

I-10: SR 202L to SR 387

Alternatives and Options Evaluation Matrix - Engineering

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
I-10 Mainline Widening Alternatives (1 added lane each direction + HOV lanes from SR 202L to Riggs Road)								
ML1	No Build	No changes to existing geometry. Existing geometric design features will be maintained, whether or not the meet current design standards.	Beyond routine maintenance, no changes to existing conditions.	AM travel time approximately 42 minutes WB through project limits. PM travel time approximately 39 minutes EB through project limits. LOS E/F on all segments	No improvements over existing conditions.	No impacts.	No Impacts.	Routine maintenance functions will condition as it does today, but will increasingly become greater as the corridor ages without improvements.
ML2	Median Widening + Ramp Upgrades	Mainline: Desirable design standards with all mainline widening to the median. 12-ft inside/outside shoulders, 12' additional inside lane. 1.5% constant cross slope maintained; however, typical section may have to be modified to a crowned section for each direction to avoid undesirable vertical clearance impacts under select bridges that remain, most notably Riggs Road, Goodyear Road, Nelson Road, Casa Blanca Road, Seed Farm Road, and SR-387/SR-187/Pinal Ave. HOV lane extended south to Riggs Road. Ramps: Parallel entrance/exits, super corrected, increased accel/decel lengths. All entrance ramps upgraded to metered configurations. Casa Blanca hook-style short exit ramps extended through bridge end span to create a long deceleration lane.	Median catch basins will need to be added, relocated and/or adjusted. Crowning of mainline at bridges will require additional drainage infrastructure. A few box culverts will be extended through the median where they are not currently connected. Pipe extensions on the outside will be needed where ramp geometry is revised.	AM travel time approximately 32 minutes WB through project limits. PM travel time approximately 31 minutes EB through project limits. LOS D or better south of Riggs Road, but LOS E/F north of Riggs Road.	Median widening will require median barrier - CMF 0.81 from CPS New General Purpose Lane - CMF 0.9 from CPS Ramp modifications - CMF 0.21 from CPS Shoulder widening - CMF 0.64 from CPS	Majority of mainline work can be accomplished with only an inside shoulder closure, with occasional single lane closures. Short term (4 weeks +/-) ramp closures likely necessary to complete ramp gore modifications.	Minimal to no utility impacts associated with the I-10 median widening.	New pavement from widening, pavement preservation of existing pavements and new concrete median barrier in the northern six miles reduces near-term maintenance. Median cable barrier for 20 miles will increase maintenance.
ML3	Outside Widening + Ramp Upgrades	Mainline: Desirable design standards with all general purpose mainline widening to the outside. 12-ft inside/outside shoulders, 12' additional inside lane. 1.5% cross slope maintained; however, typical section may have to be modified to a crowned section for each direction to avoid undesirable vertical clearance impacts under select bridges that remain, most notably Riggs Road. HOV lane extended south to Riggs Road with widening to the median. Ramps: Parallel entrance/exits, super corrected, increased accel/decel lengths. All entrance ramps upgraded to metered configurations. Casa Blanca hook-style short exit ramps extended through bridge end span to create a long deceleration lane.	Median catch basins will need to be added, relocated and/or adjusted north of Riggs Road. Crowning of mainline at bridges will require additional drainage infrastructure. All box culverts and pipe extensions will be extended to the new clear zone to the outside.	AM travel time approximately 32 minutes WB through project limits. PM travel time approximately 31 minutes EB through project limits. LOS D or better south of Riggs Road, but LOS E/F north of Riggs Road.	New General Purpose Lane - CMF 0.9 from CPS Ramp modifications - CMF 0.21 from CPS Shoulder widening - CMF 0.64 from CPS No benefit from median barrier south of Riggs Road, but north of Riggs Road - CMF 0.81 from CPS.	Majority of mainline work can be with an outside shoulder closure and some inside shoulder closures, with occasional single lane closures Ramp closures necessary to complete upgrades	Minimal to no utility impacts associated with the I-10 outside widening.	New pavement from widening and pavement preservation reduces near-term maintenance. Six miles of median cable barrier in Maricopa County will increase maintenance.

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		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
Wild Horse Pass / Sundust Road Interchange Options								
WH1	No Build	No impacts, except for ADA upgrades. Crest curve actual design speed is 62 mph which is adequate for the existing 35 mph posted speed limit. Existing vertical clearance exceeds 16.5'. Compatible with both ML2 or ML3.	No impacts	Operational problems that exist today will only get worse over the next 20 years under no-build. Expected Level of Service F in the am peak and E in the pm peak.	ADA upgrades will improve safety and accessibility for pedestrians, otherwise no changes.	No impact	No impact	Maintenance functions will condition as it does today, but will increasingly become greater as the corridor ages without improvements. Since this location is only about 30 years old, do not expect maintenance to increase dramatically over the next 20 years.
WH2	Diverging Diamond Interchange (DDI) with bike & ped accommodations	Relatively new configuration to AZ, but becoming commonplace across the US. Standard 12' lanes, except through the crossovers and across the existing bridge where lanes shall be 15'. Standard shoulders and vertical clearance on new bridge. DDI configuration eliminates the off-ramp to on-ramp through movement sometimes utilized during incident management, bridge maintenance, or overweight vehicle passage. Compatible with both ML2 or ML3.	Minor modifications to the on-site drainage system to accommodate the new configuration.	Expected Level of Service B in both am and pm peak period.	Compared to a diamond interchange (no-build), a DDI reduces conflict points by 50% and eliminates many of the most severe crash types. Data suggests that total crashes will be reduced by 46 percent. Geometric design discourages wrong way drivers.	The new bridge and nearly half of the new interchange can be built entirely offline. Relatively minor traffic adjustments will be necessary to complete the paving and signal system at the crossovers. Some short term lane closures and detours will be necessary, including on I-10. Advance traffic control notification to the public will be needed prior to when the crossover design goes active.	Potential impacts to FMS and ADOT electrical. Minor outages to each could be expected.	A bigger interchange with more bridge and more pavement will eventually require more maintenance, but it will be minimal for probably the next 20 years given how new the interchange is overall.
WH3	Displaced Left Turn (DLT) Interchange with bike & ped accommodations	Unfamiliar interchange design in AZ, and generally rare in the US. Driver confusion and/or wrong way drivers could be a concern. Standard 12' lanes, standard 8' shoulders on new bridge. DLT configuration preserves the off-ramp to on-ramp through movement sometimes utilized during incident management, bridge maintenance, or overweight vehicle passage. Compatible with both ML2 or ML3.	Minor modifications to the on-site drainage system to accommodate the new configuration. Working near the Gila Ditch in the northwest quadrant.	Expected Level of Service C in both am and pm peak period.	Compared to a diamond interchange (no-build), a DLT slightly reduces the number of the most severe conflict points. However, unfamiliar design may create driver confusion and could increase the change of wrong way drivers, possibly reducing safety benefits.	The new bridge and most of the new interchange can be built entirely offline. Relatively minor traffic adjustments will be necessary to complete the paving and signal system at the eastbound ramp terminal and the DLT crossover. Some short term lane closures and detours will be necessary, including on I-10. Advance traffic control notification to the public will be needed prior to when the DLT design goes active.	Potential impacts to FMS and ADOT electrical. Minor outages to each could be expected.	A bigger interchange with more bridge and more pavement will eventually require more maintenance, but it will be minimal for probably the next 20 years given how new the interchange is overall.

