APPENIDIX I – OL-B-1, Baseline Tail Track to Sherman

Section Overview

Locations: Baseline Tail Track • Southern Avenue • Roeser Road • Broadway Road • Pioneer Street • Buckeye Road • Lincoln Interlocking • Sherman Yard Entrance
Line: Orange Line (B Line) – South Central Extension / Baseline Segment
Platforms:

- Baseline Rd / Central Ave – South Terminal (EB / WB)
- Southern Ave / Central Ave – EB / WB
- Roeser Rd / Central Ave – EB / WB
- Broadway Rd / Central Ave – EB / WB
- Pioneer St / Central Ave – EB / WB
- Buckeye Rd / Central Ave – EB / WB
- Lincoln St / Central Ave – EB / WB
- Lincoln St / 1st Ave – WB platform (split pair)

Track Type: Dual-track median alignment within Central Avenue corridor featuring a transition from suburban arterial to urban street running. The section includes multiple at-grade crossings with limited safe-zone clearance at narrow medians and terminates at Sherman Yard Entrance and 27th Street Interlocking.

Crossover: Baseline (Baseline Road – South Central Extension)

Switch ID	Track	Description / Function
1A	Track 1	Facing-point crossover switch from Track 1 to Track 2 (northbound direction).
1B	Track 2	Trailing-point crossover switch paired with 1A for southbound movements returning to Track 1.
3A	Track 1	Trailing-point crossover switch completing Track 1 to Track 2 alignment.
3B	Track 2	Facing-point crossover switch paired with 3A for Track 2 to Track 1 movements.
5	Track 1	Diverging switches provide access to auxiliary or test track siding.

Crossover: Hidalgo (Central Avenue & Hidalgo Street – South Central Extension)

Switch ID	Track	Description / Function
1A	Track 1	Facing-point crossover switch from Track 1 to Track 2 (northbound direction).
1B	Track 2	Trailing-point crossover switch paired with 1A for southbound movements returning to Track 1.
3A	Track 1	Trailing-point crossover switch completing Track 1 to Track 2 alignment.
3B	Track 2	Facing-point crossover switch paired with 3A for Track 2 to Track 1 movements.

Crossover: Raymond (Central Avenue & Raymond Street – South Central Extension)

Switch ID	Track	Description / Function
1A	Track 1	Facing-point crossover switch from Track 1 to Track 2 (northbound direction).
1B	Track 2	Trailing-point crossover switch paired with 1A for southbound movements returning to Track 1.
3A	Track 1	Trailing-point crossover switch completing Track 1 to Track 2 alignment.
3B	Track 2	Facing-point crossover switch paired with 3A for Track 2 to Track 1 movements.

Crossover: Cocopah (Central Avenue & Cocopah Street – South Central Extension)

Switch ID	Track	Description / Function
1A	Track 1	Facing-point crossover switch from Track 1 to Track 2 (northbound direction).
1B	Track 2	Trailing-point crossover switch paired with 1A for southbound movements returning to Track 1.
3A	Track 1	Trailing-point crossover completing Track 1 to Track 2 alignment.
3B	Track 2	Facing-point crossover switch paired with 3A for Track 2 to Track 1 movements.

Interlocking: Sherman Loop (Central Avenue & Sherman Street – South Central Extension)

Switch ID	Track	Description / Function
5B	Track 2	Loop entry switch (south end) allows movement from Track 2 into the Sherman Loop.
5A	Track 1	Loop exit switch (north end) allows trains to return from the loop to Track 1.
1A	Track 1	Facing-point crossover switch from Track 1 to Track 2 (northbound direction).
1B	Track 2	Trailing-point crossover switch paired with 1A for southbound return movements.
3A	Track 1	Trailing-point crossover switch completing Track 1 to Track 2 alignment.
3B	Track 2	Facing-point crossover switch paired with 3A for Track 2 to Track 1 movements.

Grade Crossing: Audubon Crossing, Victory Crossing

Work Activity Description

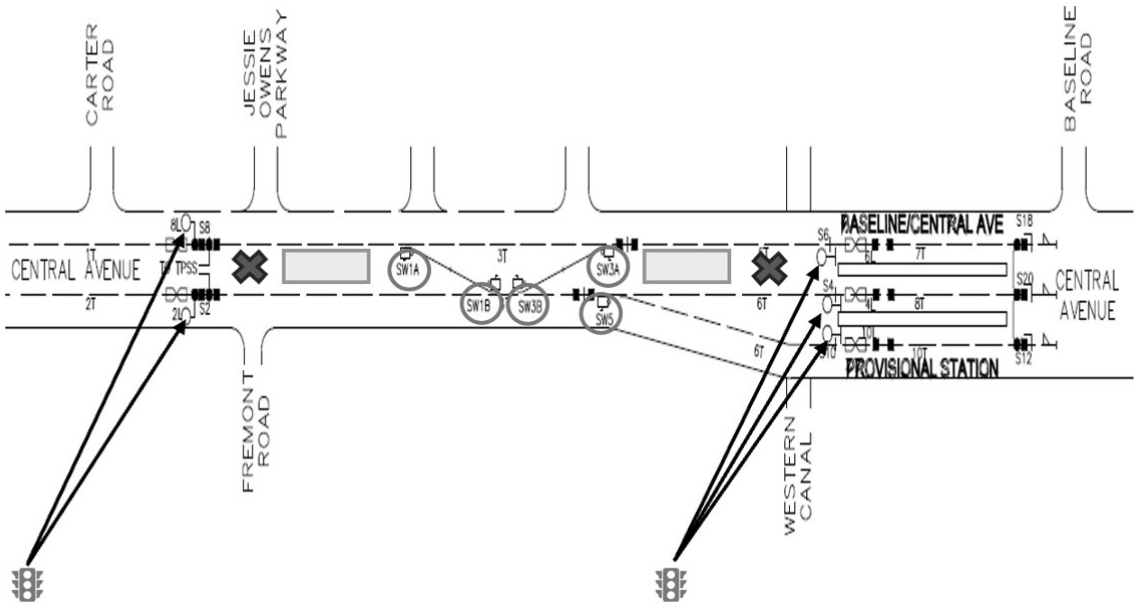
This section encompasses the southern terminal area of the Orange Line where routine track and OCS inspections, switch testing, and yard access operations occur under Roadway Worker Protection (RWP) coverage. The alignment includes a combination of open median track and tight street segments requiring strict adherence to established safe zones and OCC communication protocols.

