HISTORY

Humans have occupied southeastern Utah for at least 12,000 years. This lengthy of period of human occupation is broadly separated into prehistoric and historic eras, and then into successive cultural stages, complexes, periods, and traditions, which are characterized by temporally distinctive artifacts, features, and settlement patterns. Whitfield et al. (2006a:4-12) provide a detailed overview of the regional culture history, which is briefly summarized here.

- PREHISTORIC ERA (circa [ca.] 10,000 Before Christ [B.C.]-Anno Domini [A.D.] 1776)
  - Paleoindian Stage (ca. 10,000-7800 B.C.)
    - Clovis Complex (10,000-9000 B.C.)
    - Folsom Complex (9000-8300 B.C.)
    - Plano Complex (8300-7800 B.C.)
  - Archaic Stage (7800-500 B.C.)
    - Early Archaic Period (7800-4000 B.C.)
    - Middle Archaic Period (4000-2000 B.C.)
    - Late Archaic Period (2000-1000 B.C.)
    - Terminal Archaic Period (1000-500 B.C.)
  - Formative Stage (500 B.C.-A.D. 1250)
    - Fremont Tradition
    - Ancestral Puebloan Tradition
    - Gateway Tradition
  - Late Prehistoric Stage (A.D. 1250-1450)
  - Protohistoric Stage (A.D. 1450-1776)
- HISTORIC ERA (A.D. 1776-present)

3.1.1 Prehistoric Era

The Paleoindian stage is generally characterized by the hunting of big game animals, low population densities, and wide spatial distributions. The Clovis, Folsom, and Plano technological complexes are commonly distinguished by large, lanceolate, fluted and unfluted projectile points, which are found at kill and butchering sites of megafauna, many of which (e.g., mammoth, giant sloth, and large bison) are now extinct.

The Archaic stage reflects a dramatic change in lifestyle as the climate warmed following the end of the Pleistocene epoch. Archaic hunters and gatherers relied on smaller game (e.g., smaller bison, deer, rabbits, and rodents) and more plant resources. Archaic sites are recognized by smaller side-notched and corner-notched projectile points and by groundstone artifacts.

The Formative Stage reflects various archaic cultural traditions that shifted from a primarily hunter-gatherer subsistence base to one partially dependent on horticulture. Cultural traits

characteristic of the Formative stage include permanent architecture, plant domestication, ceramics, and the bow and arrow. Populations increased in size and became more sedentary. The Moab area probably represents a zone of overlap between the Fremont tradition, generally found to the north and west, and the Ancestral Puebloan tradition, occurring to the south and east. The Gateway tradition is regionally focused and characterized by a more limited reliance on plant domesticates, small corner-notched projectile points, lower population densities, and shorter-term occupations. After ca. A.D. 1250, the region was depopulated as the Fremont and Ancestral Puebloan peoples left the region and moved south to regions with more sustainable environments. Gateway tradition peoples may have remained in place.

The Late Prehistoric stage documents the spread of the Numic-speaking peoples into a partial cultural vacuum created by the departure of Formative stage groups. Numic groups generally pursued a hunting and gathering lifestyle and manufactured distinctive brown ware ceramics, side-notched and triangular projectile points, and lived in brush structures or wikiups.

The Protohistoric stage is characterized by the appearance of artifacts of European and/or American manufacture and historically identifiable tribal groups, such as the Utes and Navajos. These groups persisted in the region until forcibly removed to reservations in the A.D. 1870s and 1880s, after which non-indigenous groups gradually settled the area.

3.1.2 Historic Era

Spanish explorers came through the Moab area in the eighteenth century and trappers and traders arrived in the early nineteenth century. Mormon settlement of present-day Moab began with the establishment of the Elk Mountain Mission in June 1855. The NRHP nomination form (Powell 1976) describes the configuration of the Elk Mountain Mission Fort as follows:

> *The original fort was sixty-four feet square. Constructed of rock quarried in the hills about a half a mile east of the fort site. The walls were twelve feet high. Built on a four-foot base, they tapered to a thickness of one and a half feet at the top. A wide gate was installed in the east wall and a narrow one in the west wall. Houses were constructed inside the fort although the exact number is not known and most were probably not completed before the fort was abandoned. A wooden corral was located in the vicinity of the fort.*

Conflicts with the Ute Indians resulted in the Mormon abandonment of the mission just three months later. The Elk Mountain Mission remained standing and provided shelter to cattle ranchers who arrived in the Moab area in the late 1870s and 1880s. The new settlers also planted fruit orchards and vineyards, but agriculture did not flourish in the region due to unpredictable freezes and the prohibitive expense of pumping irrigation water (City of Moab 2002; Whitfield et al. 2006b).

The community, which was initially known as Mormon Fort and subsequently as Grand Valley, was renamed Moab in March 1880 when the local post office was established and designated under that name. In 1883, the Denver & Rio Grande narrow gauge rail line was constructed between Denver, Colorado, and Salt Lake City, Utah, and a railhead was established at Thompson Springs, approximately 25 miles north of Moab. The Utah Legislature created Grand

County in 1890 and Moab was incorporated as a town on December 20, 1902 (City of Moab 2002; Whitfield et al. 2006b).

Beginning in the 1880s, mining began to dominate the local economy. Between the 1890s and 1920s, coal, copper, and gold was mined and in 1912, vanadium was discovered in the area. Up to $2.5 million in uranium was produced in southeastern Utah by 1920, and potash and manganese mining played a prominent role in Moab's economy. During the Cold War, uranium was in high demand, and when that mineral was discovered south of Moab, the town's economy boomed. The community experienced dramatic growth until 1957, when the Atomic Energy Commission announced that its uranium supply had reached saturation. However, the government continued to purchase uranium into the 1960s and the processing mill continued as the community's major employer until it closed in the early 1980s (City of Moab 2002; Whitfield et al. 2006b).

Tourism, which began to impact the region in the post-World War II era, rescued the local economy after the decline of the mining industry. Canyonlands National Park and Arches National Park were established in 1964 and 1971, respectively, and today the local economy relies heavily on tourism (City of Moab 2002; Whitfield et al. 2006b).

3.2 BACKGROUND RESEARCH

AECOM conducted a search of the project and site files maintained by the Utah Division of State History. The search discovered six prior surveys conducted within or adjacent to the APE (Table 3-1) and nine previously documented sites (Table 3-2).

Table 3-1. Prior Surveys Within or Adjacent to the APE

Project No.	Survey Organization	Investigation Year	Project Description
U82AF0210	AERC	1982	Seismic corridors near Moab
U88AS0261	Abajo Archaeology	1988	UDOT Road Improvements near Moab US-191 Pack Creek
U03MQ0528	Montgomery Archaeological Consultants	2003	Moab Main Street Improvement
U05MQ1239	Montgomery Archaeological Consultants	2005	Colorado and Fossil Resource Inventory for the Utah Department of Transportation's Colorado River Bridge Replacement Project
U08MQ1199	Montgomery Archaeological Consultants	2008	UDWR Matheson Wetland
U11BT1035	Bennett Management Services	2011	US-191 Shoulder Widening

Table 3-2. Known Sites Within or Adjacent to the APE

Site No.	Site Name	Age	Description	NRHP Eligibility
42GR2813	Moab-Thompson Wagon Road	Historic	Wagon Road	Not Eligible
42GR3622	None	Historic	Irrigation Ditch	Not Eligible
42GR3623	None	Historic	Irrigation Ditch	Not Eligible
42GR3625	None	Historic	Irrigation Ditch	Not Eligible
42GR3626	None	Prehistoric	Lithic Scatter	Eligible
42GR3627	None	Prehistoric	Lithic Scatter	Eligible
42GR3628	None	Prehistoric	Lithic Scatter	Eligible
42GR3629	None	Historic	Debris Scatter	Not Eligible
42GR5569	Elk Mountain Mission Fort	Historic	Fort	Listed

SECTION 4 METHODS

An intensive pedestrian cultural resources survey of the project APE was completed. One archaeologist walked parallel transects, each transect spaced 15 meters apart, within the APE. As he walked, the archaeologist carefully inspected the ground surface for any evidence of past, patterned human activity that was 50 years or older. If such evidence was found, the immediate area was carefully reconnoitered to determine if the find was isolated or a site. A site is generally defined as five or more artifacts in close proximity (10 meters or less) or a cultural feature (hearth, stone circle, structural foundations, or irrigation ditch). An isolated find is defined as four or fewer artifacts and no cultural features. The site boundaries were defined based on the horizontal distribution of exposed artifacts and features, as best could be determined. A sketch map was drawn and photographs taken from several directions to illustrate site details and the surroundings. As noted in Section 3, several prehistoric and historic sites have previously been recoded with the project APE. Each of these site locations was revisited to determine if any evidence of the site remains, if some elements are missing, or additional details have become evident since the original recording. A Trimble Geo7X submeter hand-held Global Positioning System (GPS) unit was used to determine the locations of all cultural resources. No artifacts were collected and no subsurface test excavations were conducted because ground visibility was excellent.

The NRHP eligibility of all documented cultural resources was assessed using the criteria set forth in 36 Code of Federal Regulations (CFR) Part 60.4, as follows:

> *The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:*
>
> > *a) that are associated with events that have made a significant contribution to the broad patterns of our history; or*
> >
> > *b) that are associated with the lives of persons significant in our past; or*
> >
> > *c) that embody the distinctive characteristics of a type, period, or method of construction, or that possess high artistic values, or that represent the a significant and distinguishable entity whose components may lack individual distinction; or*
> >
> > *d) that has yielded, or may be likely to yield, information important in prehistory or history.*

In order to be eligible for listing in the NRHP, a property must meet at least one of the above criteria, but it may meet more than one. Historic resources are typically eligible under Criterion A, B, or C, while prehistoric resources are usually eligible under Criterion D. Guidelines for assessment of NRHP eligibility are provided in *How to Apply the National Register Criteria for Evaluation* (NPS 1991) and *Guidelines for Evaluating and Registering Archeological Properties* (Little et al. 2000). Historic properties must also possess integrity, "the ability of a property to convey its significance."

SECTION 5 RESULTS

Nine previously recorded sites were revisited and re-evaluated, and they are described briefly below. Other than a new segment of the Moab-Thompson Wagon Road (42GR2813), no new sites were encountered within the project APE.

5.1 SITE DESCRIPTIONS

42GR2813

This site is described as several segments of the historic Moab-Thompson wagon road, which was in use from 1883 to 1919 when it was replaced by a federally funded highway. It was originally recorded in 2002 by Sagebrush Archaeological Consultants (Weymouth 1998) and re-recorded by Montgomery Archaeological Consultants in 2005 (Montgomery 2005; Whitfield et al. 2006a:15) and 2007 (Montgomery 2007). The form was updated in 2009 (Larmore 2009) and 2011 (Bennett 2011). Two segments of the historic wagon road in Moab were previously recorded in the APE and were described as narrow, unpaved segments on the east side of US-191. The recorded northern segment is described as a stacked sandstone rock retaining wall (Feature A on the 2005 recording form) that ranges in height from 3 to 10 feet and presently serves as a driveway to the residence located at 1050 N. Main (**Figure 5-1**). The retaining wall is most likely associated with the residence rather than the historic wagon road, and the access road to the residence probably eliminated the wagon road. The southern segment was reported in 2011 as having been destroyed by construction of a nearby bike/pedestrian path. Other than a level area at this location, no evidence of a historic road was visible in 2018 (**Figure 5-2**). Near the northern end of the APE, a short section of rock wall that may be part of the historic wagon road was documented during the present survey (**Figure 5-3**). This feature is approximately 30 feet long, 12 inches wide, and curves slightly to the east. It is approximately 4 feet tall, with 8 to 9 courses of local sandstone. The wall has collapsed in the center. This wall may have been built for another purpose, but based on historical maps, the wall is in the correct location to be associated with the Moab-Thompson wagon road.

Figure 5-1. View looking north at northern recorded segment of historic Moab-Thompson Wagon Road (42GR2813).
Rock wall now used as retaining wall for residence at 1050 N. Main.

Figure 5-2. View of southern recorded segment of historic Moab-Thompson Wagon Road (42GR2813), looking north.
Site destroyed by construction of bike path.

Figure 5-3. Segment of rock wall that may be associated with historic Moab-Thompson Wagon Road (42GR2813).

42GR3622

This site is a historic ditch. It was documented in 2005 as a shallow, earthen ditch approximately 50 feet long, 3.3 feet wide, and 1.5 feet deep (Whitfield et al. 2006a:16-17). It was overgrown with weeds and grass and it contained no water. No artifacts were found in association with the ditch. Recent disturbance in the area has removed any evidence of the ditch (**Figure 5-4**).

Figure 5-4. Site of historic ditch (42GR3622); the ditch is no longer visible.

42GR3623

This site was documented in 2005 as two segments of a historic earthen ditch, which originates at a natural spring in Stewart Canyon on the east side of the Moab Valley (Whitfield et al. 2006a:17). The first segment runs along the northern edge of the parking lot for Lin Ottinger's Rock Shop, continues northwest in a shallow ditch on the east side of the highway, crosses underneath the highway, and continues northwest on the west side of the highway. This segment of the ditch appears on a ca. 1930s UDOT as-built sheet. The second segment of the ditch begins in a culvert (Feature A) north of the rock shop, passes underneath the highway in a large (4-foot diameter) corrugated metal pipe, and empties into a channel on the west side of the highway. A concrete wall, with two wings set at an obtuse angle (Feature B), directs the water coming out of the metal pipe into the channel (**Figure 5-5**). This wall probably dates to the 1950s. This segment continues northwest along the outer edge of a residential neighborhood to join the first segment between the highway and a parking lot. The ditch segments are weedy and overgrown, but their size and alignments match the original 2005 documentation.

Figure 5-5. Feature B, concrete wall and culvert, for historic ditch (42GR3623).

42GR3625

This site was documented in 2005 as a historic ditch, which originates at a natural spring on the historic Arthur Taylor property, east of US-191 (Taniguchi 1979). Water from the spring flows into a metal grate east of the highway (Feature C), continues underneath the highway in a small (12-inch) diameter culvert (Feature B), and exits into a concrete headgate (Feature A), which diverts water to the north and south along the west side of the highway (**Figure 5-6**). The original channel is present north of the headgate, but the channel south of the headgate has been replaced with a 10-inch diameter polyvinyl chloride (PVC) pipe. The headgate is presently used as a watering trough for horses, within an enclosure formed of wooden posts and straight wire. Water that overtops the headgate flows west to a point just outside the enclosure, where it has been recently diverted north and south into two hand-dug channels that irrigate an adjacent agricultural field.

A possible second headgate (Feature D) was discovered during the current investigations, located approximately 300 feet southeast of Feature A and 30 feet southeast of metal gate and access road to the agricultural field (**Figure 5-7**). Feature D is visible as the top of a concrete wall, 10 inches wide, with a total length of 10 feet. The first section of this concrete wall is 6 feet long and runs parallel to the barbed wire fence on the western edge of the highway right-of-way (ROW); the wall then angles toward the highway and continues for another 4 feet. On the west side of the ROW fence, the top of a second concrete wall, 6 inches wide and 6 feet long, is visible. A large chunk of concrete lies next to this second wall segment.

Figure 5-6. View of the headgate (Feature A) of the historic irrigation ditch (42GR3625), looking south.
The ditch to the south (running just west of powerline) has been replaced by 10-inch PVC pipe. Note hand-dug feeder laterals in agricultural field west of the enclosure.

Figure 5-7. Previously unrecorded concrete features associated with the historic irrigation ditch (42GR3625).

42GR3626

This site was recorded in 2005 and described as a small, dispersed scatter of lithic artifacts, including 11 pieces of lithic debitage, one Late Prehistoric Rose Spring series projectile point, and one biface fragment (Whitfield et al. 2006a:18). The debitage includes secondary, tertiary, and flake fragments manufactured from five types of chert. These materials are found on the eastern edge of a fallow agricultural field, immediately west of US-191 (**Figure 5-8**). A revisit of the site located only two artifacts, a tertiary white chalcedony flake and a tertiary gray quartzite flake. Neither the prepared tools nor the datum were relocated. Inspection in 2008 of a pipeline trench that is approximately 5 meters east of the site revealed no buried cultural materials. Given the location of this site in a dynamic geomorphological context (i.e., the floodplain of the Colorado River), it is likely that this is a surface artifact scatter with no subsurface character. Excavations in 2008 of utility lines just east of the site corroborates this assessment. Two other lithic scatters, 42GR3627 and 42GR3628, are located immediately north of 42GR3626 on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

Figure 5-8. Overview of 42GR3626, prehistoric lithic scatter, looking southeast.

42GR3627

This site was recorded in 2005 and described as a medium-density, dispersed scatter of lithic materials, including 34 pieces of lithic debitage and one Protohistoric/Contact Cottonwood Triangular projectile point (Whitfield et al. 2006a:18). The debitage includes secondary, tertiary, and flake fragments manufactured from opaque chert, semitranslucent chert, and quartzite. These materials are found on the eastern edge of a fallow agricultural field, immediately west of US-191 (**Figure 5-9**). A revisit of the site located eight artifacts, including two gray/orange mottled primary flakes, two gray/orange mottled secondary flakes, one gray/orange mottled

tertiary flake, two white chalcedony secondary flakes, and one white chalcedony tertiary flake. Neither the projectile point nor the site datum were relocated. Inspection in 2008 of a pipeline trench that crosses the eastern edge of the site revealed no buried cultural materials. This finding, coupled with the fact that the site lies within the floodplain of the Colorado River, suggests that it is a surface artifact scatter with no subsurface character. Two other lithic scatters, 42GR3626 and 42GR3628, are located immediately south and north of 42GR3627, respectively, on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

Figure 5-9. Overview of 42GR3627, prehistoric lithic scatter, looking north.