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		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
SR 347 / Queen Creek Road Interchange Options								
QC1	No Build	No changes. Crest curve actual design speed is 75 mph which is adequate for existing posted speed of 45 mph east of I-10 and 55 mph west of I-10. Existing vertical clearance exceeds 16.5'. Compatible with both ML2 or ML3.	No impacts	Operational problems that exist today will only get worse over the next 20 years under no-build. Expected Level of Service F in both the am and pm peak.	No changes	No impacts	No impacts, but a future Gila River Community Department of Public Works (DPW) waterline crossing of I-10 is proposed nearby and will need to be coordinated.	Maintenance functions will condition as it does today, but will increasingly become greater as the corridor ages without improvements. Since this location is only about 20 years old, do not expect maintenance to increase dramatically over the next 20 years.
QC2	Diverging Diamond Interchange (DDI) with bike & ped accommodations	Relatively new configuration to AZ, but becoming commonplace across the US. Standard 12' lanes, except through the crossovers and across the existing bridge where lanes shall be 15'. Standard shoulders and vertical clearance on new bridge. DDI configuration eliminates the off-ramp to on-ramp through movement sometimes utilized during incident management, bridge maintenance, or overheight vehicle passage. Compatible with both ML2 or ML3.	Minor modifications to the on-site drainage system to accommodate the new configuration.	Expected Level of Service C in the am peak and B in the pm peak.	Compared to a diamond interchange (no-build), a DDI reduces conflict points by 50% and eliminates many of the most severe crash types. Data suggests that total crashes will be reduced by 46 percent. Geometric design discourages wrong way drivers.	The new bridge and nearly half of the new interchange can be built entirely offline. Relatively minor traffic adjustments will be necessary to complete the paving and signal system at the crossovers. Some short term lane closures and detours will be necessary, including on I-10. Advance traffic control notification to the public will be needed prior to when the crossover design goes active.	Minor impacts to ADOT electrical systems. Minor outages to each could be expected. Coordination with the future DPW waterline will be required.	A bigger interchange with more bridge and more pavement will eventually require more maintenance, but it will be minimal for probably the next 20 years given how new the interchange is overall.
QC3	Displaced Left Turn (DLT) Interchange with bike & ped accommodations	Unfamiliar interchange design in AZ, and generally rare in the US. Driver confusion and/or wrong way drivers could be a concern. Standard 12' lanes, standard 8' shoulders on new bridge. DLT configuration preserves the off-ramp to on-ramp through movement sometimes utilized during incident management, bridge maintenance, or overheight vehicle passage. Compatible with both ML2 or ML3.	Minor modifications to the on-site drainage system to accommodate the new configuration.	Expected Level of Service C in both the am and pm peak.	Compared to a diamond interchange (no-build), a DLT slightly reduces the number of the most severe conflict points. However, unfamiliar design may create driver confusion and could increase the change of wrong way drivers, possibly reducing safety benefits.	The new bridge and most of the new interchange can be built entirely offline. Relatively minor traffic adjustments will be necessary to complete the paving and signal system at the eastbound ramp terminal and the DLT crossover. Some short term lane closures and detours will be necessary, including on I-10. Advance traffic control notification to the public will be needed prior to when the DLT design goes active.	Minor impacts to ADOT electrical systems. Minor outages to each could be expected. Coordination with the future DPW waterline will be required.	A bigger interchange with more bridge and more pavement will eventually require more maintenance, but it will be minimal for probably the next 20 years given how new the interchange is overall.

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		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
Riggs Road Interchange Options								
RR1	No Build	Existing crossroad deficiencies remain including narrow shoulder width. Vertical clearance is 16.0'. Crest curve actual design speed is 54 mph which is adequate for existing 45 mph posted speed limit. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impacts	Operational problems that may exist today will only get worse over the next 20 years under no-build. Eastbound exit ramp is known to backup onto I-10 during certain times.	Bridge railing is dated and does not meet current crash test criteria. Guardrail offset and shoulder does not meet current standards. Disabled vehicles have no space to pull off the traveled way and emergency vehicles have no shoulder for use in response to incidents across the interchange. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone and are therefore barrier protected.	No impacts	No impact	Bridge is nearing the end of its service life, with the bridge deck/superstructure having the most need. Narrow approach roadways with guardrail remain.
RR2	Bridge deck rehabilitation	Existing deficiencies remain including narrow shoulder width. Vertical clearances of 16.0' will be retained. Bridge railing replaced and updated with the new deck rehabilitation. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impacts	Retiming of the existing signals will result in Level of Service B/C in the am peak hour, and level of service B in the pm peak hour now and into 2040.	Bridge railing is replaced to meet current MASH crash test criteria however guardrail is not replaced. Disabled vehicles have no space to pull off the traveled way and emergency vehicles have no shoulder for use in response to incidents through the interchange. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Rehab bridge CMF 0.95 from CPS.	Assuming deck rehabilitation is done in halves, lane closures necessary, 1-way operations with temporary signal on Riggs. Some short term lane closures and detours will be necessary, including on I-10, for old deck removal, setting forms, and for deck pours.	No impact	Bridge deck is replaced reducing near-term maintenance. Condition of approach guardrails remain, though end treatments would be updated to current standards if needed.
RR3	Bridge deck rehabilitation with shoulder widening	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Median is extended across the bridge between ramp terminal intersections. Vertical clearance will drop a few inches less than the existing 16.0' with widening. Symmetrical widening proposed to minimize the length of impacts along Riggs Road. Bridge width increased to about 59-feet. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	An existing 30" CMP under I-10 has the potential of being impacted by new fill slopes. Would likely need to be reconstructed to a new alignment. Four existing concrete drainage chutes down the Riggs Road embankment would need to be reconstructed.	Retiming of the existing signals will result in Level of Service B/C in the am peak hour, and level of service B in the pm peak hour now and into 2040. Bikes gain use of standard shoulder width through the interchange.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width through the interchange. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Rehab bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS.	Assuming deck rehabilitation is done in halves, lane closures necessary, 1-way operations with temporary signal on Riggs. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for old deck removal, setting forms, setting girders, and for deck pours.	Conflict with the underground ADOT signal electrical line crossing I-10 at Riggs Rd. Minor outage could be expected.	Bridge deck, bridge railing, and guardrail are replaced or rehabilitated reducing near-term maintenance.