Personnel must remain clear of active train movements and maintain continuous radio contact on **Channel 2 (B Line)** when performing inspection or maintenance activities. Limited safe-zone clearances exist along Southern Avenue and Buckeye Road, where workers are to use the adjacent sidewalk or designated pull-off areas as temporary safe locations. Due to shared vehicular traffic corridors, high visibility PPE and cone barriers must be deployed per RWP and traffic-control requirements.

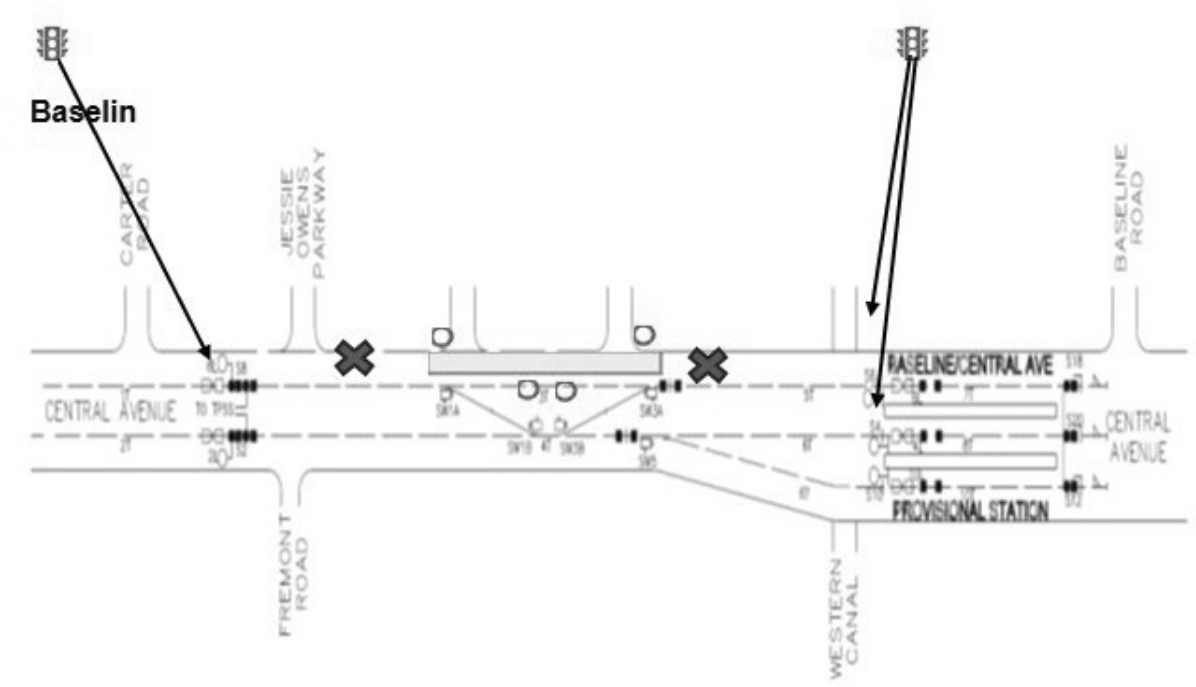
Baseline Terminal End



Baseline Crossover



OL-B-1 – Baseline Crossover Risk Assessment



Location: Baseline Rd & Central Avenue
Line: Orange Line (B Line) – South Central Extension
Track Type: Dual-track median alignment within wide arterial corridor featuring terminal crossover and approach to Baseline / Central Ave Station.
Assets: Switches SW3A, SW3B, signal masts S6–S10, OCS junction over Western Canal, and provisional tail track.

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Switch misalignment or loss of correspondence due to terminal crossover complexity (SW3A/B).	Medium	High	High	Verify switch position prior to entry; OCC confirmation required; visual indicator check at

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
					ground level.
H-2	Train movement conflicts during OCC route establishment at terminal station.	Medium	High	High	OCC exclusive authority; use Exclusive Track Occupancy (ETO) when performing inspections.
H-3	Limited worker clearance in median during daytime hours with live traffic on both sides.	High	Medium	High	Use sidewalk safe zone near Western Canal; cone barriers required if within curb lane.
H-4	Vehicular and pedestrian intrusion at Baseline intersection and station crosswalks.	High	Medium	High	Assign lookout; deploy cones; coordinate with Traffic Control during work.
H-5	Overhead Contact System (OCS) exposure due to tensioning devices and feeder overlap near Western Canal.	Medium	High	High	Maintain 10 ft minimum clearance; OCS de-energization if elevated work; qualified personnel only.

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-6	Slip/trip hazards at crossover frogs and flangeways during wet conditions.	Medium	Medium	Medium	Non-slip footwear; avoid crossing rails when wet; clear debris before inspection.
H-7	Environmental glare from sun alignment (east-west) affecting signal sight lines and visibility.	Medium	Low	Medium	Use shaded positioning; wear anti-glare eyewear; confirm signal aspect audibly via OCC.

Environmental & Traffic Conditions

- High-volume arterial corridor (Baseline Rd) with four-lane cross traffic and adjacent commercial driveways.
- Bus stops and pedestrian crossings adjacent to station platform.
- Wide open median with partial curb barriers, but limited protection from traffic.
- Canal bridge transition introduces surface grade changes that can cause footing hazards.
- Daytime glare and ambient traffic noise reduce situational awareness.

Safe Zone & Access Control

Location	Safe Zone Description	Access Control
Western Canal (north of station)	Sidewalk or utility easement area clear of track; use for observation only.	OCC clearance required; do not occupy track.
Baseline Station	Platform area clear of track gauge; use for brief staging.	TAW or ETO required for any access beyond platform edge.
Median track area	No safe refuge; not authorized for standing or work while trains active.	Exclusive Track Occupancy required.

Communication & Control

- OCC Radio Channel: Channel 2 (Orange Line)
- Call Reference: “Baseline Crossover – from Western Canal to Baseline Station.”
- Protection Type: Exclusive Track Occupancy (ETO) for fixed work; Train Approach Warning (TAW) for mobile or visual checks.
- Minimum Staffing:
    - Roadway Worker In Charge (RWIC)
    - Designated Lookout (if TAW used)
    - Qualified employee for OCS verification

Recommended Controls / Mitigation

- Conduct pre-job briefing covering switch operation, OCS proximity, and expected train frequency.
- Use cone taper at median entry points and post “Track Personnel Ahead” signage.
- Perform switch correspondence test prior to entering the crossover area.
- Limit all on-track time to off-peak or overnight maintenance windows (0100–0430).
- Prohibit lone-worker activities within crossover or station zone.
- Verify SCADA indication stability before setting route for test trains.