42GR3628

This site was recorded in 2005 and described as a low-density, dispersed scatter of 11 pieces of lithic debitage, including secondary, tertiary, and flake fragments manufactured from opaque chert, semitranslucent chert, and siltstone (Whitfield et al. 2006a:19). These materials are found on the eastern edge of a fallow agricultural field, immediately west of US-191 (**Figure 5-10**). A revisit of the site located 10 artifacts, including tan chalcedony and gray/orange mottled flakes, mostly tertiary flakes but a few primary and secondary flakes. The site datum was not relocated. Inspection in 2008 of a pipeline trench that is approximately 5 meters east of the site revealed no buried cultural materials. This finding, coupled with the fact that the site lies within the floodplain of the Colorado River, suggests that it is a surface artifact scatter with no subsurface character. Two other lithic scatters, 42GR3626 and 42GR3627, are located immediately south of 42GR3628, on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

Figure 5-10. Overview of 42GR3628, prehistoric lithic scatter, looking southeast.

42GR3629

This site was recorded in 2005 and described as a grouping of five historic features, including three piles of rocks and concrete/cinder blocks and two concentrations of historic artifacts (Whitfield et al. 2006a:19). All five features are present and relatively unchanged from their original descriptions. The artifacts include cans, glass jars, bottle fragments, ceramics, wire, and rubber. Other artifacts noted on site include parts of a rusted bed frame, box springs, a tire rim, a metal fuel container, vehicle parts, and sections of stove pipe. Diagnostic attributes for the glass artifacts and cans suggest manufacturing dates to the middle to late 1950s. A charred wooden post (originally described as a "burned tree stump") was found near the center of the site (**Figure 5-11**). The site is interpreted as a locale for the incidental dumping of discarded residential and construction debris. The dumping episodes may have occurred at various times during the middle to late 1950s. An alternative explanation is that these artifacts accumulated elsewhere and were dumped here more recently in a single episode.

Figure 5-11. Overview of 42GR3629, historic debris scatter, looking west. Note charred wooden post at right center.

Elk Mountain Mission Fort (42GR5569)

This historic fort was documented in June 1976 and listed in the NRHP on June 15, 1978 (Powell 1976). The fort was located on the northern edge of Moab, approximately one mile east of the Colorado River (**Figure 5-12**). The original fort measured 64 feet square and was constructed of local stones obtained from bedrock outcrops approximately one-half mile east of the site. The walls were originally 12 feet high, with a base 4 feet wide tapering to 1.5 feet at the top. A wide gate was installed in the east wall and a narrow gate in the west wall. Structures may have been constructed inside the fort, but the number and type(s) are unknown. Alfred N. Billings and 40 other men from the Mormon Church were sent by Brigham Young in the spring of 1855 to establish a mission at the foot of the Elk Mountains, which are now called the La Sal Mountains (Whitfield et al. 2006b:4). Construction of the fort was completed during the summer of 1855. Threatened with an attack by local Indians, the settlers abandoned the fort on September 23, 1855. The fort stood until after the permanent settlement of Moab in the early 1880s and provided shelter for new settlers. Eventually it was no longer used and it fell into ruin.

A portion of the south wall and a short section of the adjoining west wall are the only visible remnants of the site. The south wall remnant is approximately 50 feet long and approximately 2 feet wide, with a maximum height of approximately 5 feet (**Figure 5-13**). The west wall remnant, one stone or 6 inches high, extends north for approximately 10 feet from the west end of the south wall. Both walls are constructed of dry laid, unshaped blocks of local sandstone. The extant walls, especially the west wall remnant, have been significantly disturbed by several cottonwood trees (**Figure 5-12**). The north and east walls may no longer exist, be buried, or are obscured by thick vegetation. No artifacts, historic or modern, were observed in association with the wall remnants. A wooden post, 6 inches in diameter and 3 feet tall, stands upright at the east of the south wall. Its function is unknown.

Figure 5-12. Overview of setting for Elk Mountain Mission Fort Site (42GR5569). Site located at base of the solitary cottonwood tree in the center of the photo.

Figure 5-13. Overview of south wall of Elk Mountain Mission Fort Site (42GR5569).

5.2 NRHP ELIGIBILITY EVALUATIONS

All recorded sites were evaluated against the four criteria found at 36 CFR 60.4. A site was considered eligible for listing in the NRHP if met at least one of the four criteria and it possessed sufficient integrity to support that eligibility. The NRHP eligibility of the recorded resources are described below.

42GR2813

This historic wagon road was determined eligible under Criterion A for its association with historic transportation and settlement of southeastern Utah, and under Criterion D because it is likely to provide archaeological data that may enhance our understanding of the local history. No evidence was found during this survey to dispute this termination. Two segments of the historic wagon road have been documented within the APE. One segment was destroyed by construction of a nearby bike path and lacks integrity. A second segment is now used as an access road to a modern residence and also lacks integrity. Therefore, these two previously recorded segments of the historic wagon road ***do not support the NRHP eligibility*** of the larger NRHP-eligible linear resource. The present survey documented a short segment of rock wall, which may be associated with the historic wagon road, on the east side of US-191 at the northern end of the project APE, but it has lost all aspects of integrity except location. This new segment also ***does not support the NRHP eligibility*** of the larger NRHP-eligible linear resource.

42GR3622

This historic irrigation ditch was previously determined ***not eligible*** for listing in the NRHP under all criteria. The present survey encountered very little evidence of the site and supports this determination.

42GR3623

This historic irrigation ditch was previously determined ***not eligible*** for listing in the NRHP under all criteria. The present survey did not discover any evidence that would contradict this finding.

42GR3625

This historic irrigation ditch was previously determined ***not eligible*** for listing in the NRHP under all criteria. The present survey did not discover any evidence that would contradict this finding.

42GR3626

This prehistoric lithic scatter was previously determined eligible for listing in the NRHP under Criterion D because of a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded, a utility pipeline trench that was excavated just east of the site was inspected in 2008 and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in a dynamic geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations, the site is now recommended ***not eligible*** for listing in the NRHP. The similarities

of the lithic material types found on 42GR3626 and two nearby sites (42GR3627 and 42GR3628) suggest that these three localities may actually be part of a larger site or probable short-term use.

42GR3627

This prehistoric lithic scatter was previously determined eligible for listing in the NRHP under Criterion D because it was considered likely to yield buried cultural materials, given a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded, a trench for a utility pipeline that crosses the eastern edge of the site was inspected and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in a dynamic geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations, the site is now recommended ***not eligible*** for listing in the NRHP. The similarities of the lithic material types found on 42GR3627 and two nearby sites (42GR3626 and 42GR3628) suggest that these three localities may actually be part of a larger site of probable short-term use.

42GR3628

This prehistoric lithic scatter was previously determined eligible for listing in the NRHP under Criterion D because it was considered likely to yield buried cultural materials, given a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded, a utility pipeline trench just east of the site was inspected and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in an active geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations, the site is now recommended ***not eligible*** for listing in the NRHP. The similarities of the lithic material types found on 42GR3628 and two nearby sites (42GR3626 and 42GR3627) suggest that these three localities may actually be part of a larger site of probable short-term use.

42GR3629

This historic debris scatter was previously determined ***not eligible*** for listing in the NRHP. No additional evidence was discovered that would contradict this finding.

Elk Mountain Mission Fort (42GR5569)

This historic fort was ***listed in the NRHP*** in 1978 under Criterion A. The fort represents a critical period in the history of Mormon settlement of southeastern Utah and with Mormon-Indian relations. The site is presently visible as a portion of the original south wall and a short section of the adjoining west wall. No segment of the walls exceeds 5 feet in height. The site is heavily vegetated with young and mature cottonwood trees and thick brush. The project may not adversely affect the site but care should be taken to avoid unnecessary impacts to the site. Should avoidance not be possible, focused excavations, north of the south wall remnant, within what would have been the interior of the fort, should be conducted to determine if buried cultural materials are present. The recovery of such information could enhance our understanding of this historic resource and its role in the early history of the Spanish Valley and Moab.

SECTION 6 CONCLUSIONS AND RECOMMENDATIONS

An intensive cultural resource survey was completed for the proposed expansion of US-191, from 400 North in Moab to the Colorado River Bridge. The project APE was generally defined as a 200-foot-wide corridor, 100 feet on either side of the centerline of the existing highway. At several locations along the corridor, the APE boundary was pushed out for varying distances to the west and east to include three proposed sedimentation basins, a proposed detention basin, and potential locations for associated pipes and ditches. Nine previously recorded sites were identified within the APE. These sites are summarized in Table 6-1.

Table 6-1. Sites Documented in the Project APE.

Site No.	Site Name	Age	Description	NRHP Eligibility
42GR2813	Moab-Thompson Wagon Road	Historic	Wagon Road	Non-supporting
42GR3622	None	Historic	Irrigation Ditch	Determined Not Eligible
42GR3623	None	Historic	Irrigation Ditch	Determined Not Eligible
42GR3625	None	Historic	Irrigation Ditch	Determined Not Eligible
42GR3626	None	Prehistoric	Lithic Scatter	Recommended Not Eligible
42GR3627	None	Prehistoric	Lithic Scatter	Recommended Not Eligible
42GR3628	None	Prehistoric	Lithic Scatter	Recommended Not Eligible
42GR3629	None	Historic	Debris Scatter	Determined Not Eligible
42GR5569	Elk Mountain Mission Fort	Historic	Fort	Listed

Each site was relocated, its current condition was assessed, and its NRHP eligibility was re-evaluated. Two short segments of the Moab-Thompson Wagon Road were previously recorded within the APE, but both segments have been destroyed by modern developments. A short section of a rock retaining wall was discovered during the current survey and it may be associated with the historic wagon road. However, this feature lacks sufficient integrity to support the eligibility of the larger linear resource. The three irrigation ditches have been determined not eligible for listing in the NRHP and that finding has not changed. The three prehistoric lithic scatters were determined eligible for listing in the NRHP, because it was believed that they may contain buried cultural materials. However, since their original recording, excavations for a utility pipeline near all three sites discovered no buried materials in the excavation trench walls or back dirt piles. In addition, these sites are located in a dynamic geomorphological setting, in which cultural materials are likely to have been destroyed or deeply buried. Consequently, this study recommends that these three sites be considered not eligible for listing in the NRHP. In addition, because these three sites are located within a few tens of meters of each other and their lithic assemblages are so similar in materials types and function, it is possible that they represent a single locus of short-term lithic manufacturing activity. A scatter

of historic debris was determined not eligible for listing in the NRHP and that finding has not changed.

The Elk Mountain Mission Fort was listed in the NRHP in 1978 and it is likely to yield archaeological data that will contribute to a better understanding of the fort's role and influence in the regional history.

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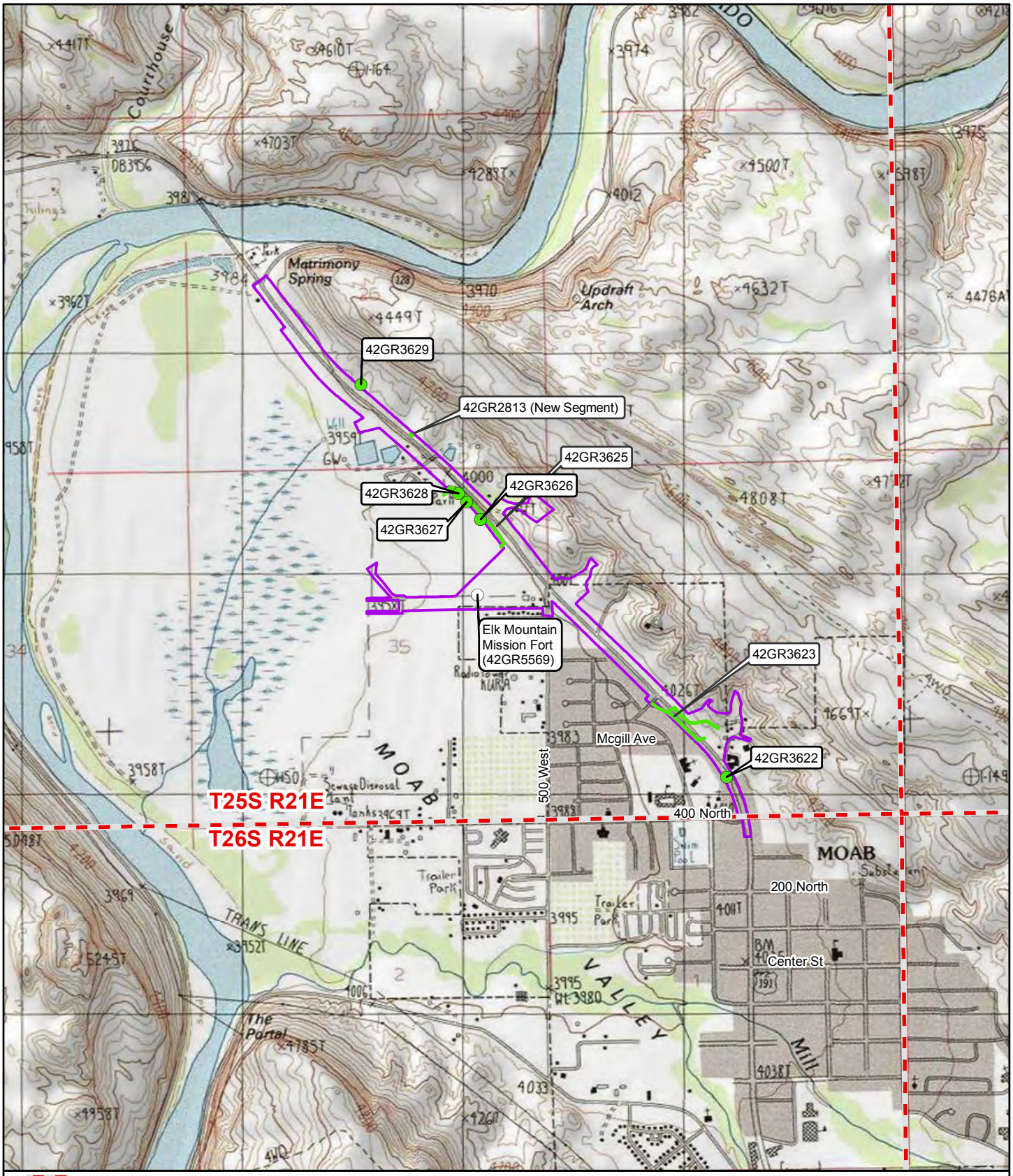
APPENDIX A: SITE LOCATION MAP



Appendix A
Archaeological Sites
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

APPENDIX B: UTAH ARCHAEOLOGICAL SITE FORMS

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR2813
2. **Temporary Site No.** :
3. **Site Name:** Moab-Thompson Wagon Road
4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: SENE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 624708 E 4272830 N NAD 83
13. **Site Dimensions**: Length: 90 m Width: 2 m Area: 180 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Protohistoric ☑Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☐Task Specific	☐Domestic	☑Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☐Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☑Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☑Recreation ☐Road/Trail ☐Vandalism/Looting ☐Other
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☑Destroyed
19. **Description** (as needed):

Several segments of this historic wagon road were originally documented in 1997 and re-evaluated in 2005 and 2011. Two segments, both labeled Feature A, lie within the APE for the current project. A third segment was documented during the current project.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☐No ☑Yes, under criterion[a]: ☑A (event) ☐B (person) ☐C (design/construction) ☑D (important information)
24. **Does it Retain Integrity**: ☐No ☑Yes, aspects present[a]: ☑Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

The entire site was previously determined eligible under Criterion A for its association with historic transportation and settlement of SE UT, and under Criterion D because it is likely to provide archaeological data that may enhance our understanding of the local history. No evidence was found during this survey to dispute this termination for the larger linear resource. Two segments of the historic wagon road have been documented within the APE. One segment was destroyed by construction of a nearby bike path and lacks integrity. A second segment is now used as an access road to a modern residence and also lacks integrity. Therefore, these two previously recorded segments of the historic wagon road do not support the eligibility of the larger NRHP-eligible linear resource. The present survey documented a short segment of rock wall, which may be associated with the historic wagon road, at the northern end of the project APE, but it has lost all aspects of integrity except location. This segment does not support the NRHP eligibility of the larger NRHP-eligible linear resource.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR2813

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site consists of several segments of the historic Moab-Thompson wagon road, which was in use from 1883 to 1919 when it was replaced by a federally funded highway. Five segments of the road were originally documented in 1997 and lie north of the current APE. Additional segments were documented more recently on the east side of US191 near the current APE. Two segments, both labeled Feature A, were documented in 2005. The northern segment was described as coinciding with the driveway to the residence located at 1050 N. Main. This segment is distinguished by a stacked sandstone rock retaining wall for the residence, which ranges in height from 3 to 10 feet. It has eroded in places and been impacted by the modern residence and driveway. The southern segment was described in 2005 as approximately 6.5 feet wide and situated between two small finger ridges, approximately 150-200 feet south of the northern segment. The southern segment was reported in 2011 as having been destroyed by construction of a nearby bike/pedestrian path, and these circumstances were confirmed during the current survey. Near the northern end of the current APE, a previously undocumented section of rock wall that may be part of the historic wagon road was recorded. This feature is approximately 30 feet long, 12 inches wide, and curves slightly to the east. It is approximately 4 feet tall, with 8 to 9 courses of local sandstone. The wall has collapsed in the center. A level area east of rock wall may be a roadbed remnant. This wall may have been built for another purpose, but based on historical maps, the wall is in the correct location to be associated with the Moab-Thompson road and its construction of dry laid blocks of local sandstone is similar to other segments.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Located at the base of a steep hill, on the east side of US 191 and the Colorado River valley. Sparse vegetation, including low shrubs and grasses, with two small cottonwood trees.