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ALTERNATIVES and OPTIONS			ENGINEERING IMPACTS					
			Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations
RR4	Bridge deck rehabilitation with shoulder widening and sidewalks	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Median is extended across the bridge between ramp terminal intersections. Sidewalk included on both sides between ramp intersections. Vertical clearance will drop a few inches less than the existing 16.0' with widening. Symmetrical widening proposed to minimize the length of impacts along Riggs Road. Bridge width increased to about 73-feet. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	An existing 30" CMP under I-10 has the potential of being impacted by new fill slopes. Would likely need to be reconstructed to a new alignment. Four existing concrete drainage chutes down the Riggs Road embankment would need to be reconstructed.	Retiming of the existing signals will result in Level of Service B/C in the am peak hour, and level of service B in the pm peak hour now and into 2040. Bikes gain use of standard shoulder width through the interchange. Pedestrians have access to sidewalks between the ramp intersections.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width through the interchange. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Rehab bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS.	Assuming deck rehabilitation is done in halves, lane closures necessary, 1-way operations with temporary signal on Riggs. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for old deck removal, setting forms, setting girders, and for deck pours.	Conflict with the underground ADOT signal electrical line crossing I-10 at Riggs Rd. Minor outage could be expected.	Bridge deck, bridge railing, and guardrail are replaced or rehabilitated reducing near-term maintenance.
RR5	Bridge replacement off of the existing alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Median is extended across the bridge between ramp terminal intersections. Sidewalk included on both sides between ramp intersections. Vertical clearances will be increased to at least 16.5'. New bridge to be realigned offset the original bridge footprint to the north. Bridge width increased to about 73-feet. Option required for use with I-10 mainline alternative ML3, but also compatible with ML2.	Four existing concrete drainage chutes down the Riggs Road embankment would need to be reconstructed.	Retiming of the existing signals will result in Level of Service B/C in the am peak hour, and level of service B in the pm peak hour now and into 2040. Bikes gain use of standard shoulder width through the interchange. Pedestrians have access to sidewalks between the ramp intersections.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width through the interchange. New two-span structure would place new abutments/piers beyond the I-10 clear zone. Replace bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Majority of Riggs Road built off-line, with short term restrictions for final tie-ins along Riggs Road. No I-10 shoulder closures required to build new bridge abutments and piers.	Conflict with the underground ADOT signal electrical line crossing I-10 at Riggs Rd. Minor outage could be expected.	New underpass structure, bridge railing, guardrail, and approach pavement reduce near-term maintenance.

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ALTERNATIVES and OPTIONS			ENGINEERING IMPACTS					
			Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations
Goodyear Road Grade Separation Options								
GY1	No Build	Existing deficiencies remain including narrow shoulder width and vertical clearances is 16.1 feet. Crest curve actual design speed is 55 mph which is adequate (no known posted speed limit exists). Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impact	No impact. This is currently a very low volume roadway so no operational issues exist now and none are expected by 2040.	Bridge railing is dated and does not meet current crash test criteria. Guardrail offset and shoulder does not meet current standards. Disabled vehicles have no space to pull off the traveled way and emergency vehicles have no shoulder for use in response to incidents across the bridge. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone and are therefore barrier protected.	No impact	No impact	Poor condition of approach pavement remains, and will continue to deteriorate. As bridge ages, maintenance will also increase.
GY2	Shoulder widening on approaches and bridge	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance will drop a few inches less than the existing 16.1' with widening. Symmetrical widening to maintain crown on center of bridge deck. Bridge width increased to about 47-feet. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	Pavement drainage runoff design perpetuated.	This is currently a very low volume roadway so no operational issues exist or are expected in 2040. Bikes gain use of standard shoulder width.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Shoulder widening CMF 0.64 from CPS	Lane or full roadway closures on Goodyear Road required for bridge widening. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for setting forms, setting girders, and for deck pours.	No impact	Bridge railing, guardrail, and approach pavement are replaced and/or rehabilitated reducing near-term maintenance.
GY3	Bridge replacement off of the existing alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance will be increased to at least 16.5' and profile design speed increased to 55 mph minimum. Roadway realigned off original bridge footprint to the north to facilitate construction while maintaining traffic. Bridge width increased to about 47-feet. Option required for use with I-10 mainline alternative ML3, but also compatible with ML2.	Pavement drainage runoff design perpetuated.	This is currently a very low volume roadway so no operational issues exist or are expected in 2040. Bikes gain use of standard shoulder width.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width. New two-span structure would place new abutments/piers beyond the I-10 clear zone. Replace bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Majority of Goodyear Road built off-line, with short term restrictions for final tie-ins along Goodyear Road. No I-10 shoulder closures required to build new bridge abutments and piers.	No impact	New underpass structure, bridge railing, guardrail, and approach pavement reduce near-term maintenance.

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Nelson Road Grade Separation Options								
NR1	No Build	Existing deficiencies remain including narrow shoulder width and vertical clearances is 16.1 feet. Crest curve actual design speed is 51 mph which is inadequate for existing 55 mph posted speed limit. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impact	No impact. No known traffic operations concerns today or are projected by 2040.	Bridge railing does not meet current crash test criteria and guardrail offset does not meet current standards. Disabled vehicles have no space to pull off the traveled way. Emergency vehicles have no shoulder for use in response to incidents. 51 mph design speed and 55 mph posted speed along the crest vertical curve over the freeway remains. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone.	No impact	No impact	Poor condition of approach pavement remains, and will continue to deteriorate. As bridge ages, maintenance will also increase.
NR2	Shoulder widening on approaches and bridge	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance will drop a few inches less than the existing 16.1' with widening and the 51 mph design speed remains. Symmetrical widening to maintain crown on center of bridge deck. Bridge width increased to about 47-feet. Local roadway connections to Nelson Road in northeast and southwest quadrants will be to be reconfigured. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	Slope drains in all four corners from Nelson Road will need to be reconstructed.	No known traffic operations concerns today or are projected by 2040. Bikes gain use of standard shoulder width.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width. 51 mph stopping sight distance remains along the crest vertical curve over the freeway, along with the 55 mph posted speed limit. Could consider dropping posted speed limit to 50 mph. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Shoulder widening CMF 0.64 from CPS	Deck widening will be done in halves with lane closures necessary, 1-way operations with temporary signal on Nelson required. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for setting forms, setting girders, and for deck pours.	Potential impact to existing overhead powerline located along the south side of Nelson Road. Minor short term outage could be expected.	Bridge railing, guardrail, and approach pavement are replaced or reconstructed reducing near-term maintenance.
NR3	Full crossroad and bridge replacement	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance increased to at least the minimum 16.5' and profile design speed increased to 55 mph minimum. Roadway realigned slightly south to facilitate reconstruction while maintaining traffic with half and half construction. Bridge width increased to about 47-feet. Local roadway connections to Nelson Road in northeast and southwest quadrants will be to be reconfigured. Option required for use with I-10 mainline alternative ML3, but also compatible with ML2.	Impact on a 36"x22" CMP under I-10 from fill slopes. Culvert would require replacement. Slope drains in all four corners from Nelson Road will need to be reconstructed.	No known traffic operations concerns today or are projected by 2040. Bikes gain use of standard shoulder width.	Bridge railing and guardrail are replaced to meet current MASH crash test criteria. Disabled and emergency vehicles have use of standard shoulder width. Design speed of crest vertical curve increased to 55 mph over the freeway to match posted speed. New two-span structure removes piers and abutments from the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Shoulder widening CMF 0.64 from CPS	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Nelson Road built with half and half construction, with 1-way operations with temporary signal on Nelson required. No I-10 shoulder closures required to build new bridge abutments and piers.	Impacts existing overhead powerline located along the south side of Nelson Road. Minor short term outage could be expected.	New underpass structure, bridge railing, guardrail, and approach pavement reduce near-term maintenance.