Overall Risk Summary

Risk Category	Overall Risk Level
Train Movement Conflicts	High
Traffic / Pedestrian Interaction	High
OCS / Electrical	Medium-High
Work Zone Clearance	High
Environmental / Visibility	Medium

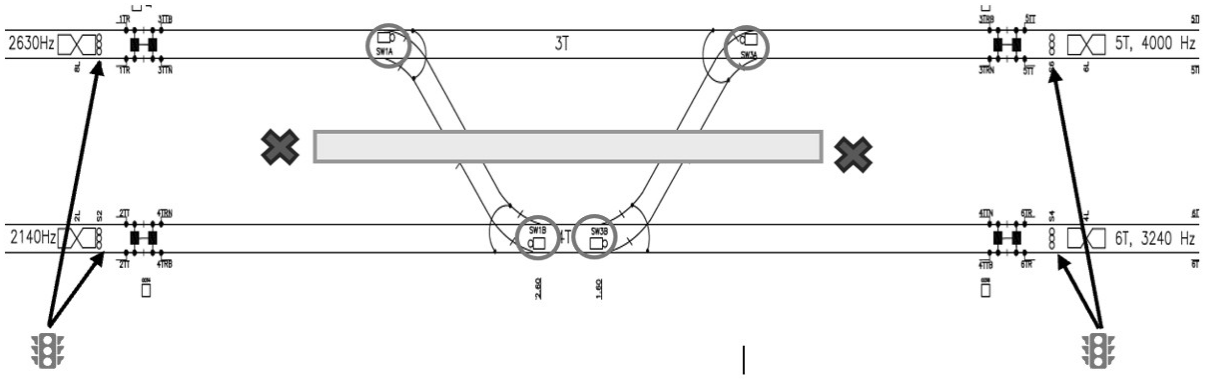
Final Recommendations

- Establish nighttime or early-morning maintenance scheduling to minimize traffic exposure.
- Assign dual lookouts for northbound and southbound train approaches.
- Maintain continuous OCC contact and log track entry/exit.
- Use portable strobe or light beacon to mark crew presence.
- Confirm switch correspondence with OCC after completion of work.

- Include Baseline Crossover in monthly RWP safety audit and annual interlocking inspection plan.

HIDALGO CROSSOVER





Hidalgo Crossover Risk Assessment

Location: Central Avenue & Hidalgo Street
Line: Orange Line (B Line) – South Central Extension
Track Type: Dual-track median alignment through mixed residential and light-commercial corridor, featuring a standard double crossover (SW1A/B and SW3A/B) with full bidirectional route capability.
Assets: Two crossovers, four switch machines, signal masts (S7–S10), OCS tension assemblies, and track circuits 1T through 6T.

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Switch misalignment or loss of	Medium	High	High	Perform switch correspondence check before

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
	correspondence between SW1A/B and SW3A/B.				entry; verify with OCC signal display; ground visual inspection required.
H-2	Opposing train movements if OCC sets route without full lockout.	Medium	High	High	Establish Exclusive Track Occupancy (ETO) before work; confirm limits via radio before fouling track.
H-3	Restricted safe-zone width in median with active traffic lanes on both sides.	High	Medium	High	Use sidewalk or pull-off zone only; deploy cones and “workers ahead” signage per traffic-control plan.
H-4	Vehicle turning movements and driveway conflicts at adjacent business entrances.	High	Medium	High	Coordinate with City Traffic Control; assign flagger/lookout for vehicle awareness.
H-5	OCS contact or induction hazard from closely-spaced support poles.	Medium	High	High	Maintain 10 ft minimum clearance; de-energize if overhead work planned; qualified OCS staff only.
H-6	Trip hazards from flangeway grooves and frog points	Medium	Medium	Medium	Daylight inspection preferred; use non-slip boots;

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
	along crossover diamond.				remove gravel or debris before walking.
H-7	Limited visibility for northbound operators due to building setbacks and signal mast angles.	Medium	Low	Medium	Approach at restricted speed; install reflective signal target panels; enhance RWIC radio callouts.

Environmental & Traffic Conditions

- Four-lane arterial corridor with high daytime traffic volumes and multiple driveway entrances.
- Residential structures on east side; commercial frontage on west side causes pedestrian mixing near crosswalks.
- Ambient noise from traffic and construction reduces audible warning range.
- Night lighting adequate but introduces headlight glare and shadowing around OCS poles.

Safe Zone & Access Control

Location	Safe Zone Description	Access Control
North end of crossover	Use sidewalk adjacent to U-Haul lot or curb pull-off; do not occupy median.	OCC authorization required before entry.
South end of crossover	West side sidewalk provides limited refuge behind OCS pole line.	TAW or ETO required; designated lookout mandatory.
Median track area	No permanent safe refuge; only access under exclusive track occupancy.	Work limits defined by OCC interlocking clearance.

Communication & Control

- Radio Channel: Channel 2 – Orange Line (B Line)
- Call Reference: “Hidalgo Crossover – between Pioneer and Raymond Segments.”
- Protection Type: Exclusive Track Occupancy (ETO) or Train Approach Warning (TAW).

- Personnel Required: Roadway Worker in Charge (RWIC), Designated Lookout, Qualified OCS Technician (if overhead activity).

Recommended Controls / Mitigation

- Conduct pre-job briefing with OCC and signal maintainers to verify switch status.
- Use portable barriers or cones to separate traffic flow from work zone.
- Schedule maintenance between 0100–0430 hours to reduce exposure.
- Ensure SCADA confirmation of switch status and no active routes before entry.
- Prohibit lone worker operations in this interlocking.
- Inspect for standing water or oil near median drainage grates before walking track.

Overall Risk Summary

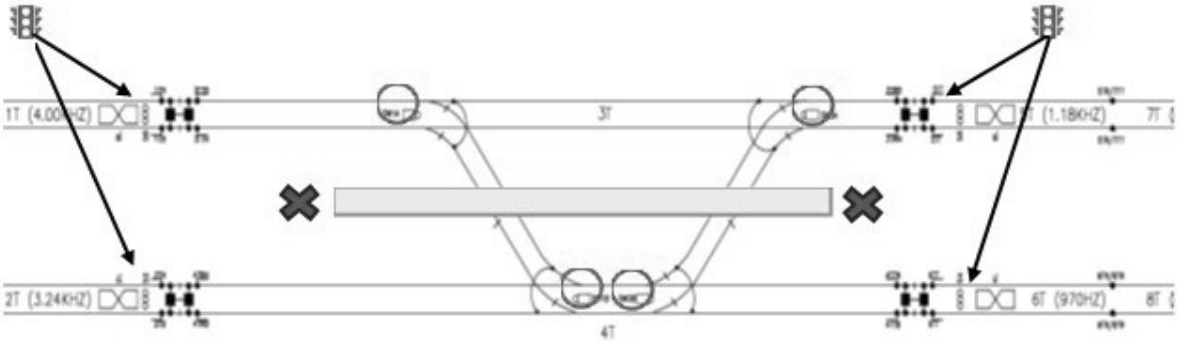
Risk Category	Overall Risk Level
Train Movement Conflicts	High
Traffic / Pedestrian Interaction	High
OCS / Electrical	Medium-High
Work Zone Clearance	High
Environmental / Visibility	Medium

Final Recommendations

- Perform routine inspections only under full OCC coordination and record authority limits in RWP log.
- Assign dual lookouts for northbound and southbound directions.
- Utilize portable strobe beacon or flashing warning device for crew visibility.
- Maintain real-time radio communication with OCC for switch testing and confirmation.
- Include Hidalgo Crossover in monthly RWP field audit and semi-annual signal inspection plan.