29. **Notes Regarding Access** (as needed):

Recorded segment is approximately 50 feet east of the US 191 roadbed.

30. **Additional Part A Comments**:

It is unlikely that the two previously recorded segments (Feature A) are remnants of the historic Moab-Thompson Wagon Road. One segment was built, and is used today, as a driveway for the residence at 1050 N. Main. The rock wall provides support for the residence, which is elevated above the surrounding terrain. The second segment of Feature A has been significantly altered by construction of a nearby bike path and, as such, it is difficult to ascertain if it is indeed a segment of the historic wagon road. The third, newly recorded segment is in the right location and similar in construction to other segments of the wagon road, but it may have been built for another reason.

[a] Check all that apply

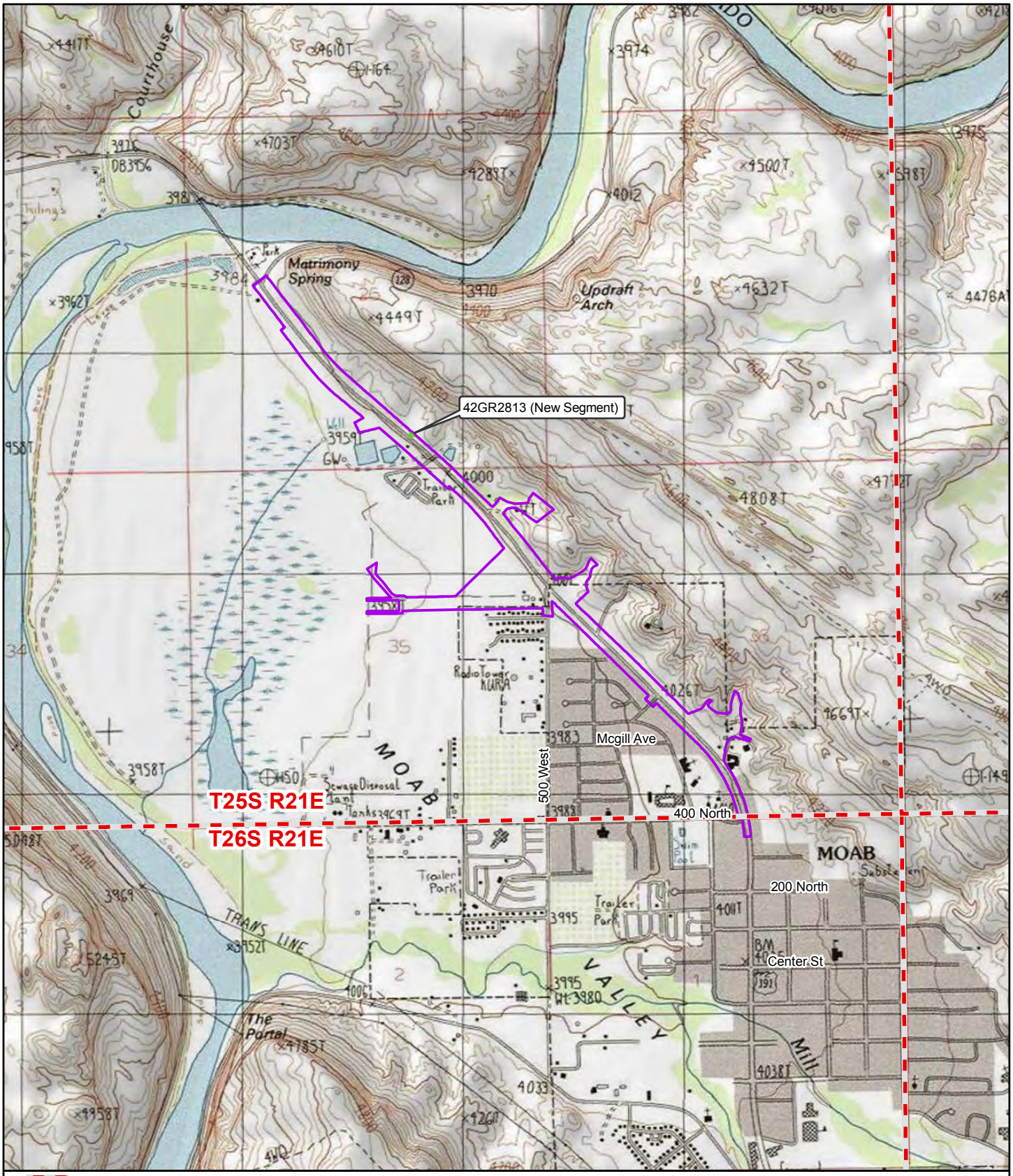
[b] See manual for additional categories

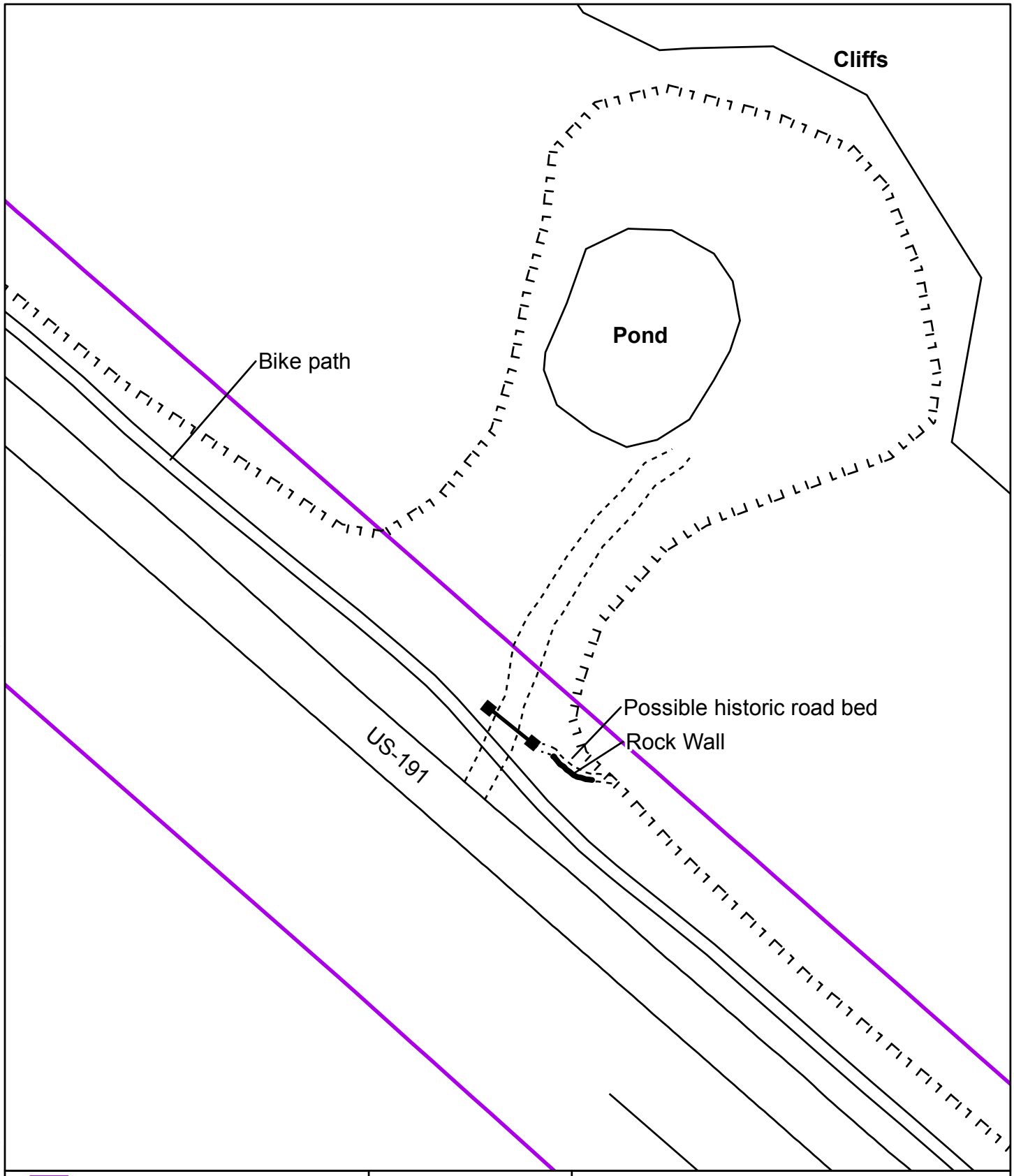
Smithsonian Trinomial: 42GR2813

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR2813 (New Segment)
Matrimony Spring
Updraft Arch
Courthouse
Trailer Park
Radio Tower KURA
MOAB
Sewage Disposal
Tanks
Mcgill Ave
500 West
400 North
200 North
Center St
T25S R21E
T26S R21E
TRANS LINE
The Portal
VALLEY
Mill
Township/Range Boundary
Area of Potential Effects
Linear Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR2813
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR2813.mxd



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Area of Potential Effects
Site Boundary
Gate
Road
Slopes

Data Sources: Utah AGRC, UDOT GIS

0 25 50 100 Feet
0 10 20 40 Meters

Scale: 1:1,200
Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

May 17, 2018

Site Sketch Map
42GR2813
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090037	4/9/18

Site Number:
42GR2813

Description:
View looking north of a previously recorded segment of historic Moab-Thompson Wagon Road. This is the southernmost segment, which was severely altered by the adjacent bike bath.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090038	4/9/18

Site Number:
42GR2813

Description:
View looking south of a previously recorded segment of historic Moab-Thompson Wagon Road. This is the southernmost segment, which was severely altered by the adjacent bike bath.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090019	4/9/18

Site Number:
42GR2813

Description:
View looking north of newly recorded rock wall, possibly a segment of historic Moab-Thompson Wagon Road. This segment is located at the northern end of the project area.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090018	4/9/18

Site Number:
42GR2813

Description:
View looking east of newly recorded rock wall, possibly a segment of historic Moab-Thompson Wagon Road. This segment is located at the northern end of the project area.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4110133	4/11/18

Site Number:
42GR2813

Description:
View looking north of access road to modern residence at 1050 N. Main, previously recorded as a segment of the historic Moab-Thompson Wagon Road. This segment is outside the APE.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4110132	4/11/18

Site Number:
42GR2813

Description:
View looking northeast of rock retaining wall for modern residence at 1050 N. Main, possibly associated with the historic Moab-Thompson Wagon Road. This segment is outside the APE.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3622
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 36 **(¼)**: SESW **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 __ __ __ 626136 E __ __ __ __ 4271130 N NAD 83
13. **Site Dimensions**: Length: 33 m Width: 11 m Area: 285 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Protohistoric ☑Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☐Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☑Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☐Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☑Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other development
18. **Site Condition:** ☐Stable ☐Deteriorating ☐Imminently Threatened ☑Destroyed
19. **Description** (as needed):

Historic ditch, of which very little evidence remains. Use of a nearby parking lot has removed most evidence of site.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☑No ☐Yes, aspects present[a]: ☐Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

The site was originally described in 2005 as a shallow, earthen ditch, next to a fence line for an adjacent residence. The surrounding area has been excavated and dirt has been piled here. The area is thickly overgrown with weeds. Very little evidence of ditch remains.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3622

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

The site was described in 2005 as a shallow, earthen ditch, which is approximately 50 feet long, 3.3 feet wide, and 1.5 feet deep. It was overgrown with weeds and grass and contained no water. No artifacts were found in association with the ditch. Recent disturbance in the area has removed any evidence of the ditch.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Site is located on the east side of the Colorado River valley and is underlain by alluvial and aeolian sediments. Grasses and weeds grow in the recorded location of the site.

29. **Notes Regarding Access** (as needed):

Site is on the south edge of a parking lot, immediately north of the Ultimate UTV Adventures establishment at 543 N. Main.

30. **Additional Part A Comments**:

Very little of site remains.

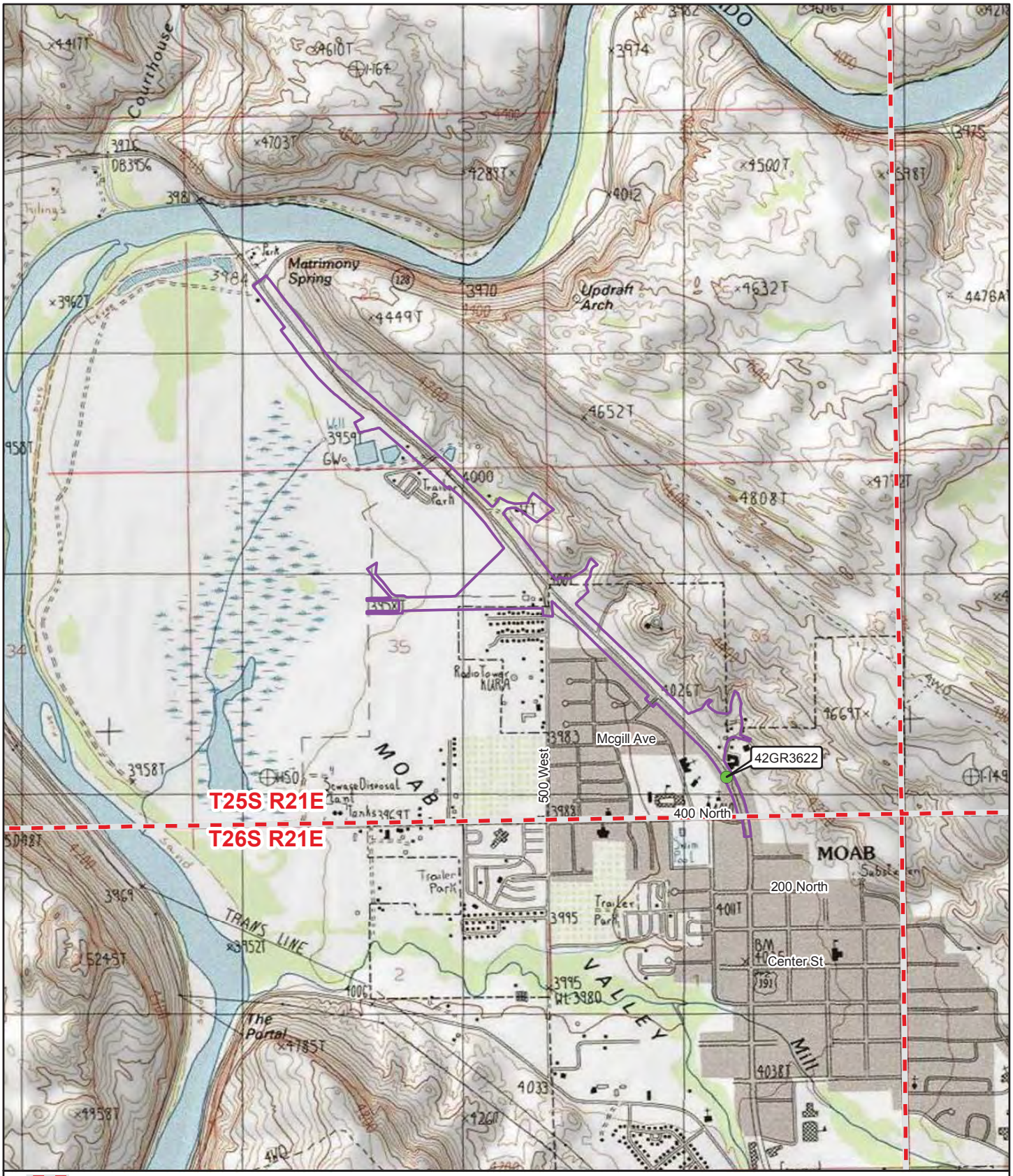
[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3622

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories



Township/Range Boundary

Area of Potential Effects

Site (not eligible)

N
W E
S

0 1,000 2,000 4,000 Feet

1:24,000

Site Location
42GR3622
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR3622.mxd

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090039	4/9/18

Site Number:
42GR3622

Description:
View of recorded historic ditch, next to fence, looking ENE.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3623
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 36 **(¼)**: NESW **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 __ __ __ 626095 E __ __ __ __ 4272240 N NAD 83
13. **Site Dimensions**: Length: 345 m Width: 10 m Area: 2,780 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Protohistoric ☑Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☐Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☑Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☐Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☑Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other development
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

Site consists of two segments of a historic earthen ditch. It originates on east side of US 191, crosses underneath the highway, and continues northwest into a residential neighborhood

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☐No ☑Yes, aspects present[a]: ☑Location ☑Design ☐Setting ☑Materials ☑Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

This historic irrigation ditch was determined not eligible for listing in the NRHP under all criteria. The present survey encountered very little evidence of the site and supports this determination.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3623

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site consists of two segments of a historic earthen ditch, which originates at a natural spring in Stewart Canyon on the east side of the Moab valley. One alignment of the ditch, previously described as the Present Route, runs along the northern edge of the parking lot for Lin Ottinger's Rock Shop, continues northwest in a shallow ditch on the east side of the highway, crosses underneath the highway, and continues northwest on the west side of the highway. The second alignment of the ditch, previously described as the Original Route (because it appears on the 1930s UDOT as-built sheet) begins in a culvert (Feature A) north of the rock shop, passes underneath the highway in a large (4-foot diameter) corrugated metal pipe, and empties into a channel on the west side of the highway. A concrete wall, with two wings set at an obtuse angle (Feature B), directs the water coming out of the metal pipe into the channel. This segment continues northwest, briefly disappearing underground where it crosses a parking lot, and joins the first segment. The combined channel continues to the northwest and empties into a natural drainage.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Site is located on the east side of the Colorado River valley and is underlain by alluvial and aeolian sediments. The ditch segments are weedy and overgrown.