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SR 587 / Casa Blanca Road Interchange Options

CB1	No Build	Existing deficiencies remain at the underpass including narrow shoulder width and vertical clearances is 16.1 feet. Crest curve actual design speed is 58 mph which is adequate for existing 55 mph posted speed limit. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impact	Continued use stop sign control of existing ramp intersections. Level of Service today is F on the east intersection and B for the west intersection. By 2040, the east intersection will continue to get worse with an even longer Level of Service F rating, while the west intersection will drop to an E by or before 2040. During incidents on I-10 north of the SR-587 interchange, traffic diversion to/from I-10 to the south from/to SR-587 to the north is significant and degrades the typical operational performance of the current interchange even more. No bike / pedestrian accommodation across the underpass structure.	Full-width shoulders are not available for disabled or emergency vehicles across the existing bridge. The additional congestion expected at the stop sign controlled intersections would likely result in an increase in congestion related crashes. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone.	No impact	No impact	Pavement rehabilitation along the interchange ramps, SR 587, and Casa Blanca Road would likely be require before 2040. As bridge ages, maintenance will also increase.
CB2	Add ramp terminal signals and turn lanes only	Existing deficiencies remain over the bridge including narrow shoulder widths. Vertical clearance will drop a few inches less than the existing 16.1' with widening. Ramp intersections are widened to provide right and left turn lanes where warranted, and to accommodate signal control. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	A 36x22" CMP will potentially be impacted by the fill slope of the crossroad and will need to be realigned. Slope drains along SR-587 will require reconstruction.	Interchange Level of Service upgraded to C or better in 2040. Under traffic diversion events, CB2 operations will hit Level of Service F, which is to be expected as this interchange configuration does not efficiently handle the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event. Bike/pedestrians not accommodated across the bridge.	Full-width shoulders are not available for disabled or emergency vehicles across the existing bridge. New signals with turn lanes and wider shoulders around the intersections will reduce congestion and will improve safety. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Construct signal CMF 0.95 from CPS; Construct turn lanes CMF 0.81 from CPS.	Shoulder closures around the intersections for widening to accommodate turn lanes. Short term lane restrictions for signal installations.	Potential impact to overhead power along SR-587 and crossing I-10, risk is low to moderate. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be minor or nonexistent.	Roadway pavement along the interchange ramps, SR 587, and Casa Blanca Road would be rehabilitated and widened thereby reducing near-term maintenance. New traffic signals would increase maintenance inventory, and given remote location, would be at least 1 hour away from service should something occur.
CB3	Add ramp terminal signals, turn lanes, bridge deck rehabilitation, and widening for bike and ped accomodations	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance will drop a few inches less than the existing 16.1' with widening. Median is extended across the bridge between ramp terminal intersections. Ramp intersections are widened to provide right and left turn lanes where warranted, and to accommodate signal control. Sidewalk included on both sides between ramp terminal intersections. Bridge width increased to about 73-feet. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	A 36x22" CMP will be impacted by the fill slope of the crossroad and will need to be realigned. Slope drains along SR-587 will require reconstruction.	Interchange Level of Service upgraded to C or better in 2040. Under traffic diversion events, CB3 operations will hit Level of Service F, which is to be expected as this interchange configuration does not efficiently handle the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event. Bike/pedestrians are accommodated across the bridge.	Bridge railing and guardrail replaced to meet current MASH crash test criteria. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Construct signal CMF 0.95 from CPS; Construct turn lanes CMF 0.81 from CPS; Rehab bridge CMF 0.95 from CPS.	Lane closures on SR-587 required for bridge widening, may require short term 1-way operation. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for setting forms, setting girders, and for deck pours. Shoulder closures around the intersections for widening to accommodate turn lanes. Short term lane restrictions for signal installations.	Potential impact to overhead power along SR-587 and crossing I-10, risk is low to moderate. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be minor or nonexistent.	Bridge deck and the roadway pavement along the interchange ramps, SR 587, and Casa Blanca Road would be rehabilitated and widened thereby reducing near-term maintenance. New traffic signals would increase maintenance inventory, and given remote location, would be at least 1 hour away from service should something occur.

I-10: SR 202L to SR 387

Alternatives and Options Evaluation Matrix - Engineering

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ALTERNATIVES and OPTIONS			ENGINEERING IMPACTS					
			Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations
CB4	CB3 but with bridge replacement off of the existing alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Median is extended across the bridge between ramp terminal intersections. Ramp intersections are widened to provide right and left turn lanes where warranted, and to accommodate signal control. Sidewalk included on both sides between ramp terminal intersections. New bridge off alignment to the south of existing and accomodates a minimum of 16.5' vertical clearance. Option required for use with I-10 mainline alternative ML3, but also compatible with ML2.	A 36x22" CMP will be impacted by the fill slope of the crossroad and will need to be realigned. Slope drains along SR-587 will require reconstruction.	Interchange Level of Service upgraded to C or better in 2040. Under traffic diversion events, CB4 operations will hit Level of Service F, which is to be expected as this interchange configuration does not efficiently handle the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event. Bike/pedestrians are accommodated across the bridge.	Bridge railing and guardrail replaced to meet current MASH crash test criteria. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. New two-span structure removes piers and abutments from the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Construct signal CMF 0.95 from CPS; Construct turn lanes CMF 0.81 from CPS.	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Casa Blanca Road / SR-587 mostly built offline, with tempoary lane restrictions for tie-ins. No I-10 shoulder closures required to build new bridge abutments and piers. Shoulder closures around the intersections for widening to accommodate turn lanes. Short term lane restrictions for signal installations.	Potential impact to overhead power along SR-587 and crossing I-10, risk is low to moderate. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be minor or nonexistent.	Complete new bridge and roadway pavement requiring less near-term maintenance. Roadway pavement along the interchange ramps, SR 587, and Casa Blanca Road would be rehabilitated and widened thereby reducing near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure. New traffic signals would increase maintenance inventory, and given remote location, would be at least 1 hour away from service should something occur.
CB5	Diamond Interchange with 5-legged roundabouts at intersections	Standard 12' lanes and 8' shoulders. Two 5-legged modern roundabouts are at both ramp terminals. New bridge next to the existng bridge, which will be built to accommodate 2 standard lanes and sidewalk across the bridge. New bridge to the north accomodates minimum 16.5' vertical clearance, whereas existing bridge vertical clearance will decrease a few inches below 16.1' due to widening, unless this bridge is replaced completely. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, exceptions are sought for shoulders, or the existing bridge is also replaced.	On-site drainage will need to be completely reconstructed and regraded for the new interchange configuration. Multiple culverts under I-10 will need to be modified (replaced or extended) to accommodate the new configuration.	Interchange Level of Service upgraded to A or better in 2040. Under traffic diversion events, CB5 operations will hit Level of Service F, as the roundabouts will become overwhelmed with the the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event. Bike/pedestrians are accommodated across the bridges between the roundabouts.	Bridge railing and guardrail replaced to meet current MASH crash test criteria on existing bridge. Full-width shoulders are available for disabled or emergency vehicles across both bridges. Bike/pedestrians are accommodated across both bridges. The new two-span structure avoids piers and abutments from being in the I-10 clear zone, however, the existing four-span structure will remain and will maintain piers adjacent to outside edge of mainline shoulder and within the clear zone. Construct multilane roundabout CMF 0.4 from CPS; Construct turn lanes CMF 0.81 from CPS; Rehab bridge CMF 0.95 from CPS.	Constructs a new bridge off alignment and then detour traffic across it while widening existing bridge. Some short term I-10 closures will be necessary for new bridge and old bridge rehabilitation for setting forms, setting girders, and for deck pours for new bridge. Casa Blanca Road / SR-587 mostly built offline, with tempoary lane restrictions for tie-ins. Outside I-10 shoulder closures required to widen existing piers, but no I-10 shoulder closures required to build new bridge abutments and piers. Shoulder closures around the intersections for widening and construction of the new roundabouts.	Potential impact to overhead power along SR-587 and crossing I-10, risk is high. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge, a rehabilitated existing bridge, and new roadway pavement throughout the interchanges will require less near-term maintenance. Since roundabouts do not require signals, maintenance requirements are substantially less given the remote location.