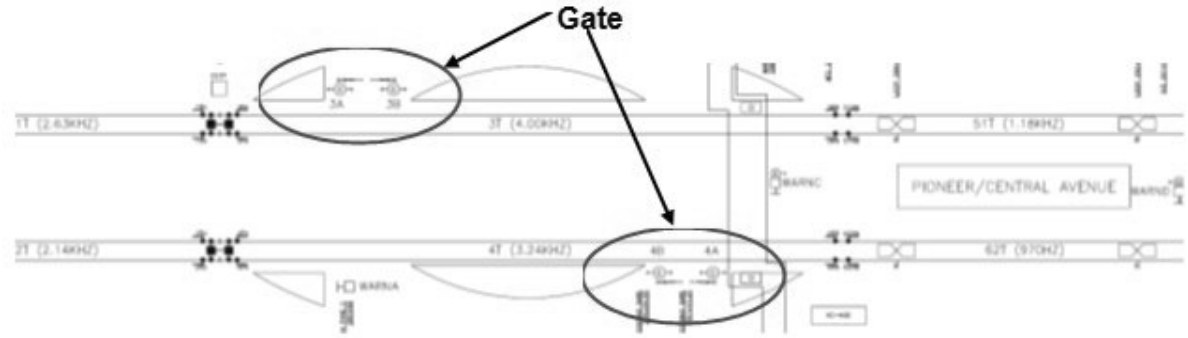
RAYMOND CROSSOVER





Victory Crossing





VICTORY CROSSING – RISK ASSESSMENT

Location: Central Avenue & Victory Street
Line: Orange Line (B Line) – South Central Extension
Track Type: Dual-track median alignment through roundabout intersection with automatic gates and flashing light assemblies.
Assets: Two active grade-crossing gate assemblies, flashing light masts, bells, approach track circuits 1T–6T, OCS pole line, span wire support system, and adjacent traffic signal integration.
Crossing Type: Protected Grade Crossing (No Switches / No Interlocking)

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Vehicle encroachment into track area within roundabout during gate activation.	High	High	High	Coordinate with City Traffic Control; ensure gates and signals pre-test before arrival; flagger positioned at north approach.
H-2	Confusion of motorists due to roundabout layout and dual gate arms.	High	Medium	High	Place “Train Coming / Stop When Flashing” advance warning signage; portable cones to channel traffic flow.
H-3	Restricted safe-zone access in median—minimal refuge between active lanes and OCS poles.	High	Medium	High	Use only narrow center island between tracks as controlled safe zone; deploy lookout on each approach.
H-4	Pedestrian and cyclist conflict along shared crosswalk alignment adjacent to gate arm.	High	Medium	High	Post temporary pedestrian detour; maintain flagger presence; ensure audible

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
					warnings operational.
H-5	OCS contact hazard from low span wire and pole proximity to roadway.	Medium	High	High	Maintain 10-ft clearance; restrict overhead work unless traction power is de-energized; qualified OCS staff only.
H-6	Limited visibility from southbound operators approaching curve into crossing.	Medium	Medium	Medium	Use enhanced radio communication ("RWIC – Victory Crossing Clear / Occupied"); restrict train speed to 10 mph if work in limits.
H-7	Electrical or grounding hazard from moisture accumulation near mast bases and drainage grates.	Medium	Medium	Medium	Inspect before work; wear dielectric boots; avoid contact with grounded equipment during rainfall.
H-8	Ambient traffic noise and bell tones reduce verbal communication among workers.	High	Low	Medium	Use radios and hand signals; position workers facing train direction; ensure lookout clear line of sight.

Environmental & Traffic Conditions

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- Located within a multi-leg roundabout with continuous vehicular flow.
- Mixed commercial frontage (restaurants, driveways) generating traffic turning near the crossing.
- High pedestrian exposure, especially near the southwest sidewalk and Central Ave bus stops.
- Moderate ambient noise from bells, vehicles, and construction; may mask train horn or RWIC calls.
- Night visibility fair but shadows present along the median—portable lighting recommended for overnight inspections.

Safe Zone & Access Control

Location	Safe Zone Description	Access Control
Center Median Between Tracks	Narrow island between both tracks; only area providing full clearance from passing trains.	Exclusive Track Occupancy (ETO) required; lookout mandatory both directions.
North Approach (toward Pioneer)	Use curb pull-off next to signal mast base; not to exceed 2 personnel.	OCC authorization; cones for traffic separation.
South Approach (toward Baseline)	Sidewalk setback area behind gate arm mechanism; clear view of northbound LRV.	RWIC oversight; do not cross live tracks without OCC approval.

Communication & Control

- Radio Channel: Channel 2 – Orange Line (B Line)
- Call Reference: “Victory Crossing – Central Avenue Roundabout.”
- Protection Type: Exclusive Track Occupancy (ETO) or Train Approach Warning (TAW) depending on scope.
- Personnel Required:
    - Roadway Worker in Charge (RWIC)
    - Designated Lookout / Flagger
    - Signal Maintainer (for gate and flasher testing)
    - OCS Technician (if overhead work required)

Recommended Controls / Mitigation

- Conduct pre-job coordination with OCC and City Traffic Control prior to entering the roundabout.
- Confirm no active LRV movements and verify gate system inactive prior to fouling track.
- When possible, schedule night or early-morning work (0100–0430 hrs) to minimize exposure to vehicle traffic.
- Deploy cones, barriers, and signage ("Rail Work Ahead") per traffic-control standard.
- Maintain dual lookout coverage facing both north and southbound traffic lanes.
- Prohibit lone worker operations due to multi-directional hazards.
- Use portable strobe beacon or reflective vests for increased visibility.
- Document entry and clearance times in RWP Log / RTRS Checklist.