29. **Notes Regarding Access** (as needed):

Site begins on the northern edge of the parking lot for Lin Ottinger's rock shop, crosses underneath US 191, and continues along the west side of the highway until it turns to the northwest at the northern edge of an open lot.

30. **Additional Part A Comments**:

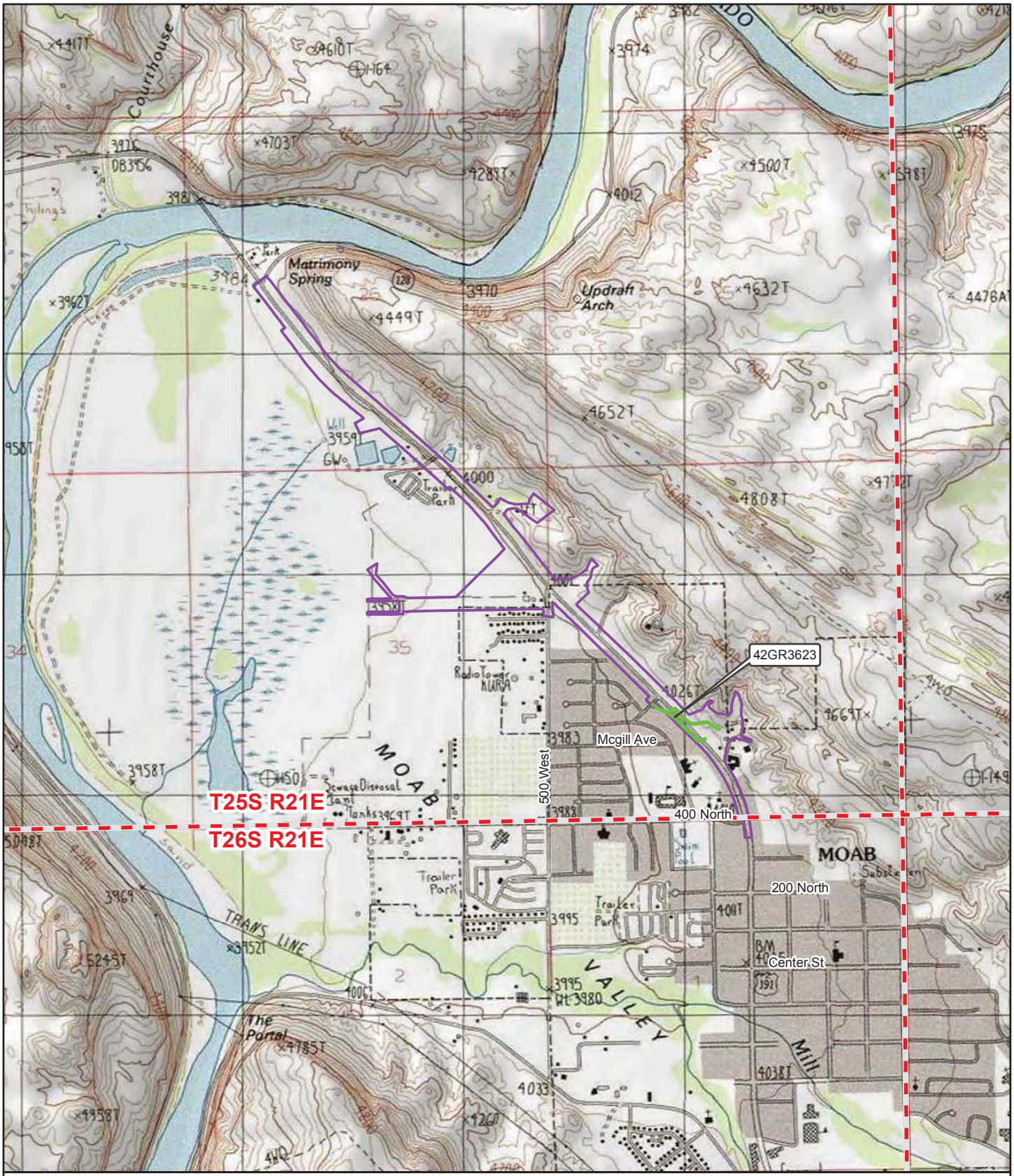
[a] Check all that apply
[b] See manual for additional categories

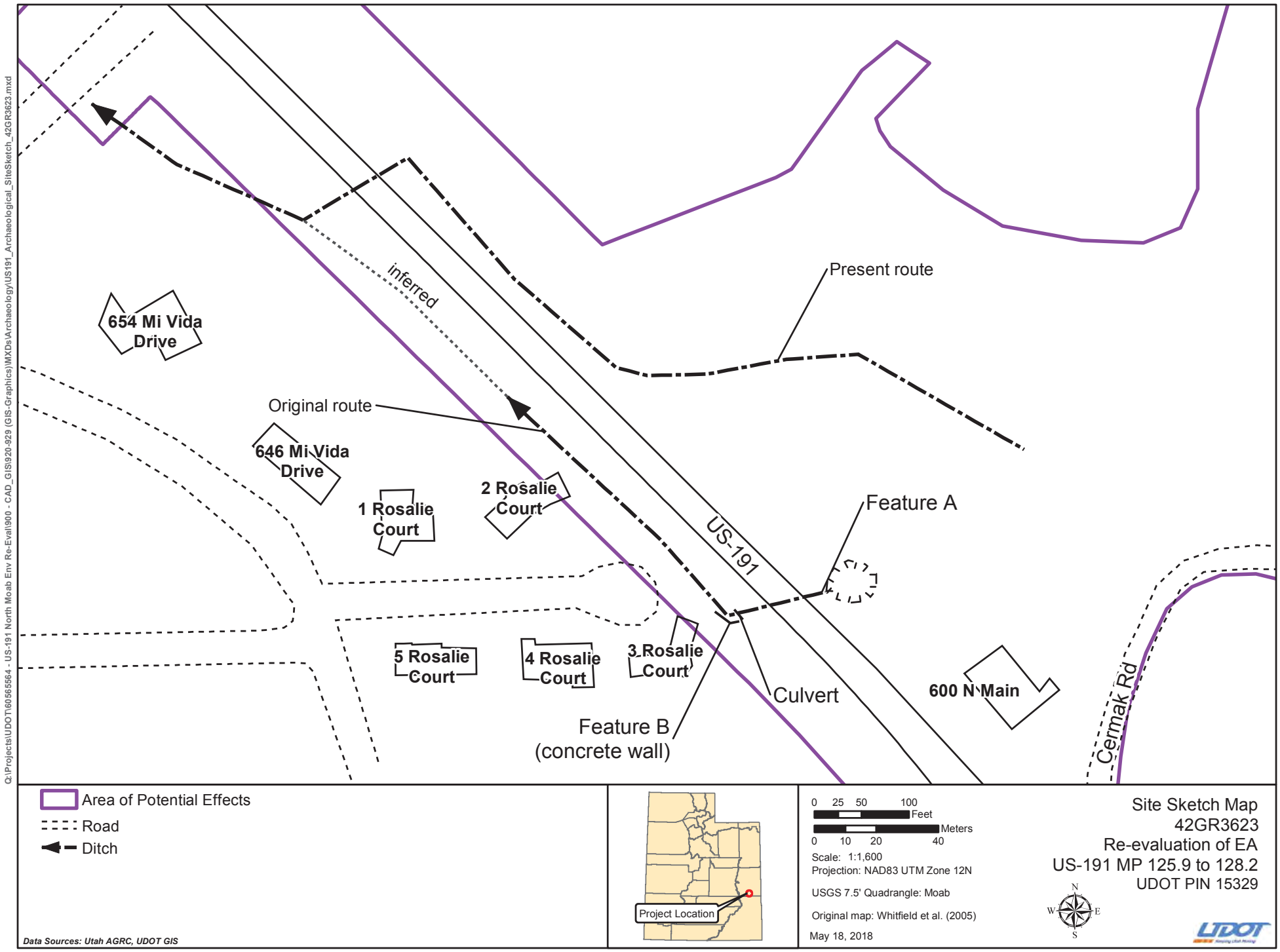
Smithsonian Trinomial: 42GR3623

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR3623
Mcgill Ave
500 West
400 North
200 North
Center St
MOAB
T25S R21E
T26S R21E
Matrimony Spring
Updraft Arch
Courthouse
TRANS LINE
The Portal
VALLEY
Trailer Park
Sewage Disposal
Radio Tower
Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR3623.mxd
Township/Range Boundary
Area of Potential Effects
Linear Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR3623
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
UDOT


Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteSketch_42GR3623.mxd
654 Mi Vida Drive
646 Mi Vida Drive
1 Rosalie Court
2 Rosalie Court
3 Rosalie Court
4 Rosalie Court
5 Rosalie Court
600 N Main
inferred
Present route
Original route
US-191
Feature A
Culvert
Feature B
(concrete wall)
Cermak Rd
Area of Potential Effects
Road
Ditch
Project Location
0 25 50 100
Feet
0 10 20 40
Meters
Scale: 1:1,600
Projection: NAD83 UTM Zone 12N
USGS 7.5' Quadrangle: Moab
Original map: Whitfield et al. (2005)
May 18, 2018
Site Sketch Map
42GR3623
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
N
W
E
S
Data Sources: Utah AGRC, UDOT GIS

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090044	4/9/18

Site Number:
42GR3623

Description:
View looking north of the Present Route of the historic ditch, east side of North Main.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090041	4/9/18

Site Number:
42GR3623

Description:
View looking NW of historic ditch, Feature B, west side of North Main.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090043
Date: 4/9/18

Site Number: 42GR3623

Description: View looking NE of the Original Route of historic ditch, west side of North Main, immediately north of point where the Original Route and Present Route come together.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090047
Date: 4/9/18

Site Number: 42GR3623

Description: View looking NW of historic ditch, where the combined channel curves away from North Main.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3625
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: NW&NE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 __ __ __ 625049 E __ __ __ __ 4272450 N NAD 83
13. **Site Dimensions**: Length: 400 m Width: 20 m Area: 6,283 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Protohistoric ☑Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☐Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☑Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☐Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☑Linear
17. **Impacting Agents**: ☐None ☐Erosion ☑Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other agriculture field
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

Historic ditch, with headgate, on eastern edge of agricultural field, west of US 191. That portion of ditch south of headgate has been placed in PVC pipe.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☐No ☑Yes, aspects present[a]: ☑Location ☑Design ☑Setting ☑Materials ☑Workmanship ☑Feeling ☑Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

This historic irrigation ditch was previously determined not eligible for listing in the NRHP under all criteria. The present survey did not discover any evidence that would contradict this finding.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3625

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site is described as a historic ditch, which originates at a natural spring on the historic Arthur Taylor property, east of US 191. Water from the spring flows into a metal grate east of the highway (Feature C), continues underneath the highway in a small (12-inch) diameter culvert (Feature B), and exits into a concrete headgate (Feature A), which diverts water to the north and south along the west side of the highway. The original channel is present north of the headgate, but the channel south of the headgate has been replaced with a 10-inch diameter PVC pipe. Water fills the headgate and is presently used as a watering trough for horses, within an enclosure formed of wooden posts and straight wire. Water overtops the headgate and flows west to a point just outside the enclosure, where it has been recently diverted north and south into two hand-dug channels that irrigate the agricultural field. A possible second headgate (Feature D) was discovered during the current investigations, located approximately 300 feet southeast of Feature A and 30 feet southeast of metal gate and access road to the agricultural field. Feature D is visible as the top of a concrete wall, 10 inches wide, with a total length of 10 feet. The first section of this concrete wall is 6 feet long and runs parallel to the barbed wire fence on the western edge of the highway right-of-way; the wall then angles toward the highway and continues for another 4 feet. On the west side of the right-of-way fence, the top of a second concrete wall, 6 inches wide and 6 feet long, is visible. A large chunk of concrete lies next to this second wall segment.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Site is located on the east side of the Colorado River valley and is underlain by alluvial and aeolian sediments. The ditch channels are filled with grass, low shrubs, and thistle. A fallow agricultural field lies to the west. Ground visibility is excellent, greater than 80 percent.

29. **Notes Regarding Access** (as needed):

Opposite the entrance to the Moab Spring Ranch (Arthur Taylor House) is a dirt road that provides access through a metal gate to the agricultural field to the west.

30. **Additional Part A Comments**:

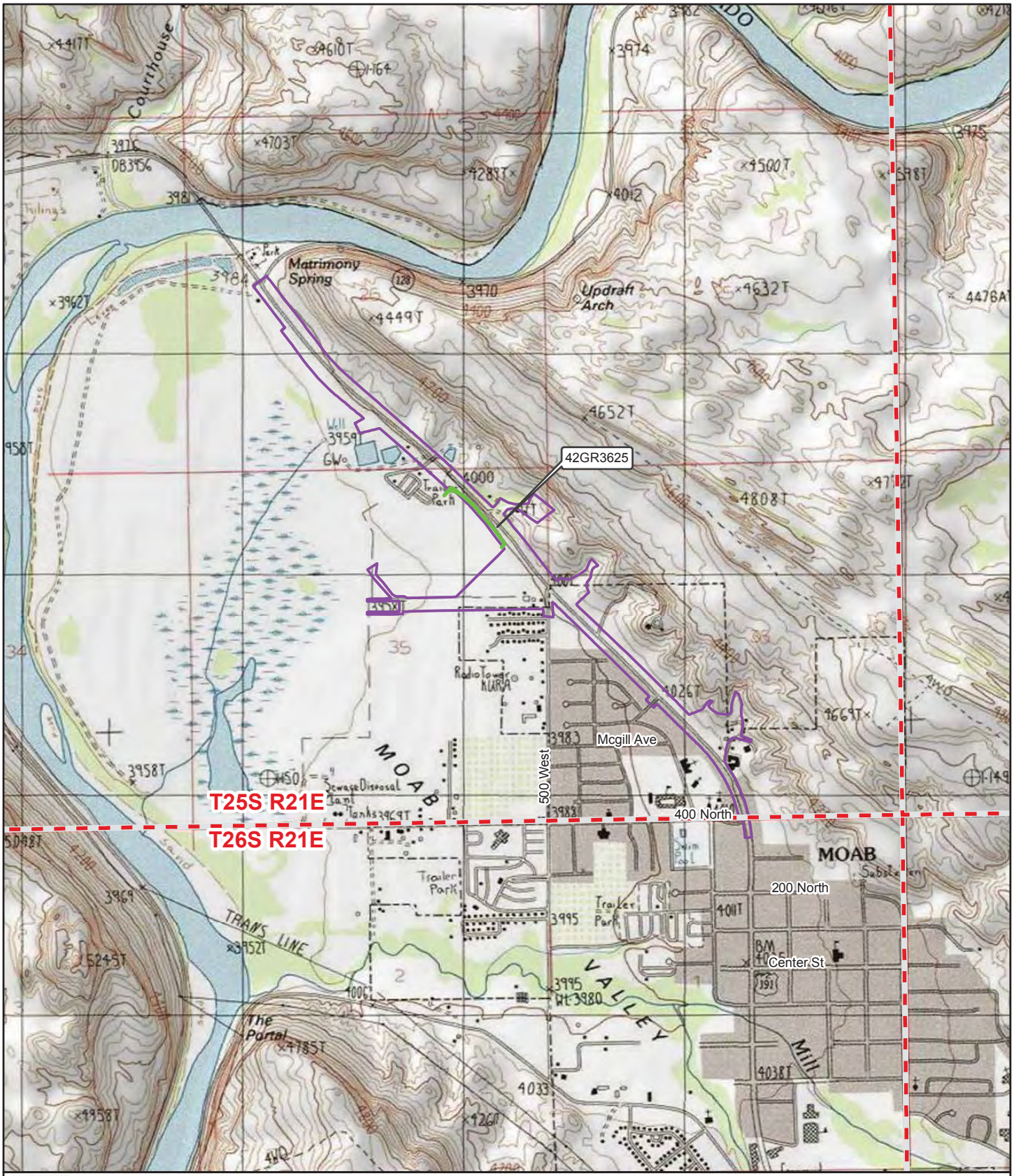
[a] Check all that apply
[b] See manual for additional categories