I-10: SR 202L to SR 387

Alternatives and Options Evaluation Matrix - Engineering

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
CB6	Diamond Interchange with Casa Blanca Road bypass	Standard 12' lanes and 8' shoulders throughout. New bridge next to the existing bridge, which will be widened to accommodate 2 standard lanes and sidewalk across the bridge. New bridge to the north will accommodate a minimum 16.5' vertical clearance, whereas the existing bridge vertical clearance will decrease a few inches below 16.1' due to the widening, unless this bridge is also replaced completely. New bridge to the south where Casa Blanca Road crosses I-10. The new Casa Blanca Road bridge will also accommodate a minimum 16.5' vertical clearance. Three new intersections are created, and a modern roundabout is proposed at each (though signals could be used in their place as a variant). Compatible with ML2, but incompatible with ML3 due to the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, exceptions are sought for shoulders, or the existing bridge is also replaced.	On-site drainage will need to be completely reconstructed and regraded for the new interchange configuration. Multiple culverts under I-10 will need to be modified (replaced or extended) to accommodate the new configuration.	Interchange Level of Service upgraded to A or better in 2040. Under traffic diversion events, CB6 operations will only drop to Level of Service B. This is because the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event are largely separated from the Casa Blanca Road traffic. Bike/pedestrians are accommodated across the bridges between the roundabouts.	Bridge railing and guardrail replaced to meet current MASH crash test criteria on existing bridge. Full-width shoulders are available for disabled or emergency vehicles across all three bridges. Bike/pedestrians are accommodated across all bridges. The new two-span structure avoids piers and abutments from being in the I-10 clear zone, however, the existing four-span structure will remain and will maintain piers adjacent to outside edge of mainline shoulder and within the clear zone. Construct multilane roundabout CMF 0.4 from CPS; Construct turn lanes CMF 0.81 from CPS; Rehab bridge CMF 0.95 from CPS.	Constructs new bridge off alignment and then detour traffic across them as applicable while widening existing bridge. Some short term I-10 closures will be necessary for new bridge and old bridge rehabilitation for setting forms, setting girders, and for deck pours. Casa Blanca Road / SR-587 mostly built offline, with temporary lane restrictions for tie-ins. Outside I-10 shoulder closures required to widen existing piers, but no I-10 shoulder closures required to build new bridge abutments and piers. Minor closures around the intersections for widening and construction of the new roundabouts.	Potential impact to overhead power along SR-587 and crossing I-10, risk is high. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge, a rehabilitated existing bridge, and new roadway pavement throughout the interchanges will require less near-term maintenance. Since roundabouts do not require signals, maintenance requirements are substantially less given the remote location.
CB7	Split Diamond Interchange with triangular circulating roadway	Split diamond configuration with one-way free-flow yield controlled circulating roadway connecting all legs. Standard 12' lanes and 8' shoulders. New bridge north of the existing bridge, which will be built to accommodate 2 standard lanes and sidewalk across the bridge. New bridge to the north will accommodate a minimum of 16.5' vertical clearance, whereas existing bridge vertical clearance will decrease a few inches below 16.1' for the widening, unless this bridge is replaced. Compatible with ML2, but incompatible with ML3 due to the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, exceptions are sought for shoulders, or the existing bridge is also replaced.	On-site drainage will need to be completely reconstructed and regraded for the new interchange configuration. Multiple culverts under I-10 will need to be modified (replaced or extended) to accommodate the new configuration.	Split diamond with circulating roadway will dramatically increase flow of traffic through the interchange. Interchange Level of Service upgraded to A or better in 2040. Under traffic diversion events, CB7 operations will only drop to Level of Service B. This is because the West-to-North (WN) and South-to-East (SE) movements associated with the traffic diversion event are easily handled with the freeflowing design. Sidewalks provided for pedestrians between two legs of Casa Blanca Road.	Bridge railing and guardrail replaced to meet current MASH crash test criteria on existing bridge. Full-width shoulders are available for disabled or emergency vehicles across both bridges. Bike/pedestrians are accommodated across both bridges. The new two-span structure avoids piers and abutments from being in the I-10 clear zone, however, the existing four-span structure will remain and will maintain piers adjacent to outside edge of mainline shoulder and within the clear zone. Construct multilane roundabout CMF 0.4 from CPS; Construct turn lanes CMF 0.81 from CPS; Rehab bridge CMF 0.95 from CPS.	Constructs new bridge off alignment and then detour traffic across it while widening existing bridge. Some short term I-10 closures will be necessary for new bridge and old bridge rehabilitation for setting forms, setting girders, and for deck pours. Majority of interchange built offline, with temporary lane restrictions for tie-ins. Outside I-10 shoulder closures required to widen existing piers, but no I-10 shoulder closures required to build new bridge abutments and piers. Minor closures around the crossroad tie-in points to the circulating roadway.	Potential impact to overhead power along SR-587 and crossing I-10, risk is medium to low. Relocation required for some ADOT lighting electrical conduits. Potential impact to the dual EPNG gasline to the north of I-10, though risk is low. Potential impact to the telephone line crossing I-10, though the risk is low. Service impacts to all of these are expected to be minor or nonexistent.	Complete new bridge, a rehabilitated existing bridge, and new roadway pavement throughout the interchanges will require less near-term maintenance. Since circulating roadway design does not require signals, maintenance requirements are substantially less given the remote location.