Overall Risk Summary

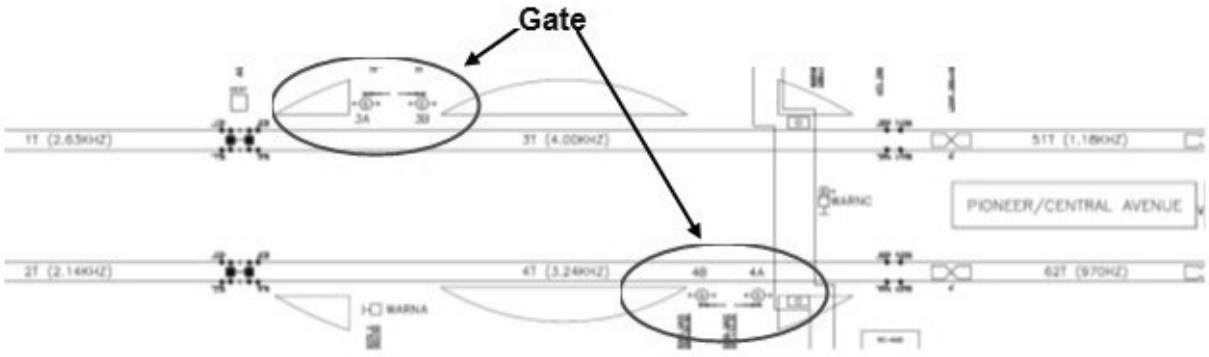
Risk Category	Overall Risk Level
Train Movement Conflicts	High
Traffic / Pedestrian Interaction	High
OCS / Electrical	Medium-High
Work Zone Clearance	High
Environmental / Visibility	Medium

Final Recommendations

- Include Victory Crossing in monthly RWP field audit and semi-annual grade-crossing safety review.
- Coordinate with City Traffic Engineering to evaluate potential installation of advance "Train Signal Activated" beacons for roundabout entries.
- Ensure RWIC briefing includes both train and roadway hazard awareness before any personnel step into the media.
- Consider temporary traffic control officer assignment during major maintenance activities.

AUDUBON CROSSING





Audubon Gate – Risk Assessment

Location: Central Ave @ Audubon (south end of bridge approach)
Line: Orange Line (B Line) – South Central Extension
Crossing Type: Protected grade crossing (gates, flashers, bell). No interlocking within the gate zone; nearest crossover equipment is outside the immediate work limits (verify with OCC).
Assets: Two gate mechanisms with flashers/bells, OCS poles/span, approach track circuits (1T–6T range on this segment), median refuge with landscaping/bollards, adjacent roadway signage.

Context Driver Note: Southbound vehicles descend off the bridge into the crossing, with higher approach speeds and shortened stopping distance.

Hazard Identification

ID	Hazard	Likelihood	Severity	Risk	Controls / Mitigations
H-1	High-speed southbound approach from bridge → longer stopping distance, late red under gate activation.	High	High	High	Night/overnight work where possible; advance “Rail Work Ahead / Be Prepared to Stop” signs 500–800 ft on bridge; portable rumble mats if approved; flagger on southbound approach.
H-2	Queue spillback from downstream roundabout/driveways blocking tracks.	Medium	High	High	RWIC to monitor queues; coordinate with City Traffic for temporary lane control; hold LRV or keep gates up until track is clear.

ID	Hazard	Likelihood	Severity	Risk	Controls / Mitigations
H-3	Limited refuge in median; landscaping/bollards constrain crew movement.	High	Medium	High	Establish tight safe-zone footprint; limit on-track crew size; pre-place cones delineating egress paths; dual lookouts.
H-4	Sight distance / sun-glare for southbound drivers (PM sun) and for operators (AM glare).	Medium	Medium	Medium	Adjust work windows; require high-vis class 3 + strobe beacons; additional lookout focused on southbound lane.
H-5	Ped/bike desire lines near gate mechanisms and sidewalk crossing.	Medium	Medium	Medium	Temporary pedestrian detour; set Type-II/III barricades around bungalow/mast bases; continuous bell verification.
H-6	OCS proximity above median refuge; tools or ladders could reach energized parts.	Medium	High	High	10-ft minimum approach distance; de-energize & ground for overhead tasks; OCS-qualified staff only.
H-7	Electrical/trip hazards at mast foundations,	Medium	Medium	Medium	Daylight inspections;

ID	Hazard	Likelihood	Severity	Risk	Controls / Mitigations
	uneven pavers, flangeways.				non-slip footwear; clear debris; paint flangeway edges if permitted.
H-8	Maintenance vehicle staging conflicts with one-lane taper at bridge end.	Medium	Medium	Medium	Staging on shoulder/off-track pad only; MUTCD-compliant taper and buffer; truck wheels chocked; beacon on.
H-9	Audibility masking (traffic, bells, wind over bridge).	Medium	Low	Medium	Radio headsets for crew; standardized hand signals; lookout maintains line-of-sight at all times.

Environmental & Traffic Conditions

- Down-grade, straight approach off the bridge into the crossing → higher kinetic energy and shorter driver reaction windows.
- Mixed commercial frontage; intermittent driveway turns near the gate island.
- Wind and ambient noise from bridge traffic + bell tones reduce verbal range.
- Night lighting good on roadway; shadowing around OCS poles and cactus plantings can hide workers.

Safe Zones & Access Control

Location	Safe-Zone Description	Access / Limits
Median between	Narrow refuge bounded by embedded rail and bollards;	ETO required for on-track work; max 2–3 personnel; dual lookouts (north & south).

tracks (primary)	workers must face traffic and LRV approach.	
Behind south gate mast	Small setback area behind mechanism case; good for single tech during signal tests (not for group staging).	TAW with lookout acceptable for non-fouling tests; remain outside dynamic envelope.
Sidewalk setback (west or east)	Off-track briefing and tool staging only.	Keep clear path for pedestrians; use cones/tape.

Communication & Control

- Radio Channel: Channel 2 – Orange Line (B Line)
- Call Reference: “Audubon Gate – southbound bridge approach.”
- Protection: Exclusive Track Occupancy (ETO) for any fouling; TAW only for non-fouling signal checks with lookout.
- Crew: RWIC, Designated Lookout(s), Signal Maintainer, OCS Tech (if overhead).