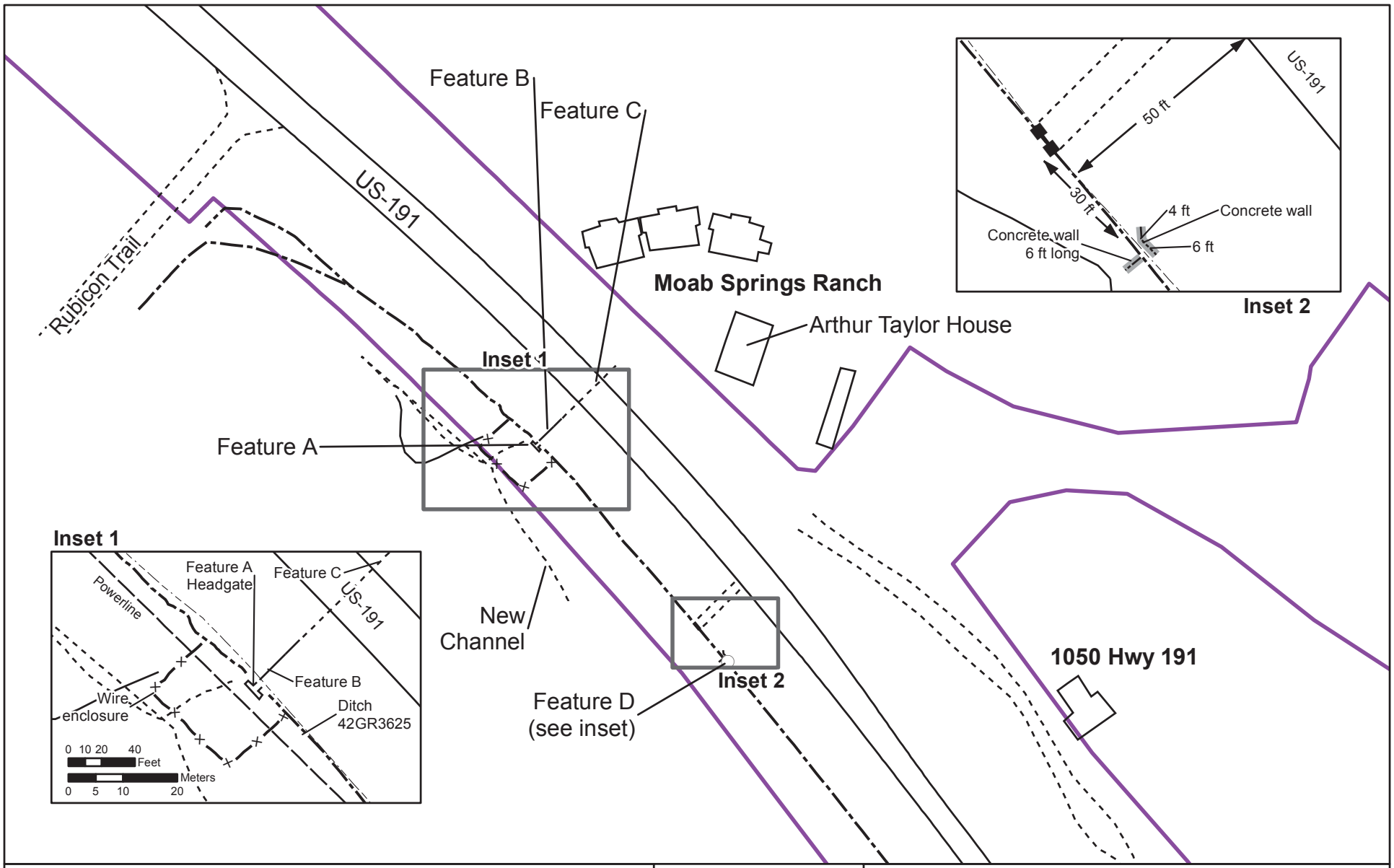
Smithsonian Trinomial: 42GR3625

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR3625
Matrimony Spring
Updraft Arch
Courthouse
Trailer Park
Radio Tower
KUAR
MOAB
Sewage Disposal
Tanks
Mcgill Ave
500 West
400 North
200 North
Center St
T25S R21E
T26S R21E
TRANS LINE
The Portal
VALLEY
Mill
Township/Range Boundary
Area of Potential Effects
Linear Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR3625
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR3625.mxd



Area of Potential Effects
42GR3625 - Ditch
Gate
Road
New Channel
Wire Enclosure
Fenceline

Data Sources: Utah AGRC, UDOT GIS

0 25 50 100 Feet
0 10 20 40 Meters

Scale: 1:1,800
Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

Original map: Whitfield et al. (2005)

May 18, 2018

Site Sketch Map
42GR3625
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteSketch_42GR3625.mxd

AECOM

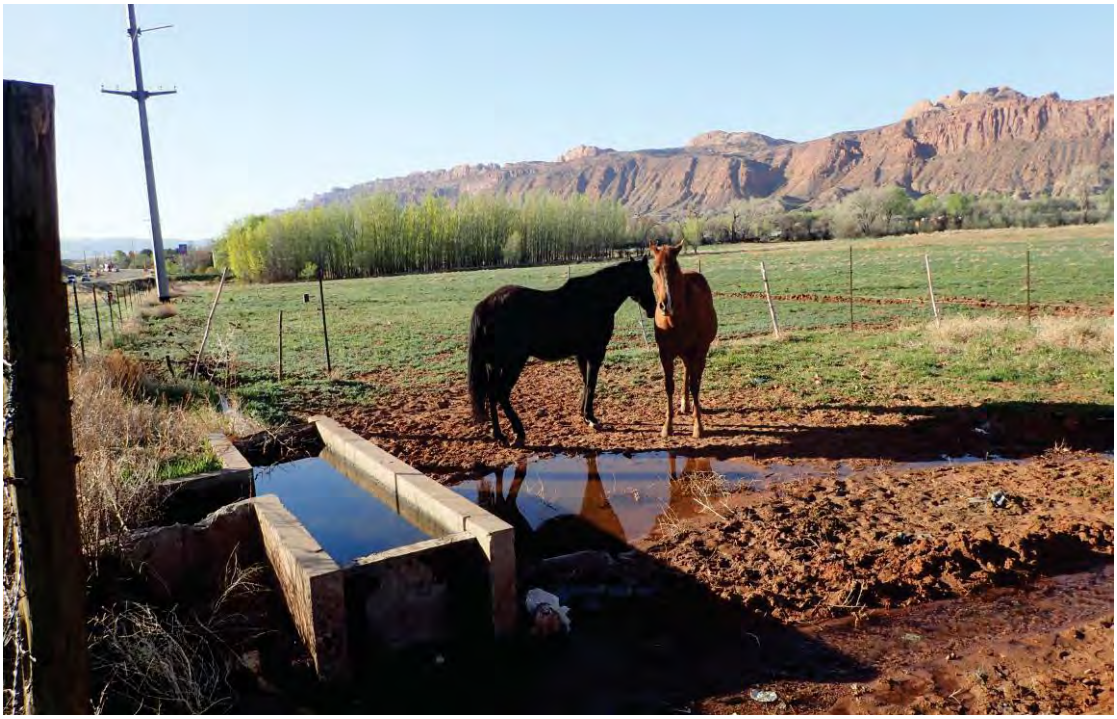
PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090004
Date: 4/9/18

Site Number: 42GR3625

Description: View of headgate (Feature A) for historic ditch, looking south. Note wire enclosure around feature.



AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090006
Date: 4/9/18

Site Number: 42GR3625

Description: View of historic ditch, south of headgate, looking SE. Note ditch has been replaced with PVC pipe.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090008
Date: 4/9/18

Site Number: 42GR3625

Description: View of historic ditch, north of headgate, looking NW.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4090005
Date: 4/9/18

Site Number: 42GR3625

Description: View of new concrete feature (Feature D), south of headgate (Feature A), looking south. Note sections on either side of fence and chunk of concrete.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3626
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: NENE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 625021 E 4272450 N NAD 83
13. **Site Dimensions**: Length: 35 m Width: 20 m Area: 550 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☑Prehistoric ☐Protohistoric ☐Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☑Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☑Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☐Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other agricultural use
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

The site is a small, dispersed scatter of lithic artifacts. Site lies in fallow agricultural field, which has been repeatedly plowed and artifacts have been moved or reburied.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Service, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☑No ☐Yes, aspects present[a]: ☐Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

This site was previously determined eligible for listing in the NRHP under Criterion D because of a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded, trenches for natural gas and water pipelines that were excavated just east of the site were inspected in 2008 and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in an active geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations and the current inspection, the site is now recommended not eligible for listing in the NRHP.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3626

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site was documented in 2005 as a small, dispersed scatter of lithic artifacts, including 11 pieces of lithic debitage, one Late Prehistoric Rose Spring series projectile point, and one biface fragment. The debitage includes secondary, tertiary, and flake fragments manufactured from five types of chert. These materials are found on the eastern edge of a fallow agricultural field, immediately west of US 191. A revisit of the site located only two artifacts, a tertiary white chalcedony flake and a tertiary gray quartzite flake. Neither the prepared tools nor the datum were relocated. Given the location of this site in a dynamic geomorphological context (i.e., the floodplain of the Colorado River), it is likely that this is a surface artifact scatter with no subsurface character. Two other lithic scatters, 42GR3627 and 42GR3628, are located immediately north of 42GR3626 on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

First alluvial terrace of the Colorado River, on the edge of a fallow agricultural field. Level field with excellent (better than 80 percent) ground visibility. Area now covered in weedy plants.

29. **Notes Regarding Access** (as needed):

Site is located immediately west of the fenceline that delineates the western edge of the US 191 right-of-way.

30. **Additional Part A Comments**:

[a] Check all that apply

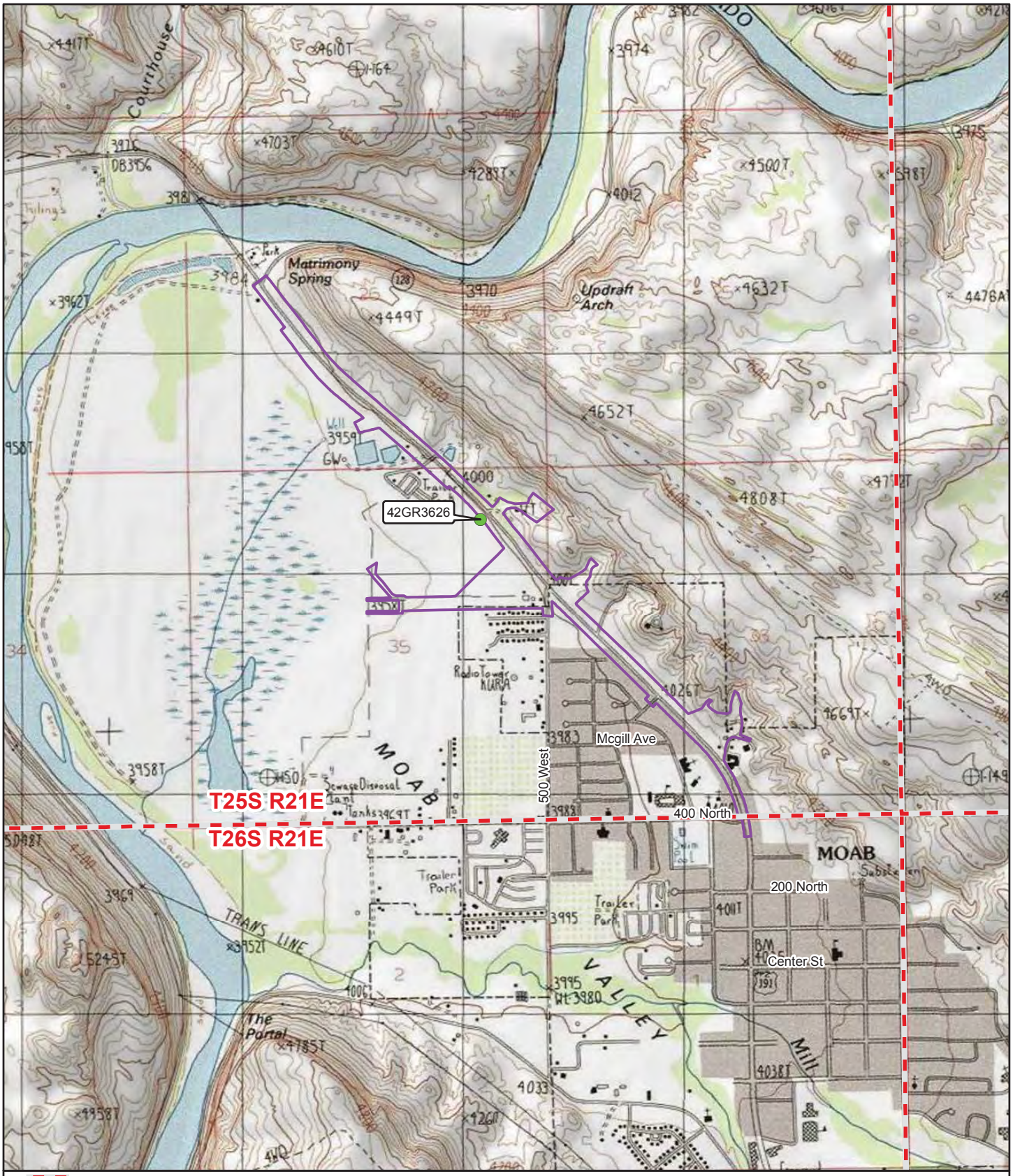
[b] See manual for additional categories

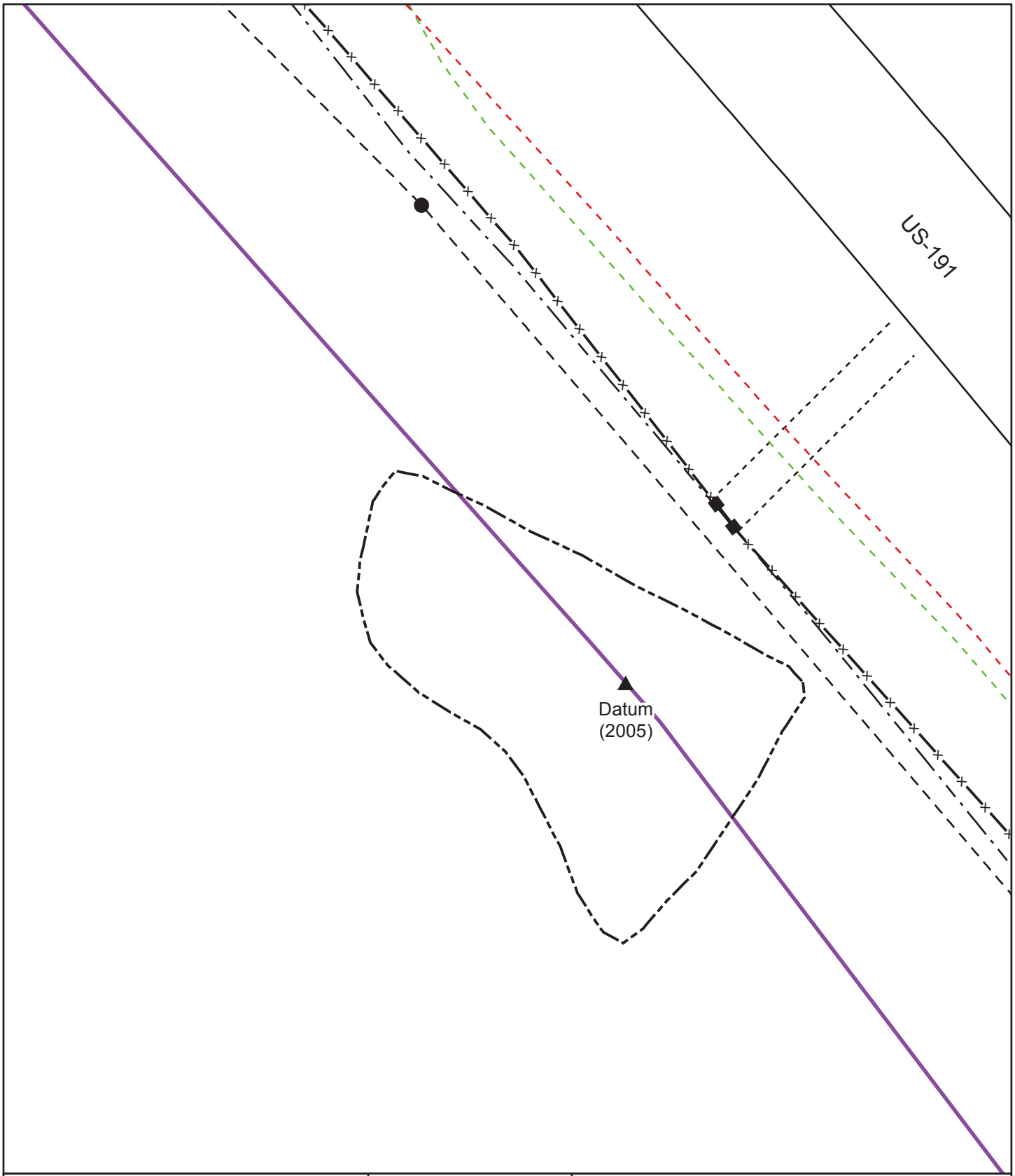
Smithsonian Trinomial: 42GR3626

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR3626
T25S R21E
T26S R21E
MOAB
Mcgill Ave
500 West
400 North
200 North
Center St
Matrimony Spring
Updraft Arch
Courthouse
TRANS LINE
VALLEY
The Portal
Trailer Park
Radio Tower
Sewage Disposal
Tanks
Township/Range Boundary
Area of Potential Effects
Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR3626
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR3626.mxd



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Area of Potential Effects
Site Boundary
Gate
Ditch (42GR3625)
Fenceline
Road
Overhead Powerline
Metal Powerline Pole
Buried Waterline
Buried Natural Gas Line

Data Sources: Utah AGRC, UDOT GIS

0 10 20 40 Feet
0 2.5 5 10 Meters

Scale: 1:400
Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

Original map: Whitfield et al. (2005)

May 21, 2018

N
W E
S

Site Sketch Map
42GR3626
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

UDOT

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090015	4/9/18

Site Number:
42GR3626

Description:
View of site area, looking SE.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3627
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 11 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: NENE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 624959 E 4272530 N NAD 83
13. **Site Dimensions**: Length: 37 m Width: 27 m Area: 784 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☑Prehistoric ☐Protohistoric ☐Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☑Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☑Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☐Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other agricultural use
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

This site is a medium-density, dispersed scatter of lithic materials. Site lies in fallow agricultural field, which has been repeatedly plowed and artifacts have been moved or reburied.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☑No ☐Yes, aspects present[a]: ☐Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

This prehistoric lithic scatter was previously determined eligible for listing in the NRHP under Criterion D because it was considered likely to yield buried cultural materials, given a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded trenches for utility pipelines that cross the eastern edge of the site were inspected and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in a dynamic geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations, the site is now recommended not eligible for listing in the NRHP.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3627

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site was described in 2005 as a medium-density, dispersed scatter of lithic materials, including 34 pieces of lithic debitage and one Protohistoric/Contact Cottonwood Triangular projectile point. The debitage includes secondary, tertiary, and flake fragments manufactured from opaque chert, semi-translucent chert, and quartzite. These materials are found on the eastern edge of a fallow agricultural field, immediately west of US 191. A revisit of the site located eight artifacts, including two gray/orange mottled primary flakes, two gray/orange mottled secondary flakes, one gray/orange mottled tertiary flake, two white chalcedony secondary flakes, and one white chalcedony tertiary flake. One of these artifacts is located outside the previous site boundary, which required that the boundary be pushed out approximately 10 meters to the south. Neither the projectile point nor the site datum were relocated. Inspection in 2008 of pipeline trenches that cross the site revealed no buried cultural materials. A reassessment of the site suggests that it is a surface artifact scatter with no subsurface character. Two other lithic scatters, 42GR3626 and 42GR3628, are located immediately south and north of 42GR3627, respectively, on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

First alluvial terrace of the Colorado River, on the edge of a fallow agricultural field. Level field with excellent (better than 80 percent) ground visibility. Area now covered in weedy plants.