I-10: SR 202L to SR 387

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ALTERNATIVES and OPTIONS			ENGINEERING IMPACTS					
			Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations
Gasline Road Grade Separation Options								
GL1	No Build	Existing deficiencies remain including narrow shoulder width, vertical clearance is 16.1 feet, and horizontal clearances along I-10 needing barrier protection. Crest curve actual design speed is 51 mph which is adequate as no known posted speed limit exists. Incompatible with both ML2 and ML3 due the bridge skew and its five-span configuration, unless mainline width design exceptions are sought for shoulders.	No impact	No impact. Traffic volumes are relatively small at this crossing so operational performance is not an issue. Wide farm equipment occasionally crosses and takes up the entire roadway width on the bridge.	Bridge railing does not meet current crash test criteria and guardrail offsets do not meet current standards. Disabled vehicles have no space to pull off the traveled way and emergency vehicles have no shoulder for use in response to incidents across I-10. Five-span structure maintains piers adjacent to inside and outside edge of mainline shoulder and within the clear zone.	No impact	No impact	Poor condition of approach pavement remains, and will continue to deteriorate. As bridge ages, maintenance will also increase.
GL2	Bridge replacement on current alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Roadway to stay on original alignment. Bridge design to either a two or four span configuration to eliminate lateral clearance issues with I-10. Vertical clearance increased to at a minimum of 16.5' and profile design speed increased to 55 mph. Bridge width increased to about 47-feet. Profile of Gasline Road raises by several feet to accommodate the design criteria listed. Compatible with both ML2 and ML3.	Gasline Road pavement drainage will need to be reconstructed. A 36x22" CMP under I-10 may be impacted and will need to be realigned or relocated.	No change in traffic operations as congestion is not an issue. However, shoulders provide 2-way operation of the roadway even with wide farm equipment crossings. Bikes and pedestrians can use the new shoulders.	New bridge updates all design standards including new bridge barrier. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. New two or four-span structure will relocate piers outside the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Shoulder widening CMF 0.64 from CPS.	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Full closure of Gasline Road required during bridge replacement (6-9 months). Shoulder closures (Inside and Outside) on Interstate to remove old build piers, and to construct new ones.	Potential impact to the two EPNG gaslines - risk medium Potential impact to overhead powerline - risk high Potential Impact to Gila River Farm Irrigation Lateral 7-4 - risk high Potential impact to the underground telephone line crossing I-10 east of Gasline Road - risk medium Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure.
GL3	Bridge replacement on parallel alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Roadway shifted east of original alignment. Bridge design to either a two or four span configuration to eliminate lateral clearance issues with I-10. Vertical clearance increased to at a minimum of 16.5' and profile design speed increased to 55 mph. Bridge width increased to about 47-feet. Profile of Gasline Road raises by several feet to accommodate the design criteria listed. Compatible with both ML2 and ML3.	Gasline Road pavement drainage will need to be reconstructed. A 36x22" CMP under I-10 will be impacted and will need to be relocated.	No change in traffic operations as congestion is not an issue. However, shoulders provide 2-way operation of the roadway even with wide farm equipment crossings. Bikes and pedestrians can use the new shoulders.	New bridge updates all design standards including new bridge barrier. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. New two or four-span structure will relocate piers outside the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Shoulder widening CMF 0.64 from CPS.	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Avoids full closure of Gasline Road required during bridge replacement. Shoulder closures (Inside and Outside) on Interstate to remove old build piers, and to construct new ones.	Avoids impact to the two EPNG gaslines Avoids impact to overhead powerline Avoids impact to Gila River Farm Irrigation Lateral 7-4 Impact to the underground telephone line crossing I-10 east of Gasline Road - risk severity is medium Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure.

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
Seed Farm Road Grade Separation / Interchange Options								
SF1	No Build	Existing non-standard 10' lanes, 3' shoulders, and existing 16.1' vertical clearance will remain. Crest curve actual design speed is 53 mph which is adequate as no known posted speed limit exists. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impact	No impact. Traffic volumes are relatively small at this crossing so operational performance is not an issue. Wide farm equipment occasionally crosses and takes up the entire roadway width on the bridge.	Bridge railing does not meet current crash test criteria and guardrail offset does not meet current standards. Disabled vehicles have no space to pull off the traveled way. Emergency vehicles have no shoulder for use in response to incidents across I-10. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone.	No impact	No impact	Poor condition of approach pavement remains, and will continue to deteriorate. As bridge ages, maintenance will also increase.
SF2	Bridge deck rehabilitation with shoulder widening - no interchange	Existing design speed of 53 mph will be retained. Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided with symmetrical 7' widening on roadway and 9' on bridge. Existing 16.1' vertical clearance will decrease a few inches due to the widening. Bridge width increased to about 47-feet. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	Seed Farm Road pavement drainage will need to be reconstructed. No impact to existing I-10 culverts.	No change in traffic operations as congestion is not an issue. However, shoulders provide 2-way operation of the roadway even with wide farm equipment crossings. Bikes and pedestrians can use the new shoulders.	Bridge railing and guardrail are replaced to meet current MASH criteria. Disabled and emergency vehicles will have use of standard shoulders. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Rehab bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS	Deck widening will be done in halves with lane closures necessary, 1-way operations with temporary signal on Seed Farm Road required. The option would close Seed Farm Road for several months while widening is completed. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for setting forms, setting girders, and for deck pours.	Potential impact to the overhead powerline crossing I-10 north of Seed Farm Road - risk is low Potential impact to the gasline crossing I-10 south of Seed Farm Road - risk is medium Potential impact to the irrigation laterals crossing Seed Farm Road and the irrigation ditches along Seed Farm Road - risk of impact is high but impacts are relatively low. Service impacts to all of these are expected to be moderate to nonexistent.	New bridge deck and railing and roadway pavement and guardrail will all require less near-term maintenance.
SF3	New tight diamond interchange with bridge replacement	Design speed will be increased to 55 mph. Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance over I-10 is increased to at a minimum of 16.5'. Pedestrian sidewalks provided on both sides of the road through the interchange. Complete bridge replacement to a two-span structure and roadway realignment and reconstruction which reduces skew with I-10. Ramp terminal intersection spacing of about 450-feet with side-by-side left turn lanes requiring an 89-foot bridge width. Tight diamond interchange configuration less commonly associated with rural connections like Seed Farm Road. Terrace Road intersection with Seed Farm east of I-10 will need to be realigned with a new access point further east. Compatible with both ML2 and ML3.	Seed Farm Road pavement drainage will need to be reconstructed. Four 36"x22" metal pipe culverts under I-10 need extension or realignment.	New interchange improves access and travel times to and from Sacaton which will remove traffic demand from SR-587/Casa Blanca and SR-387/SR-187/Pinal Ave interchanges. New access provides more direct route to I-10 and decreases travel times, improved mobility for vehicles, cyclists, and pedestrians alike. Level of Service A is projected for 2040.	New bridge with new barrier and guardrail. Disabled and emergency vehicles will have use of standard shoulders. Two-span structure removes piers from the clear zone adjacent to outside edge of mainline shoulder. Replace bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS. New TI improves incident response time for emergency services.	Majority of improvements can be built off-line with little impacts to Seed Farm Road. Short term closure of Seed Farm Road for final tie-ins on both sides. Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Shoulder closures (Outside) on Interstate to remove old build piers, and to construct new ones.	Potential impact to the overhead powerline crossing I-10 north of Seed Farm Road - risk is high Potential impact to the gasline crossing I-10 south of Seed Farm Road - risk is high Potential impact to the irrigation laterals crossing Seed Farm Road and the irrigation ditches along Seed Farm Road - risk of impact is high, and impact many facilities. Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure. However, a new interchange means much more pavement to maintain over its life.