Recommended Controls / Work Methods

1. Pre-job with OCC + City Traffic: confirm timing plans; request temporary speed reduction and “Be Prepared To Stop” sign on bridge.
2. Southbound approach control: place advance warning and a flagger at bridge crest with escape route; consider PCMS during day work.
3. Gate testing: perform during 0100–0430 when feasible; if daytime, hold trains or run manual activation windows coordinated by OCC.
4. Staging: no parking in taper; use shoulder/pad; maintain 100–150 ft buffer per posted speed.
5. Lone worker prohibited within gate island/track area.
6. Document entry/clear times in RTRS; photograph cone layout for audit.

Overall Risk Summary

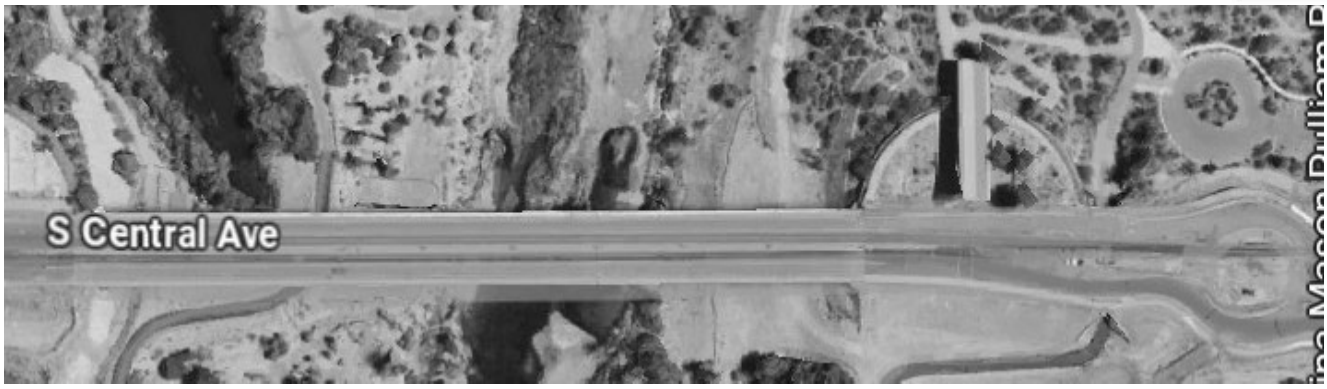
Category	Level
Train Movement Conflicts	High
Traffic / Ped Interaction	High (due to downhill approach)
OCS / Electrical	Medium–High
Work-Zone Clearance	High
Environmental / Visibility	Medium

Final Recommendations

- Add to monthly RWP field audit and quarterly crossing functional tests with a specific check on southbound approach timing.
- Evaluate advance flashing beacons or rumble treatment on the bridge (City action).
- During any extended work, request temporary officer control at southbound approach.
- Capture near-misses (vehicle roll-throughs under activation) in a crossing log to support timing adjustments.

SALT RIVER BRIDGE







Salt River Bridge – Risk Assessment

Location: Central Avenue Bridge over Salt River
Line: Orange Line (B Line) – South Central Extension
Track Type: Dual-track, long-span elevated bridge structure with no pedestrian crossing points or vehicle intersections.
Work Activities:

- Track and OCS inspection
- Expansion joint greasing
- E-clip and fastener integrity checks

Safe Zone Availability: Only between the two tracks along the full bridge length; no sidewalk or shoulder refuge.

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Limited or no safe egress — workers confined to narrow space between active tracks.	High	High	High	Exclusive Track Occupancy (ETO) required for full bridge; no partial occupancy permitted.
H-2	Train movement exposure from either direction; insufficient clearance from dynamic envelope.	Medium	High	High	Apply ETO for both tracks; if TAW used for limited inspection, enforce speed restriction ≤ 10 mph and dual lookouts.
H-3	Fall hazard from elevated deck edge (no guardrail beyond parapet).	Medium	High	High	Maintain 6-ft setback; use harness and lanyard within 6 ft of edge; suspend work during high winds.
H-4	OCS contact hazard from low span wires and insulators.	Medium	High	High	Maintain 10-ft clearance; de-energize prior to OCS work; OCS-qualified staff only.

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-5	Heat exposure from direct sun; no shade or water access mid-span.	High	Medium	High	Schedule early morning work (<1000 hrs); hydrate every 20 min; use cooling PPE.
H-6	Slips/trips from greased joints and E-clip assemblies.	Medium	Medium	Medium	Use controlled applicators; daylight inspections; wipe excess material immediately.
H-7	Wind exposure causing tool loss or balance hazard.	Medium	Medium	Medium	Suspend overhead work > 25 mph winds; tether all tools.
H-8	Long distance / poor radio coverage along bridge.	High	Low	Medium	Use headsets or repeaters; maintain radio checks every 5 minutes.
H-9	No mid-span vehicle access or emergency egress.	Medium	High	High	Stage vehicles at both ends; RWIC to pre-brief exit routes and confirm rescue plan.

Environmental & Structural Conditions

- Continuous elevated dual-track bridge approximately 2,000 ft in length.
- Exposed to high wind, heat, and solar glare.
- Narrow center refuge only — no walkway or railings beyond parapet.
- Bridge carries OCS poles and tension anchor points; joint access at each end.
- No alternate refuge: all workers must maintain awareness of train direction and clearance limits.

Safe Zone & Access Control

Location	Safe Zone Description	Access Control
Centerline Between Tracks	Only location offering full clearance; minimal lateral space.	ETO required. Under limited TAW conditions for brief inspections, train speed restricted to 10 mph max, dual lookouts required.
North Abutment (approach)	Staging and OCC coordination area; crew entry point.	Radio clearance from OCC; cone perimeter for staging vehicle.
South Approach (Audubon Gate side)	Crew access and pull-off zone.	RWIC monitors southbound traffic; establish taper for work vehicles.

Communication & Control

- Radio Channel: Channel 2 – Orange Line (B Line)
- Call Reference: “Salt River Bridge – between Audubon Gate and Broadway approach.”
- Protection Type: Exclusive Track Occupancy (ETO) or Train Approach Warning (TAW – inspection-only, reduced speed).
- Speed Restriction:
  - Under ETO: No train movement permitted.
  - Under TAW (inspection only): All trains restricted to 10 mph and must provide audible approach signal before entering limits.
  - Work vehicles on approaches: ≤ 5 mph.
- Personnel Required:
  - Roadway Worker in Charge (RWIC)
  - Track Maintainers / OCS Technicians
  - Safety Watchperson with radio headset

Recommended Controls / Mitigation

- Establish full ETO or TAW with speed restriction before entry.
- Require RWIC confirmation of OCC log entry and speed restriction in effect before any work begins.
- Maintain continuous radio contact and check-ins every 5 minutes.
- Use tethered tools and limit carried materials to essentials.
- Conduct heat-stress and hydration check during shift briefing.
- When possible, schedule inspections 0100–0430 hrs or before 1000 hrs during summer months.
- Post “No Refuge – Both Tracks Protected” signage at both ends.
- Verify traction power de-energized for any OCS or joint work.