29. **Notes Regarding Access** (as needed):

Site is located immediately west of the fenceline that delineates the western edge of the US 191 right-of-way.

30. **Additional Part A Comments**:

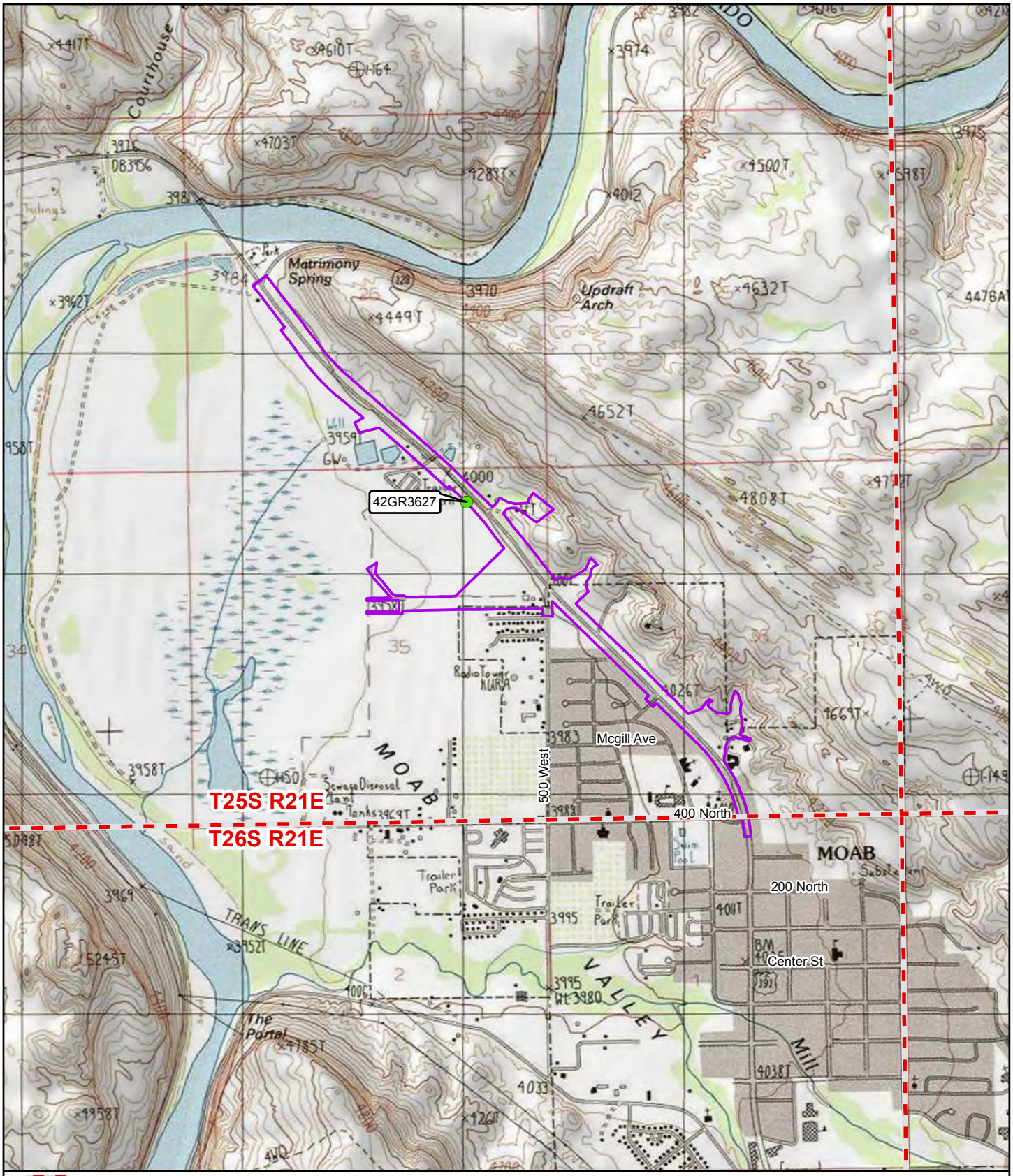
[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3627

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR3627
Matrimony Spring
Updraft Arch
Courthouse
T25S R21E
T26S R21E
MOAB
Mcgill Ave
500 West
400 North
200 North
Center St
TRANS LINE
VALLEY
The Portal
Trailer Park
Sewage Disposal
Radio Tower
Township/Range Boundary
Area of Potential Effects
Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR3627
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
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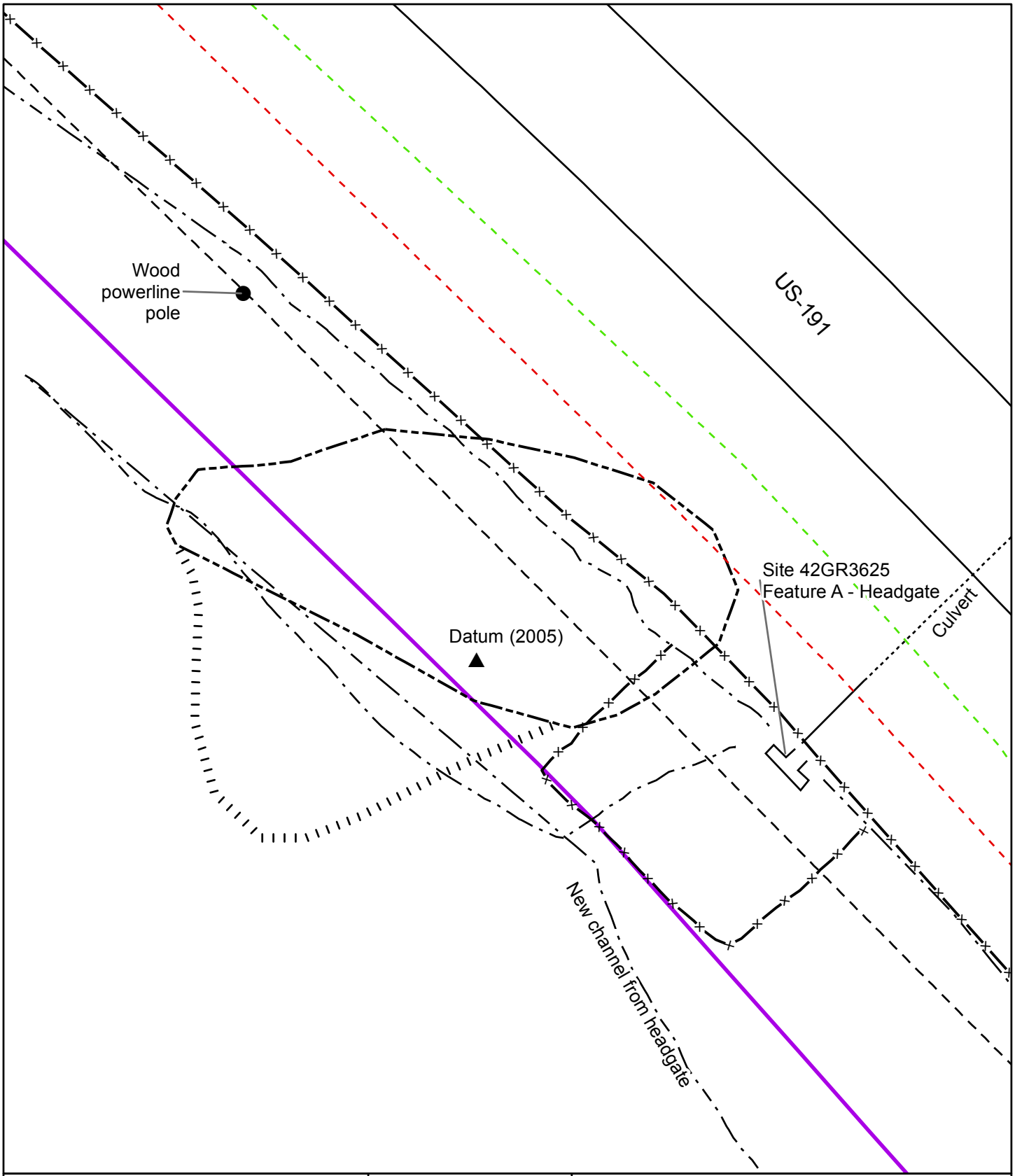

Area of Potential Effects
Site Boundary
Ditch (42GR3625)
Fenceline
Road
Site Boundary (2018)
Overhead Powerline
Metal Powerline Pole
Buried Waterline
Buried Natural Gas Line

Data Sources: Utah AGRC, UDOT GIS

0 10 20 40 Feet
0 2.5 5 10 Meters

Scale: 1:400
Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

Original map: Whitfield et al. (2005)

May 21, 2018

Site Sketch Map
42GR3627
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

UDOT

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AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4110144	4/11/18

Site Number:
42GR3627

Description:
Overview of site area, looking north. Note hand-dug feeder lateral.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090012	4/9/18

Site Number:
42GR3627

Description:
Overview of site area, looking SE. Historic ditch (42GR325) at left and wire enclosure around headgate (Feature A) for ditch.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3628
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: NWNE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 __ __ __ 624922 E __ __ __ __ 4272570 N NAD 83
13. **Site Dimensions**: Length: 20 m Width: 15 m Area: 236 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☑Prehistoric ☐Protohistoric ☐Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☑Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☑Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☐Linear
17. **Impacting Agents**: ☐None ☐Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☑Other agricultural use
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

The site is a low-density, dispersed scatter of lithic materials. Site lies in fallow agricultural field, which has been repeatedly plowed and artifacts have been moved or reburied.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☑No ☐Yes, aspects present[a]: ☐Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

This prehistoric lithic scatter was previously determined eligible for listing in the NRHP under Criterion D because it was considered likely to yield buried cultural materials, given a rather tenuous correlation with buried habitation sites in similar environments along the Colorado River and associated drainages in the Moab Valley. Since the site was recorded, utility pipeline trenches just east of the site were inspected and no cultural materials or staining were noted in the trench walls or back dirt piles. Moreover, this site is located in a dynamic geomorphological setting, which is underlain by deep alluvial deposits and is subject to active erosion by the Colorado River. Based on all of these observations, the site is now recommended not eligible for listing in the NRHP.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3628

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site was described in 2005 as a low density, dispersed scatter of 11 pieces of lithic debitage, including secondary, tertiary, and flake fragments manufactured from opaque chert, semitranslucent chert, and siltstone. These materials are found on the eastern edge of a fallow agricultural field, immediately west of US 191. A revisit of the site located 10 artifacts, including tan chalcedony and gray/orange mottled flakes, mostly tertiary flakes but a few primary and secondary flakes. The site datum was not relocated. Inspection in 2008 of pipeline trenches that cross a nearby site (42GR3627) revealed no buried cultural materials. A reassessment of site 42GR3628 suggests that it is a surface artifact scatter with no subsurface character. Two other lithic scatters, 42GR3626 and 42GR3627, are located immediately south of 42GR3628, on the western edge of the fallow agricultural field. The raw materials present on the three sites are similar, so it is likely that these three loci are part of one larger site of short-term use.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

First alluvial terrace of the Colorado River, on the edge of a fallow agricultural field. Level field with excellent (better than 80 percent) ground visibility. Area now covered in weedy plants.

29. **Notes Regarding Access** (as needed):

Site is located immediately west of the fenceline that delineates the western edge of the US 191 right-of-way.

30. **Additional Part A Comments**:

[a] Check all that apply

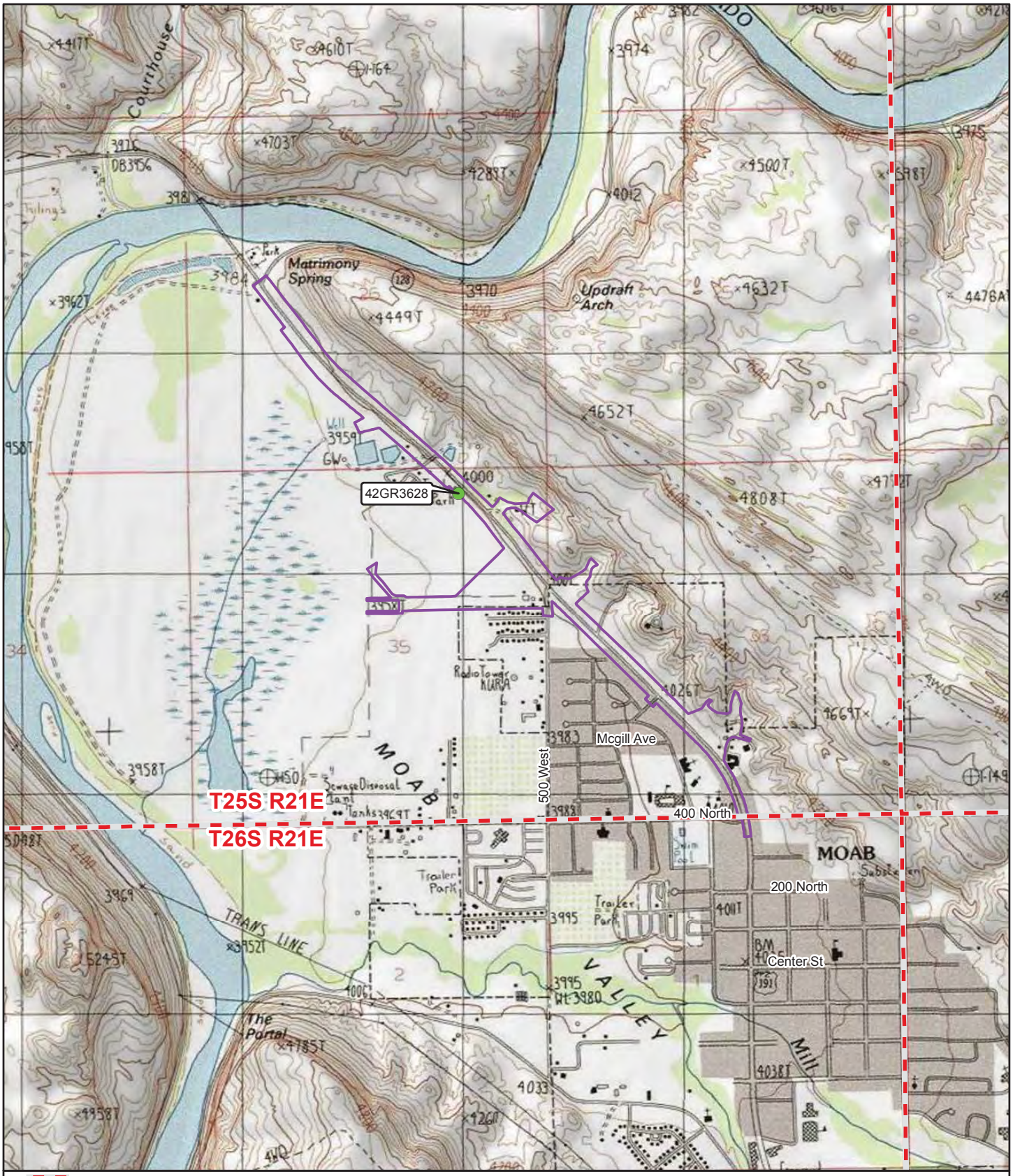
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3628