I-10: SR 202L to SR 387

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
SF4	New spread diamond interchange with bridge replacement	Design speed will be increased to 55 mph. Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance over I-10 is increased to a minimum of 16.5'. Pedestrian sidewalks provided on both sides of the road through the interchange. Complete bridge replacement to a two-span structure and roadway realignment and reconstruction to the south. Ramp terminal intersection spacing of about 1,150-feet with back-to-back left turn lanes requiring an 81-foot bridge width. Spread diamond interchange configuration most commonly associated with rural connections like Seed Farm Road. Terrace Road intersection with Seed Farm east of I-10 will need to be realigned with a new access point further east. Compatible with both ML2 and ML3.	Seed Farm Road pavement drainage will need to be reconstructed. Four 36"x22" metal pipe culverts under I-10 need extension or realignment.	New interchange improves access and travel times to and from Sacaton which will remove traffic demand from SR-587/Casa Blanca and SR-387/SR-187/Pinal Ave interchanges. New access provides more direct route to I-10 and decreases travel times, improved mobility for vehicles, cyclists, and pedestrians alike. Level of Service A is projected for 2040.	New bridge with new barrier and guardrail. Disabled and emergency vehicles will have use of standard shoulders. Two-span structure removes piers from the clear zone adjacent to outside edge of mainline shoulder. Replace bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS. New TI improves incident response time for emergency services.	Majority of improvements can be built off-line with little impacts to Seed Farm Road. Short term closure of Seed Farm Road for final tie-ins on both sides. Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Shoulder closures (Outside) on Interstate to remove old build piers, and to construct new ones.	Potential impact to the overhead powerline crossing I-10 north of Seed Farm Road - risk is high Potential impact to the gasoline crossing I-10 south of Seed Farm Road - risk is high Potential impact to the irrigation laterals crossing Seed Farm Road and the irrigation ditches along Seed Farm Road - risk of impact is high, and impact many facilities. Service impacts to all of these are expected to be moderate to nonexistent.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood overhead vehicles hit the superstructure. However, a new interchange means much more pavement to maintain over its life.
SF5	New spread diamond interchange with widened existing bridge	Existing design speed of 53 mph will be retained. Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Existing 16.1' vertical clearance will decrease a few inches due to the widening. Pedestrian sidewalk provided on the north side of the bridge and on both sides of the road through the interchange. Bridge modification remains a four-span structure. Roadway reconstruction limits the profile grade to 3% max. Ramp terminal intersection spacing of about 1,150-feet with back-to-back left turn lanes requiring a 70-foot bridge width. Spread diamond interchange configuration most commonly associated with rural connections like Seed Farm Road. Terrace Road intersection with Seed Farm east of I-10 will need to be realigned with a new access point further east.	Seed Farm Road pavement drainage will need to be reconstructed. Four 36"x22" metal pipe culverts under I-10 need extension or realignment.	New interchange improves access and travel times to and from Sacaton which will remove traffic demand from SR-587/Casa Blanca and SR-387/SR-187/Pinal Ave interchanges. New access provides more direct route to I-10 and decreases travel times, improved mobility for vehicles, cyclists, and pedestrians alike. Level of Service A is projected for 2040.	Bridge railing and guardrail are replaced to meet current MASH criteria. Disabled and emergency vehicles will have use of standard shoulders. Four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Rehab bridge CMF 0.95 from CPS; Shoulder widening CMF 0.64 from CPS. New TI improves incident response time for emergency services.	Deck widening will be done in halves with lane closures necessary, 1-way operations with temporary signal on Seed Farm Road required. The option would close Seed Farm Road for several months while widening is completed. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for setting forms, setting girders, and for deck pours.	Potential impact to the overhead powerline crossing I-10 north of Seed Farm Road - risk is high Potential impact to the gasoline crossing I-10 south of Seed Farm Road - risk is medium Potential impact to the irrigation laterals crossing Seed Farm Road and the irrigation ditches along Seed Farm Road - risk of impact is high, and impact many facilities. Service impacts to all of these are expected to be moderate to nonexistent.	New bridge deck and railing and roadway pavement and guardrail will all require less near-term maintenance. However, a new interchange means much more pavement to maintain over its life.

I-10: SR 202L to SR 387

Alternatives and Options Evaluation Matrix - Engineering

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
Dirk Lay Road Grade Separation Options								
DL1	No Build	Existing deficiencies remain including narrow shoulder width. Vertical clearance is 16'-3.5". Horizontal clearances along I-10 needing barrier protection. Crest curve actual design speed is 54 mph which is adequate as no known posted speed limit exists. Incompatible with both ML2 and ML3 due the bridge skew and its five-span configuration, unless mainline width design exceptions are sought for shoulders.	No impact	No impact. Traffic volumes are relatively small at this crossing so operational performance is not an issue.	Bridge railing does not meet current crash test criteria and guardrail offsets do not meet current standards. Disabled vehicles have no space to pull off the traveled way and emergency vehicles have no shoulder for use in response to incidents across I-10. Five-span structure maintains piers adjacent to inside and outside edge of mainline shoulder and within the clear zone.	No impact	No impact	Poor condition of approach pavement remains, and will continue to deteriorate. As bridge ages, maintenance will also increase.
DL2	Bridge replacement on current alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) and sidewalks are provided. Vertical clearance increased to at least the minimum 16.5' and profile design speed increased to 55 mph. Roadway to stay on original alignment. Bridge width increased to about 61 feet. Profile of Dirk Lay Road raises by several feet to accommodate the design criteria listed. Compatible with both ML2 and ML3.	Dirk Lay Road pavement drainage will need to be reconstructed. A double 48" CMP under I-10 will be impacted and will need to be relocated.	No change in traffic operations as congestion is not an issue. Bikes and pedestrians can safely cross I-10.	New bridge updates all design standards including new bridge barrier. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. New two or four-span structure will relocate piers outside the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Shoulder widening CMF 0.64 from CPS.	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Full closure of Dirk Lay Road required during bridge replacement (6-9 months). Shoulder closures (Inside and Outside) on Interstate to remove old build piers, and to construct new ones.	No impacts.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure.
DL3	Bridge replacement on parallel alignment	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) and sidewalks are provided. Vertical clearance increased to at least the minimum 16.5' and profile design speed increased to 55 mph. Roadway realigned parallel and to the west of the original bridge footprint to facilitate construction while maintaining traffic on Dirk Lay Road. Bridge width increased to about 61 feet. Compatible with both ML2 and ML3.	Dirk Lay Road pavement drainage will need to be reconstructed.	No change in traffic operations as congestion is not an issue. Bikes and pedestrians can safely cross I-10.	New bridge updates all design standards including new bridge barrier. Full-width shoulders are available for disabled or emergency vehicles across the bridge. Bike/pedestrians are accommodated across the bridge. New two or four-span structure will relocate piers outside the I-10 clear zone. Replace bridge CMF 0.95 from CPS. Shoulder widening CMF 0.64 from CPS.	Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Avoids full closure of Dirk Lay Road required during bridge replacement. Shoulder closures (Inside and Outside) on Interstate to remove old build piers, and to construct new ones.	No impacts.	Complete new bridge and roadway pavement requiring less near-term maintenance. Increased vertical clearance reducing the likelihood over-height vehicles hit the superstructure.