Overall Risk Summary

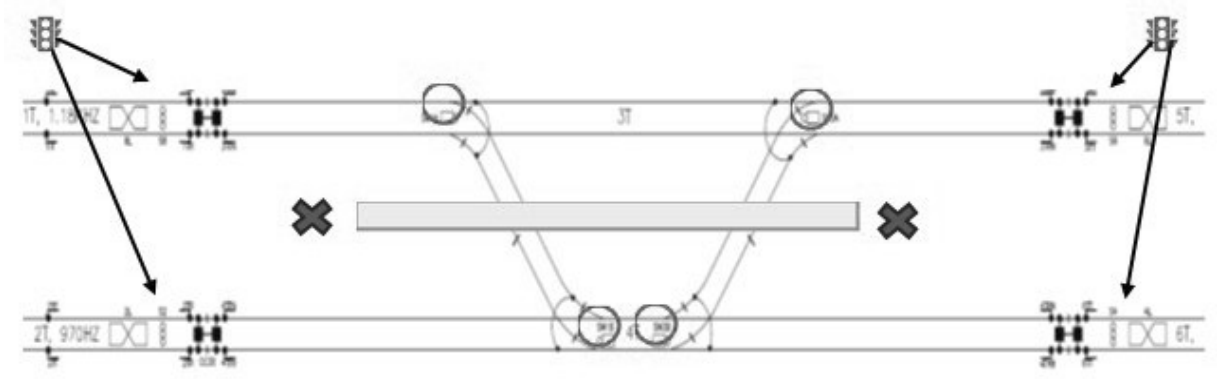
Risk Category	Overall Risk Level
Train Movement Conflicts	High
Structural / Fall Hazards	High
OCS / Electrical	High
Work Zone Clearance	High
Environmental / Visibility	Medium-High

Final Recommendations

- Include Salt River Bridge in Quarterly RWP and Structural Inspection Audit.
- Require speed restriction confirmation in OCC RWP log for all operations.
- Equip crews with portable radios, strobe beacons, and cooling PPE.
- Maintain dual-track occupancy control and do not authorize single-track work under active service.
- Review SCADA alarm and circuit status post-inspection to verify clearance

COCOPAH CROSSOVER





Cocopah Crossover – Risk Assessment

Location: 3rd Avenue & Cocopah Street
Line: Orange Line (B Line) – South Central Extension
Track Type: Dual-track median alignment in an industrial corridor with moderate curvature and limited sight distance approaching from the north. Standard double crossover (SW1A/B and SW3A/B) configuration supporting bidirectional moves for operations and maintenance.
Assets: Two crossovers, four switch machines, associated signal masts, OCS supports, and track circuits 1T–6T.

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Switch misalignment or loss of correspondence between SW1A/B or SW3A/B during manual or OCC-controlled route setup.	Medium	High	High	Perform visual switch correspondence verification; confirm alignment via OCC before fouling the track. Ground check required before occupancy.
H-2	Opposing train movements if ETO or route lockout not properly established.	Medium	High	High	Establish Exclusive Track Occupancy (ETO) with OCC; confirm work limits; maintain radio contact throughout.
H-3	Limited visibility due to bridge grade and curvature approaching southbound direction.	Medium	Medium	Medium	Use designated lookout positioned north of crossover; implement Train Approach Warning (TAW) if ETO not established.
H-4	Worker struck-by hazard from traffic or work vehicles positioned near narrow roadway shoulder.	Medium	Medium	Medium	Use cones, signage, and high-visibility barriers; park work truck parallel to track on west side in designated shoulder space.

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-5	Trip hazard from track flange ways and uneven pavement between track slabs.	Medium	Low	Low	Maintain 3-point contact when crossing tracks; wear approved safety footwear with defined sole.
H-6	OCS clearance hazard during overhead inspections or lift-truck operations.	Low	High	Medium	De-energize and ground section before any overhead work; maintain minimum 10-ft clearance when energized.
H-7	Unauthorized access or intrusion by vehicles or pedestrians entering the alignment.	Low	Medium	Low	Use cones and flaggers during active work; post “Track Closed / Do Not Enter” signage when under ETO conditions.

Safe Zone & Watchperson Positioning

Location	Safe Zone Description	Lookout / Watchperson Position
North of crossover (between tracks)	Narrow paved median between track 1 and track 2 – adequate for 2 personnel standing clear with awareness.	Station lookout north of SW1A within sight of approaching train from bridge grade.
South of crossover (near industrial driveway)	Wide paved shoulder adjacent to westbound track, safe for crew staging and vehicle parking.	Secondary lookout monitors southbound approach toward the bridge curve.