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories



Township/Range Boundary

Area of Potential Effects

Site (not eligible)

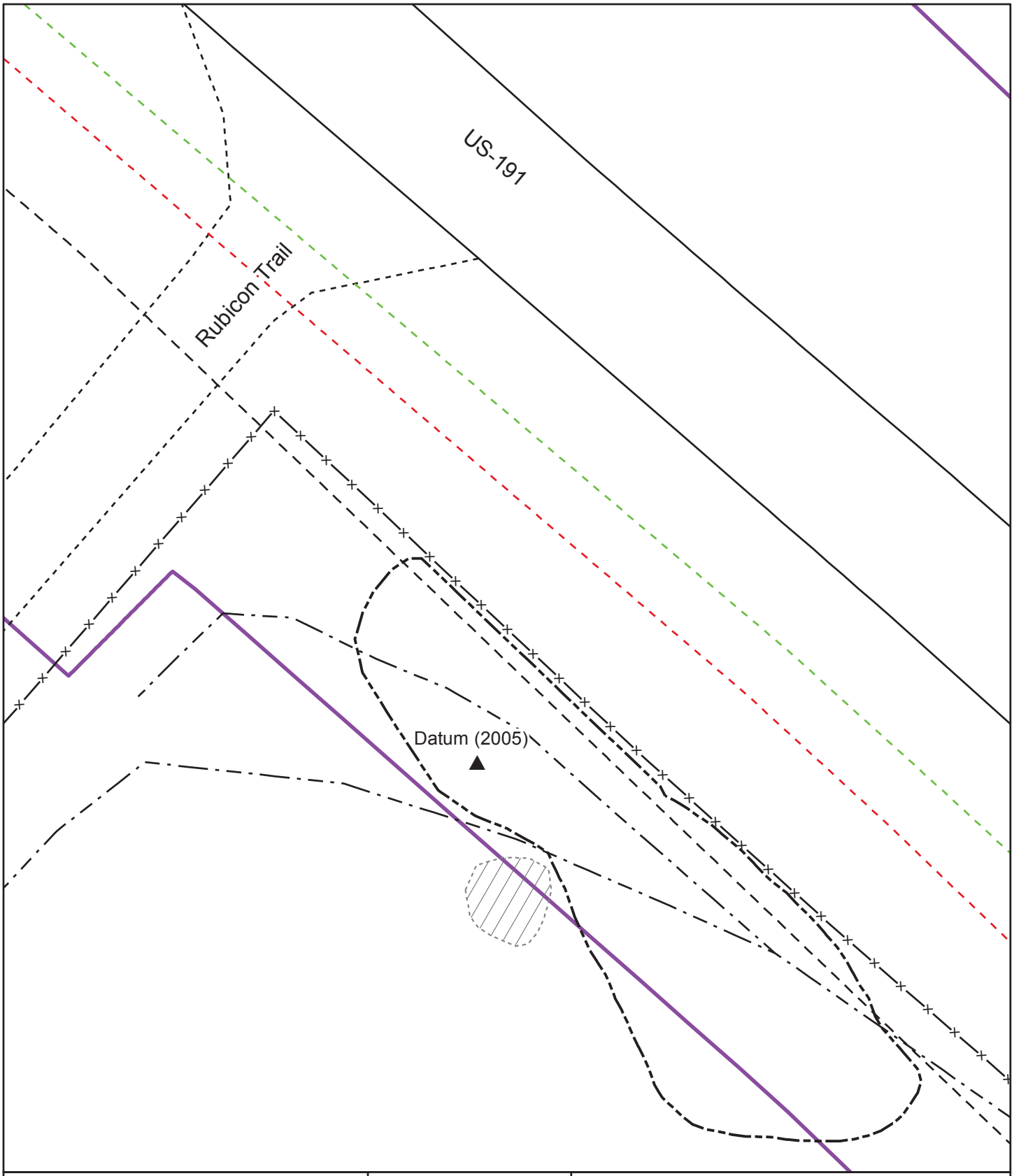
N
W E
S

0 1,000 2,000 4,000 Feet

1:24,000

Site Location
42GR3628
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS



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Area of Potential Effects
Site Boundary
Powerline
Ditch (42GR3625)
Fenceline
Road
Push Pile
Buried Waterline
Buried Natural Gas Line

Data Sources: Utah AGRC, UDOT GIS

0 10 20 40 Feet
0 2.5 5 10 Meters

Scale: 1:400
Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

Original map: Whitfield et al. (2005)

May 21, 2018

Site Sketch Map
42GR3628
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090013	4/9/18

Site Number:
42GR3628

Description:
Overview of site area, looking SE. Historic irrigation ditch (42GR3625) runs parallel to right-of-way fence at left. Modern push pile at right center.

UTAH ARCHAEOLOGY SITE FORM — PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR3629
2. **Temporary Site No.** :
3. **Site Name:** None

4. **Date Recorded**: 4 / 11 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Project Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 26 **(¼)**: NESW **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 __ __ __ 624478 E __ __ __ __ 4273060 N NAD 83
13. **Site Dimensions**: Length: 35 m Width: 25 m Area: 687 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Protohistoric ☑Historic
15. **Site Type**:

Prehistoric/Protohistoric		Historic	
☐Long-Term Residential	☐Task Specific	☑Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☐Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☑Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☐Architectural Feature(s) ☐Non-Architectural Feature(s) ☐Linear
17. **Impacting Agents**: ☐None ☑Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☐Vandalism/Looting ☐Other
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

This site is a grouping of five historic features, which are located in a small side canyon just east of US 191. It is subject to significant downslope erosion.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☑No ☐Yes, under criterion[a]: ☐A (event) ☐B (person) ☐C (design/construction) ☐D (important information)
24. **Does it Retain Integrity**: ☑No ☐Yes, aspects present[a]: ☐Location ☐Design ☐Setting ☐Materials ☐Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☑Not eligible ☐Eligible ☐Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

Site is a locus of incidental dumping of historic domestic debris. This historic debris scatter was previously determined not eligible for listing in the NRHP. No additional evidence was discovered that would contradict this finding.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3629

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

Site is described as a grouping of five historic features, including three piles of rocks and concrete/cinder blocks and two concentrations of historic artifacts. The artifacts include cans, glass jars, bottle fragments, ceramics, wire, and rubber. Other artifacts noted on site include parts of a rusted bed frame, box springs, tire rim, metal fuel container, vehicle parts, and sections of stove pipe. Diagnostic attributes for the glass artifacts and cans suggest manufacturing dates in the mid- to late 1950s. A charred wooden post was found near the center of the site and its purpose is unknown. The site is interpreted as a locale for incidental dumping of discarded debris. The episodes of dumping may have occurred at various times during the mid- to late 1950s, or these artifacts accumulated elsewhere and were dumped here more recently in a single episode.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Heavily eroded, rocky narrow side canyon, below the rim on the east side of the Moab valley. Vegetation is sparse, consisting of low shrubs and grasses. Ground visibility is excellent, nearly 100 percent.

29. **Notes Regarding Access** (as needed):

Site is located approximately 100 feet east of US 191 and bike path that parallels the east side of the highway.

30. **Additional Part A Comments**:

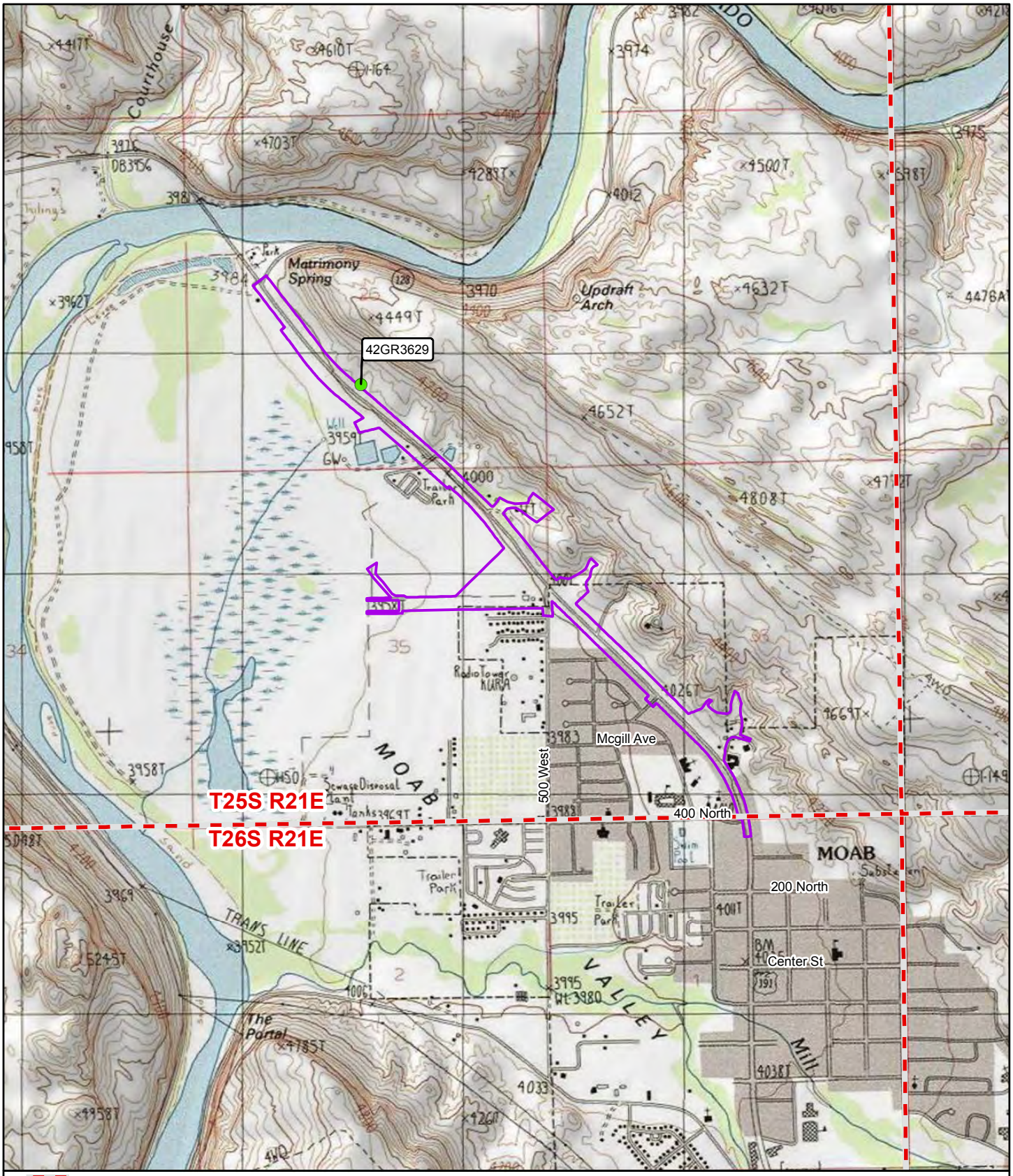
[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR3629

Temporary Site No. :_____

Additional Part A Comments:

[a] Check all that apply
[b] See manual for additional categories


42GR3629
Matrimony Spring
Updraft Arch
Courthouse
Trailer Park
Radio Tower KURA
Sewage Disposal
Tanks
MOAB
T25S R21E
T26S R21E
Mcgill Ave
500 West
400 North
200 North
Center St
MOAB
TRANS LINE
VALLEY
The Portal
Mill
Township/Range Boundary
Area of Potential Effects
Site (not eligible)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR3629
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
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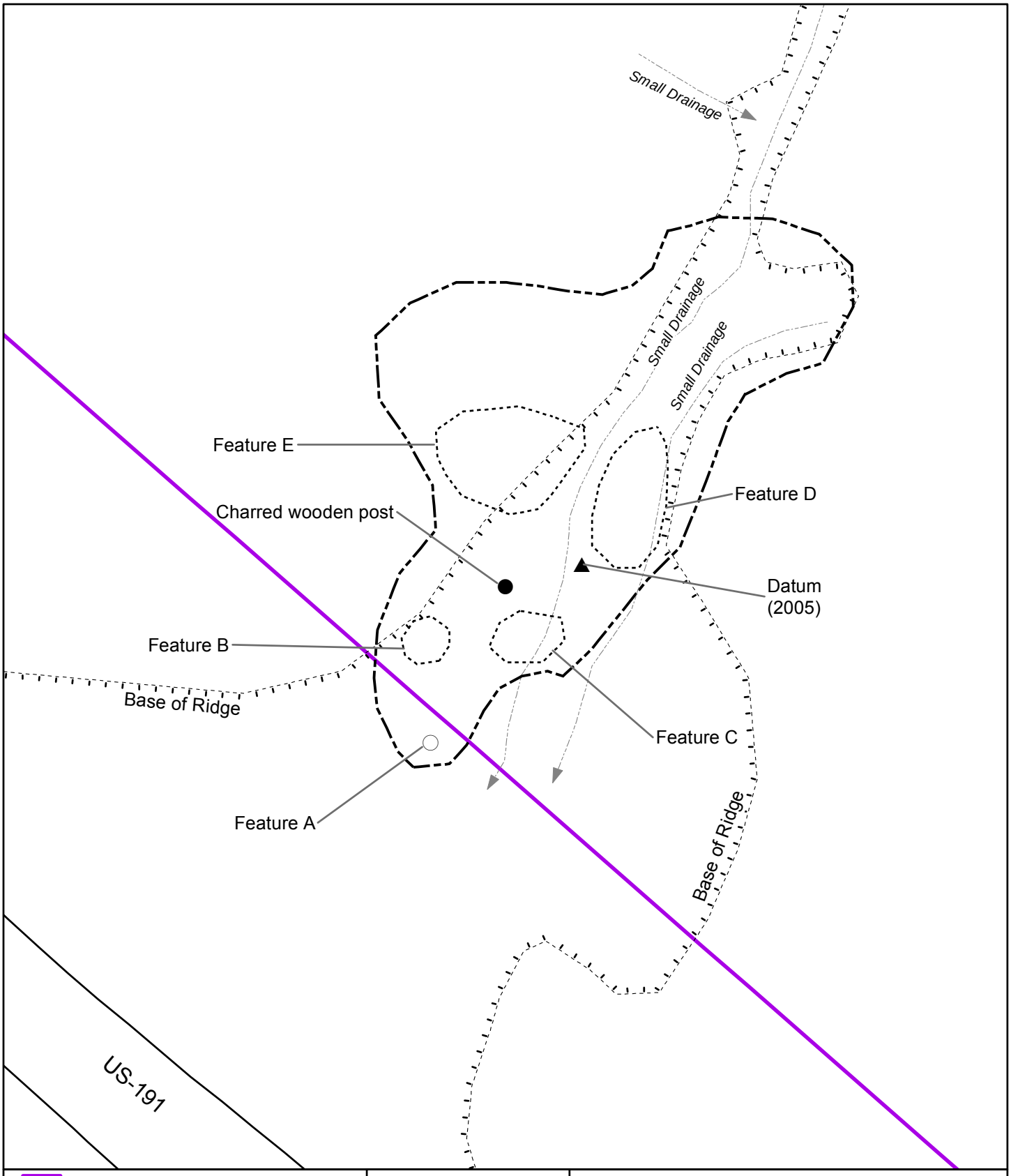

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Area of Potential Effects
Site Boundary
Artifact
Slopes

Data Sources: Utah AGRC, UDOT GIS

0 10 20 40 Feet
0 2.5 5 10 Meters
Scale: 1:400
Projection: NAD83 UTM Zone 12N
USGS 7.5' Quadrangle: Moab
Original map: Whitfield et al. (2005)
May 18, 2018

N
W E
S

Site Sketch Map
42GR3629
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

UDOT

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4110166
Date: 4/11/18

Site Number: 42GR3629

Description: Overview of site area, looking east. Note charred wooden post near photo center.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.: P4110167
Date: 4/11/18

Site Number: 42GR3629

Description: Overview of site area, looking west. Charred wooden post at right center.

UTAH ARCHAEOLOGY SITE FORM

PART A – Administrative Data

1. **Smithsonian Trinomial**: 42GR5569
2. **Temporary Site No**. :
3. **Site Name:** Elk Mountain Mission Fort
4. **Date Recorded**: 4 / 9 / 2018
5. **Type of Recording:** ☐First Recording ☐Full Re-record ☑Update
6. **Project Name**: US191-North Moab to Colorado River Bridge
7. **State Report Number**: U18OM0144
8. **Land Status**: Private
9. **USGS 7.5' Quad Map Name and Date**: Moab, UT (1985)
10. **Township**: 25S **Range**: 21E **Section**: 35 **(¼)**: SWNE **County**: Grand
11. **Meridian**: ☑Salt Lake ☐Uintah
12. **UTMs:** Zone 12 0 625008 E 4272110 N NAD 83
13. **Site Dimensions**: Length: 15 m Width: 3 m Area: 45 m^2 ☐GIS ☑Estimate
14. **Site Class**[a]: ☐Prehistoric ☐Ethnohistoric ☑Historic
15. **Site Type**:

Prehistoric/Ethno-historic		Historic	
☐Long-Term Residential	☐Task Specific	☐Domestic	☐Transportation/Communication
☐Temporary Camp	☐Specialty Site	☐Agriculture/Subsistence	☑Defense
☐Unknown		☐Industry/Processing/Extraction	☐Unknown
☐Other		☐Other[b]	

16. **Site Characteristics**[a]: ☐Artifact Scatter ☐Rock Art/Inscription ☐Lithic Source/Quarry ☐Rock Shelter/Cave ☑Architectural Feature(s) ☐Non-Architectural Feature(s) ☐Linear
17. **Impacting Agents**[a]: ☐None ☑Erosion ☐Livestock Concentration ☐Recreation ☐Road/Trail ☑Vandalism/Looting ☑Other vegetation growth
18. **Site Condition:** ☐Stable ☑Deteriorating ☐Imminently Threatened ☐Destroyed
19. **Description** (as needed):

Only a small section (one rock wall and a short section of a second wall) of the site remains. It is possible that stones from the walls have been removed for other purposes over the years.