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ALTERNATIVES and OPTIONS		ENGINEERING IMPACTS						
		Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations	Maintenance / Maintainability
SR 387 / SR 187 / Pinal Avenue Interchange Options								
PA1	No Build	No change from existing. Crest curve actual design speed is 54 mph which is slightly inadequate for the posted 55 mph speed limit. Vertical clearance is 16.6'. Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	No impact	Operational problems that exist today will only get worse over the next 20 years under no-build. Expected Level of Service F at both intersections in both the am and pm peak.	The existing left turn lanes from SR-187/Pinal Ave to each direction of I-10 are less than the recommended lengths for new construction. No existing accommodation exists for bikes or pedestrians, which can be problematic during annual bike events that occur in this area.	No impact	No impact	Bridge is nearing the end of its typical service life. Narrow approach roadways with guardrail remain.
PA2	Shoulder widening & sidewalk on approaches and bridge, add signals	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Left turn lane storage lengths are increased to meet standards for new construction. Roadway to stay on original alignment, but widen the existing structure. Structure widened to about 73 feet. Vertical clearance will reduce a few inches below 16.6' for the bridge widening. Add signals to intersections (roundabouts are an option to signals). Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	Pinal Ave/SR-187 pavement drainage will need to be reconstructed. No impact to existing I-10 culverts.	As growth occurs in the future and more people commute from Casa Grande to/from Phoenix, this interchange is likely to see higher movements in the north-to-west and east-to-south movements. The additional width on the bridge allows for increased storage for left turns from Pinal Ave to westbound I-10. Expected Level of Service is expected to improve to D or better in 2040. Improved mobility for cyclists and pedestrians.	The existing four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Bicycles are accommodated in the Pinal Ave shoulders; pedestrians are barrier-separated from roadway traffic. Shoulder widening CMF 0.64 from CPS. Construct turn lanes CMF 0.81 from CPS; Traffic signal installation CMF 0.95 from CPS (and could go as low as 0.4 if roundabouts used instead of signals).	Pinal Ave/SR-187 shoulder closures for bridge and roadway widening. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for old deck removal, setting forms, setting girders, and for deck pours.	ADOT electrical conduits may be impacted - risk is low. A minor outage could be expected.	Upgraded interchange pavement and bridge widening reducing near-term maintenance, however, two new signalized intersections will increase maintenance.
PA3	Upgrade ramp terminal capacity, shoulder widening & sidewalk on approaches and bridge, add signals	Roadway to stay on original alignment, but widen the existing structure. Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Left turn lane storage lengths are increased to meet standards for new construction. Structure widened to about 73 feet in width. Vertical clearance will reduce a few inches below 16.6' for the bridge widening. Westbound to northbound right turn pocket added. Add signals to intersections (roundabouts are an option to signals). Compatible with ML2, but incompatible with ML3 due the bridge piers immediately adjacent to the outside shoulder of I-10, unless the mainline design is altered with a horizontal shift toward the median, or exceptions are sought for shoulders.	Pinal Ave/SR-187 pavement drainage will need to be reconstructed. No impact to existing I-10 culverts.	As growth occurs in the future and more people commute from Casa Grande to/from Phoenix, this interchange is likely to see higher movements in the north-to-west and east-to-south movements. The additional width on the bridge allows for increased storage for left turns from Pinal Ave to westbound I-10. A right turn pocket is added to the WB exit ramp at the junction with the crossroad, which will better facilitate access to Sacaton from the south. Expected Level of Service is expected to improve to D or better in 2040. Improved mobility for cyclists and pedestrians.	The existing four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Bicycles are accommodated in the Pinal Ave shoulders; pedestrians are barrier-separated from roadway traffic. Shoulder widening CMF 0.64 from CPS. Construct turn lanes CMF 0.81 from CPS; Traffic signal installation CMF 0.95 from CPS (and could go as low as 0.4 if roundabouts used instead of signals).	Pinal Ave/SR-187 and ramp shoulder closures for bridge and roadway widening. Outside I-10 shoulder closures to widen piers. Some short term I-10 closures will be necessary for old deck removal, setting forms, setting girders, and for deck pours.	ADOT electrical conduits may be impacted - risk is low. A minor outage could be expected.	Upgraded interchange pavement and bridge widening reducing near-term maintenance, however, two new signalized intersections will increase maintenance.

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ALTERNATIVES and OPTIONS			ENGINEERING IMPACTS					
			Roadway Design Factors	Drainage Considerations	Traffic Operations in 2040	Safety	Constructability / Maintenance of Traffic	Utility Considerations
PA4	Bridge replacement off of the existing alignment, add signals	Standard 12' lanes and 8' shoulders (10' shoulders on bridge) are provided. Vertical clearance increased to at least the minimum 16.5' and profile design speed increased to 55 mph. Roadway realigned to east, parallel to original bridge footprint to facilitate construction while maintaining traffic. Bridge width increased to about 73 feet. Add signals to intersections (roundabouts are an option to signals). Option required for use with I-10 mainline alternative ML3, but also compatible with ML2.	Pinal Ave/SR-187 pavement drainage will need to be reconstructed. One 24" culvert under I-10 is impacted and will need to be replaced.	As growth occurs in the future and more people commute from Casa Grande to/from Phoenix, this interchange is likely to see higher movements in the north-to-west and east-to-south movements. The additional width on the bridge allows for increased storage for left turns from Pinal Ave to westbound I-10. A right turn pocket is added to the WB exit ramp at the junction with the crossroad, which will better facilitate access to Sacaton from the south. Expected Level of Service is expected to improve to D or better in 2040. Improved mobility for cyclists and pedestrians.	The existing four-span structure maintains piers adjacent to outside edge of mainline shoulder and within the clear zone. Bicycles are accommodated in the Pinal Ave shoulders; pedestrians are barrier-separated from roadway traffic. Shoulder widening CMF 0.64 from CPS. Construct turn lanes CMF 0.81 from CPS; Traffic signal installation CMF 0.95 from CPS (and could go as low as 0.4 if roundabouts used instead of signals); Replace bridge CMF 0.95 from CPS.	Majority of improvements can be built off-line with little impacts to SR-187/Pinal Ave. Short term closure of SR-187/Pinal Ave for final tie-ins on both sides. Some short term I-10 closures will be necessary for old bridge removal, and for setting forms, setting girders, and for deck pours for new bridge. Shoulder closures (Outside) on Interstate to remove old build piers, and to construct new ones.	ADOT electrical conduits may be impacted - risk is medium to low. A minor outage could be expected.	Upgraded interchange pavement and a new bridge reducing near-term maintenance, however, two new signalized intersections will increase maintenance.
ADOT FMS and GRTI Fiber Optic Facility Option								
FO	Fiber Optic Installation	Geometric design (alignment and profile) can be very flexible to avoid impacts, improve accessibility for maintenance, etc.	Fiber optic facility will cross numerous drainage conveyances along the corridor. Most crossings will not result in any drainage impact, but some may require minor alterations after the fiber optic has been installed.	With a fully functioning and connected ADOT FMS system, traffic operations via real time driver information can be improved with no fear of communications issues due to weather or other issues with cellular communications.	With a fully functioning and connected ADOT FMS system, traffic safety will benefit due to the ability to reliably deliver real time driver information with no fear of communications issues due to weather or other issues with cellular communications.	Fiber optic facility will be installed using a mixture of either direct bury, directional drill, or rock drilling technology, whichever is most applicable depending on site conditions.	With the flexibility in alignment and depth of the fiber optic installation, no utility impacts are expected as the fiber optic location can always be adjusted as needed to avoid them. Utility outages are not anticipated.	Access pull boxes will be installed as needed to facilitate maintenance access to the facility.