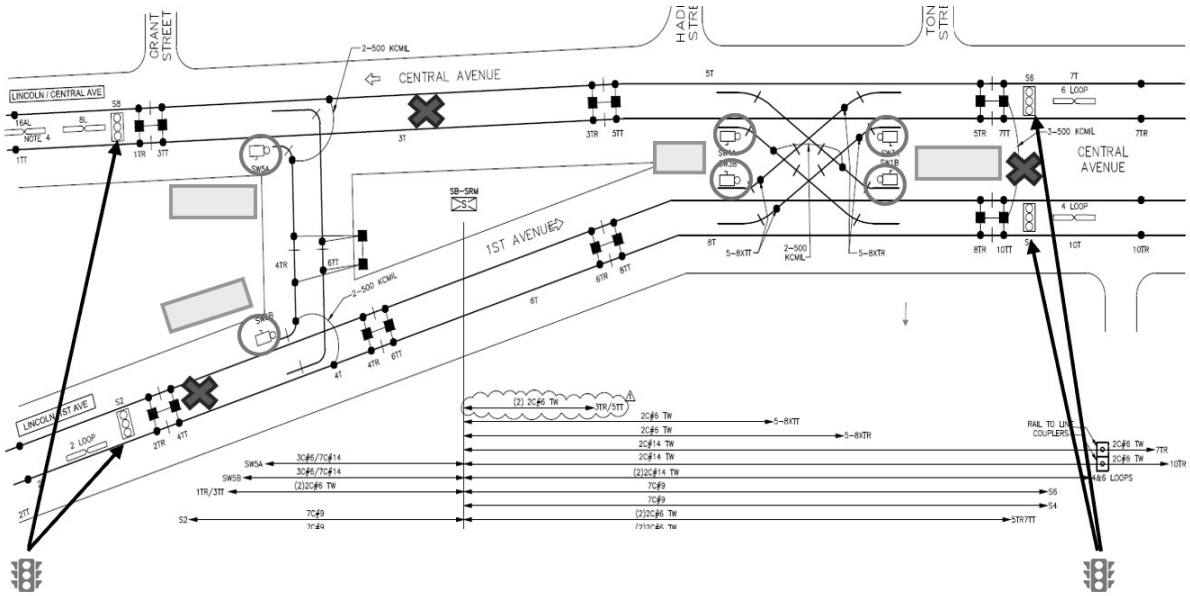
Operational Notes

- Due to southbound traffic descending from the bridge, braking distance for LRVs may be reduced—extra caution required during inspections or switch maintenance.
- All movements through Cocopah Crossover must be confirmed via OCC with switch correspondence verified before entry.
- Work truck setup is tight due to single-lane restriction; use spotter when positioning vehicles.
- Maintain continuous radio monitoring on Channel 2 (Orange Line) and identify as “Signal/Track Crew at Cocopah Crossover.”

Sherman Loop







Sherman Loop – Risk Assessment

Location: 1st Avenue & Central Avenue (Sherman Loop)
Line: Orange Line (B Line) – Downtown Phoenix South Junction
Track Type: Dual-track alignment transitioning into a loop junction where northbound and southbound alignments merge before continuing northbound toward Lincoln Street.
Assets: Loop track connection, crossover (SW1A/B and SW3A/B), OCS pole line, track circuits 3T–8T, switch machines, and signal masts (S5–S8).
Work Activities:

- Track and OCS inspection
- Switch and signal maintenance
- Visual verification of wheel flanges, bond wires, and insulated joints
- Crossover correspondence checks

Hazard Identification

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
H-1	Restricted visibility / blind spots through the loop curve; operators cannot see workers until close range.	High	High	High	Require reduced speed ≤ 10 mph during inspection; lookout positioned on north and south approaches; use high-visibility strobes.
H-2	Tight curve geometry causes wheel flange noise and distraction, limiting audible detection of trains.	High	Medium	High	Use dual lookouts; maintain continuous radio communication with OCC and train operators during test runs.
H-3	Confined clearance in the loop—no sidewalk or median refuge.	High	High	High	Exclusive Track Occupancy (ETO) required; workers positioned between tracks only under full protection.
H-4	Operator line-of-sight obstruction at crossover turnout due to signal mast and pole line.	Medium	High	High	Limit movements through crossover to 10 mph; ensure signal maintainers confirm correspondence before releasing route.
H-5	Simultaneous opposing train entry if OCC sets	Medium	High	High	Verify route lockout through OCC; apply single-direction

Hazard ID	Hazard Description	Likelihood	Severity	Risk Rating	Controls / Mitigations
	both loop and mainline routes.				authority during inspection; log route limits in RWP form.
H-6	Pedestrian interaction at Lincoln/1st Ave crosswalk near station platform.	Medium	Medium	Medium	Deploy cones and “Rail Work Ahead” signage; lookout at pedestrian crossing; work off-peak hours.
H-7	OCS proximity hazard in curve—low contact wire height and close span poles.	Medium	High	High	Maintain 10 ft clearance; de-energize for any overhead work; OCS-qualified personnel only.
H-8	Vehicle right-turn conflicts at Lincoln/1st Ave and Central Ave signals.	Medium	Medium	Medium	Coordinate with City Traffic Control; flagger at intersection during day work.
H-9	Heat and glare from concrete surfaces reduces visibility of hand signals.	High	Medium	High	Schedule early morning/overnight work; reflective PPE and hard-hat strobes required.

Environmental & Traffic Conditions

- Mixed urban arterial intersection with adjacent commercial and industrial frontage.
- Curved alignment creates blind zones for operators traveling northbound from Central and southbound from 1st Avenue.
- High vehicle and pedestrian presence at Lincoln Street crossing and platform area.
- Ambient noise and echo from surrounding walls reduce warning audibility.

- Night lighting fair but creates shadowing between OCS poles and signal masts—portable lighting recommended for night work

Safe Zone & Access Control

Location	Safe Zone Description	Access Control
Between Tracks (Loop Interior)	Only limited refuge between tracks; workers must stay centered and alert to both directions.	ETO required for all track occupancy; dual lookouts mandatory.
North Approach (Central Avenue)	Limited clearance near platform; usable for staging tools only.	OCC authorization; no fouling track.
South Approach (1st Avenue)	Slightly wider pavement shoulder; suitable for safety briefing or temporary refuge.	OCC authorization; cones/barriers required if near live lane.

Communication & Control

- Radio Channel: Channel 2 – Orange Line (B Line)
- Call Reference: “Sherman Loop – between 1st Ave and Central Ave crossovers.”
- Protection Type: Exclusive Track Occupancy (ETO) or Train Approach Warning (TAW – inspection only, reduced speed).
- Speed Restrictions:
  - Under ETO: No train movement.
  - Under TAW: Maximum train speed 10 mph through curve and crossover; audible bell required approaching limits.
  - Switch and signal testing: 5 mph movement for verification only.
- Personnel Required:
  - Roadway Worker in Charge (RWIC)
  - Signal Maintainer
  - OCS Technician (if overhead)

Recommended Controls / Mitigation

- When possible, perform work 0100–0430 hrs when traffic and train volume lowest.
- Pre-brief with OCC and confirm which alignment (Central or 1st Ave) is active.
- Use portable Type III barricades or cones along station edge for pedestrian control.
- Prohibit lone-worker operations in this loop and crossover zone.
- Deploy dual strobes on each end of work limits.

- Confirm switch correspondence and signal aspect dark prior to walking track.
- Apply speed restriction ≤ 10 mph during any TAW condition, and 5 mph during crossover movement testing.
- Maintain continuous radio check-ins every 5 minutes.

Overall Risk Summary

Risk Category	Overall Risk Level
Train Movement Conflicts	High
Visibility / Blind Spots	High
OCS / Electrical	Medium-High
Work-Zone Clearance	High
Traffic / Pedestrian	Medium
Environmental / Lighting	Medium

Final Recommendations

- Include Sherman Loop in monthly RWP field audits and quarterly signal-correspondence verification.
- Install or maintain reflective delineators along curve to improve operator sightline.
- Review CCTV visibility and signal mast placement to reduce blind zones.
- Enforce 10 mph restricted speed during all inspection, greasing, and visual verification activities.
- Coordinate with City of Phoenix Traffic Signal department for any lane closures or detours near Lincoln Street.

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