20. **Recorded By**: Gordon C. Tucker Jr. 21. **Organization**: AECOM Technical Services, Inc.
22. **Material Collected:** ☑No ☐Yes (describe in Site Description) **Repository**: N/A

NRHP Evaluation

23. **Is the Site Significant**: ☐No ☑Yes, under criterion[a]: ☑A (event) ☐B (person) ☐C (design/construction) ☑D (important information)
24. **Does it Retain Integrity**: ☐No ☑Yes, aspects present[a]: ☐Location ☑Design ☐Setting ☑Materials ☑Workmanship ☐Feeling ☐Association
25. **NRHP Status**: ☐Not eligible ☐Eligible ☑Listed
26. **Justification** (include discussion of historic context, significance, and integrity):

The site was listed in the NRHP on June 15, 1978. The Elk Mountain Mission Fort site represents a critical period in the history of Mormon settlement in southeastern Utah and with Mormon-Indian relations. The site is likely to provide archaeological data important to a greater understanding of the early history of the Spanish Valley and Moab.

[a] Check all that apply
[b] See manual for additional categories

Smithsonian Trinomial: 42GR5569

Temporary Site No. :_____

27. **Site Description** (interpretation, context, size, artifact and feature assemblage, dating, previous work and curation, etc.)**:**

The Utah Historic Sites Survey originally documented the site in June 1976. The original fort was located on the northern edge of Moab, approximately one mile east of the Colorado River. It measured 64 feet square and was constructed of local stones obtained from bedrock outcrops approximately one-half mile east of the site. The walls were originally 12 feet high, with a base 4 feet wide tapering to 1.5 feet at the top. A wide gate was installed in the east wall and a narrow gate in the west wall. Structures may have been constructed inside the fort, but the number and type(s) are unknown. Alfred N. Billings and 40 other men from the Mormon Church were sent by Brigham Young in the spring of 1855 to establish a mission at the foot of the Elk Mountains, which are now called the La Sal Mountains. Construction of the fort was completed during the summer of 1855. Threatened with an attack by local Indians, the settlers abandoned the fort on September 23, 1855. The fort stood until after the permanent settlement of Moab in the early 1880s and provided shelter for new settlers. Eventually it was no longer used and it fell into ruin.

The site today is visible as a portion of the south wall and a short section of the adjoining west wall. The south wall remnant is approximately 50 feet long and approximately 2 feet wide, with a maximum height of approximately 5 feet. What remains of the western wall is a loose alignment of stones, rather than a cohesive structure, which is 6 inches high and extends north for approximately 10 feet from the west end of the south wall. Both walls are constructed of dry laid, unshaped blocks of local sandstone. The extant walls, especially the west wall remnant, have been significantly disturbed by several cottonwood trees. The north and east walls may no longer exist, be buried, or obscured by thick vegetation. No artifacts, historic or modern, were observed in association with the wall remnants. A wooden post, 6 inches in diameter and 3 feet tall, stands upright at the east of the south wall. Its function is unknown.

28. **Environmental Context** (topography, vegetation, ground visibility, depositional context)**:**

Site lies on the level ground of the Colorado River alluvial valley. Agricultural fields are found north and south of the site, and a belt of cottonwood and willow trees separate the two fields, running parallel with a chain link fence. Besides the trees, the ground around the wall remnants consists of grass and a thick stand of brush. Ground visibility is generally less than 10 percent.

29. **Notes Regarding Access** (as needed):

From the intersection of North 500 West and US 191 (MP127), walk west for approximately 950 feet, parallel to a chain link fence that crosses the yard of the Kellerstrass Oil Co. at 995 North Main (US 191) and a fallow agricultural field. The south wall remnant runs east-west immediately north of the chain link fence.

30. **Additional Part A Comments**:

If some or all of the brush could be removed from the site, more evidence of the fort will undoubtedly be found.

[a] Check all that apply

[b] See manual for additional categories

Smithsonian Trinomial: 42GR5569

Temporary Site No. :_____

Additional Part A Comments:

A stone monument for Elk Mountain Mission Fort site is presently located in the parking lot behind the Grand County Library in Moab. The monument is 8 feet high and 4 feet square, tapering to 2 feet square at the top. A plaque on the bottom of the north side of this multi-tiered, mortared sandstone monument reads, "This monument was relocated in April 2006. The monument was formerly located at 995 N. Highway 191, which is 1.5 miles northwest of where the monument now stands. The location of the Old Fort was 3000 ft W, 1320 ft from the NW corner of Sec 35 Township 25S, Range 21 E, Salt Lake Base Meridian."

The original bronze plaque, which is located near the top of the monument on the north side, reads as follows:

"Daughters of Utah Pioneers, No. 35, Erected Nov 30, 1940.
ELK MOUNTAIN MISSION
In April 1855, forty-one men under the leadership of Alfred N. Billings were called to establish a mission in the Elk Mountains. They left Salt Lake City May 7, 1855, arriving at Grand River June 11, and selected the site for a fort. By July 15, they had built a fort 64 feet square, with stone walls, 12 feet high, 4 feet at the base and 1 & 1/2 feet at the top. Three of the pioneers, James. W. Hunt, Edward Edwards and William Behunin were buried within the fort which was located about 800 feet from this monument."

[a] Check all that apply
[b] See manual for additional categories

UTAH ARCHAEOLOGY SITE FORM

PART C – Historic Component

Smithsonian Trinomial: 42GR5569

Temporary Site No. :_____

1. **Primary dates of site use**: 1855 to 1880
2. **Secondary dates of site use**: _____ to _____
3. **Architectural Features**

Type	Description
Rock Wall	A remnant of the south wall is approximately 50 feet long and 2 feet wide, with a maximum height of 5 feet. A remnant of the west wall, only one stone or 6 inches high, extends north for approximately 10 feet from the west end of the south wall. Both walls, especially the west wall remnant, have been significantly disturbed by several cottonwood trees and dense shrubbery.
Wooden Post	A wooden post, 6 inches in diameter and 3 feet tall, stands upright at the east of the south wall. Its function is unknown.

4. **Non-Architectural Features**

Type	Description

5. **Feature Comments**:

6. **Cans** - Total Quantity: 0

Quantity	Type	Description

7. **Can Comments**:

8. **Glass Bottles** - Total ENV: 0

ENV	Manufacturing Method	Description
_____	_____	
_____	_____	
_____	_____	
_____	_____	

9. **Glass Bottle Comments**:

10. **Ceramics** - Total ENV: 0

ENV	Ware	Description
_____	_____	
_____	_____	
_____	_____	
_____	_____	

11. **Ceramic Comments**:

12. **Additional Artifacts/Debris:**

☐ Ammunition/Firearms	☐ Car/Car parts	☐ Glass (non-bottle)	☐ Nails (wire)	☐ Toys
☐ Bone	☐ Ceramics (non-tableware)	☐ Hardware	☐ Plastic	☐ Other _____
☐ Building Materials	☐ Clothing	☐ Nails (cut)	☐ Stove Parts	

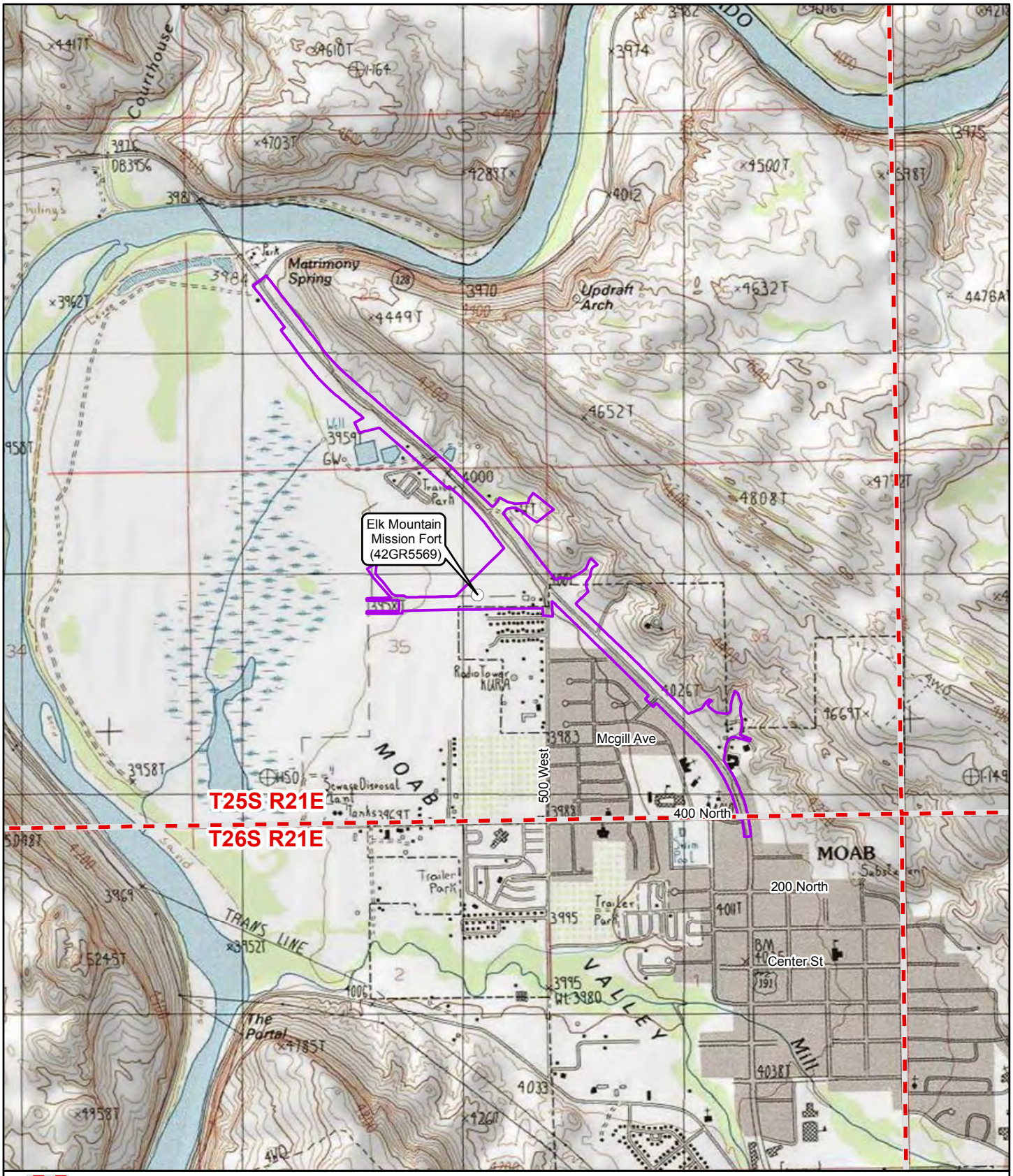
13. **Additional Artifact/Debris Description**:
No artifacts, of any age, were identified in association with the rock walls

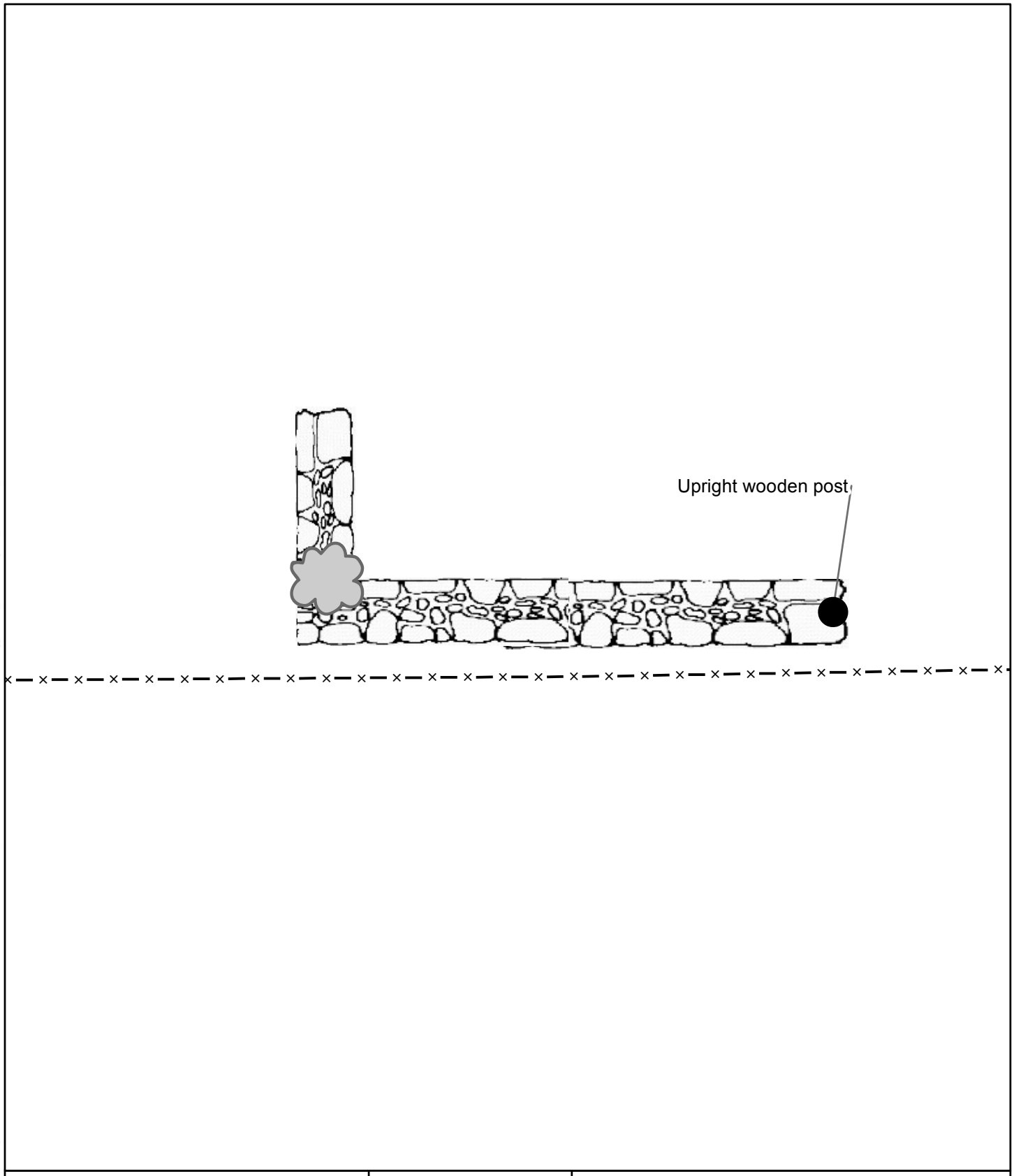
14. **Additional Part C Comments**:

Smithsonian Trinomial: 42GR5569

Temporary Site No. :_____

Additional Part C Comments:


Elk Mountain
Mission Fort
(42GR5569)
T25S R21E
T26S R21E
MOAB
Mcgill Ave
500 West
400 North
200 North
Center St
Matrimony
Spring
Updraft
Arch
TRANS LINE
VALLEY
The
Portal
Courthouse
Trailer
Park
Radio Tower
KURA
Sewage Disposal
Tanks
Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteTopo_42GR5569.mxd
Township/Range Boundary
Area of Potential Effects
Site (listed)
N
W
E
S
0
1,000
2,000
4,000
Feet
1:24,000
Site Location
42GR5569
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329
Data Sources: Utah AGRC, UDOT GIS
UDOT



Slab Wall

Chain Link Fenceline

Cottonwood Tree

0 5 10 20 Feet

0 1 2 4 Meters

Scale: 1:200

Projection: NAD83 UTM Zone 12N

USGS 7.5' Quadrangle: Moab

May 18, 2018

Site Sketch Map
Elk Mountain Mission
Fort (42GR5569)
Re-evaluation of EA
US-191 MP 125.9 to 128.2
UDOT PIN 15329

Data Sources: Utah AGRC, UDOT GIS

Q:\Projects\UDOT\60565564 - US-191 North Moab Env Re-Eval\900 - CAD_GIS\920-929 (GIS-Graphics)\MXDs\Archaeology\US191_Archaeological_SiteSketch_42GR5569.mxd

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090031	4/9/18

Site Number:
42GR5569

Description:
View of south wall of the Elk Mountain Mission Fort site, looking north.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090033	4/9/18

Site Number:
42GR5569

Description:
View of south wall of the Elk Mountain Mission Fort site, looking west. Note upright wooden post in center.

AECOM

PHOTOGRAPHIC LOG

Client Name:	Project:	Project No.:
UDOT	US-191 Moab to Colorado River Bridge	60565564

Photo No.:	Date:
P4090035	4/9/18

Site Number:
42GR5569

Description:
View of the west wall of the Elk Mountain Mission Fort site, looking south.