

Appendix A

TRAFFIC SIGNAL MODIFICATIONS AND INTERCONNECT REVIEW

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Date: June 16, 2022

To: Angie Hueftle, PE, NCE

From: Loren Chilson, PE

Subject: ***East William Street – Traffic Signal Modifications & Interconnect Review***

INTRODUCTION

This memorandum report provides a summary of the traffic signal modification and traffic signal interconnect work items which should be included, or considered for inclusion, in the East William Street Complete Street Project.

EVALUATION

Following development of the preferred alternative roadway configuration, which conceptually defines the roadway/lane configurations and scope of curb & gutter, sidewalk, pedestrian ramp, and crosswalk locations, Headway conducted a field review of the traffic signal systems to determine necessary traffic signal modification work items necessary for the new configuration and ADA compliance. The evaluation also included identification of optional work items that would update aging equipment, resolve minor existing issues, or generally improve the traffic signal systems for more efficient maintenance and operations. The following traffic signal systems were evaluated:

- Carson Street / E. William Street
- Stewart Street / E. William Street
- Roop Street / E. William Street
- Saliman Road / E. William Street
- Gold Dust Way / E. William Street

Review of the traffic signal interconnect systems serving the above locations was also reviewed to identify opportunities to construct conduit for future fiber optic interconnect concurrently with utility work in the corridor. We understand the traffic signals listed above are currently connected to the City operations building and can be remotely managed via radio communication.

This evaluation presents the scope and estimated cost of necessary and optional traffic signal modifications and interconnect infrastructure for the preferred alternative roadway configuration. “Necessary” items are defined as those required to implement the preferred alternative configuration in accordance with Manual on Uniform Traffic Control Devices (MUTCD) standards and to provide compliance with the Americans with Disabilities Act (ADA) and Public Right of Way Accessibility Guidelines (PROWAG). “Optional” items are defined as those elements which are beneficial to the City, the project, or the end user, but not required to meet minimum national design standards.

FINDINGS

The findings for necessary and optional improvements at each location are listed below and illustrated in the attached Conceptual Signal Modification exhibits.

Carson Street / E. William Street

Necessary Improvements:

- Modify pedestrian push buttons/locations/signs/mounting heights
- Construct pedestrian ramps coordinated with pedestrian push buttons
- Relocate pull boxes to be outside of new pedestrian ramps

Optional Improvements:

- Remove 5-section configuration protected/permissive left turn phasing and replace with 4-section flashing yellow arrow (FYA) configuration
- Install new signal poles with longer arms for FYA configuration
- Update equipment for new configuration and phasing changes
- Replace dented/damaged signal pole in southwest quadrant
- Replace non traffic rated pull boxes with traffic rated pull boxes
- Replace existing legacy street name signs
- Install new detection system
- Consider replacing westbound advanced overhead sign pole

Stewart Street / E. William Street

Necessary Improvements:

- Modify pedestrian push buttons/locations/signs/mounting heights
- Relocate pedestrian push button post
- Install new signal pole with longer arm (northeast quadrant)
- Reconfigure signal head locations on NE and SE quadrant poles for lane adjustments
- Replace mast arm sign (northeast quadrant)
- Relocate pull box (southeast quadrant)

Optional Improvements:

- Replace non traffic rated pull boxes with traffic rated pull boxes
- Replace existing legacy street name signs
- Install new detection system
- Consider improving crosswalk/intersection lighting

Roop Street / E. William Street

Necessary Improvements:

- Modify pedestrian push buttons/locations/signs/mounting heights
- Construct new pedestrian push button posts
- Reconfigure signal head locations on NW and SE quadrant poles for lane adjustments
- Replace mast arm sign (northwest quadrant and southeast quadrant)
- Relocate pull box (northeast quadrant)
- Replace or relocate signal pole on northeast quadrant

Optional Improvements:

- Replace non traffic rated pull boxes with traffic rated pull boxes
- Replace existing legacy street name signs
- Install new detection system
- Consider replacing signal poles on NW and SE quadrants (outdated specifications)

Saliman Road / E. William Street

Necessary Improvements:

- Modify pedestrian push buttons/locations/signs/mounting heights
- Construct new pedestrian push button post(s)
- Replace signal pole on southwest quadrant for longer arm
- Reset signal pole (southeast quadrant)
- Reconfigure signal heads/locations on SW and SE quadrant poles for lane adjustments/FYA
- Remove mast arm sign (southeast quadrant pole)
- Relocate pull box (northeast quadrant)
- Update equipment for new configuration and phasing changes
- Replace/relocate signal pole on NW quadrant

Optional Improvements:

- Replace non traffic rated pull boxes with traffic rated pull boxes
- Replace existing legacy street name signs
- Install new detection system
- Consider improving crosswalk/intersection lighting
- Consider replacing signal pole on NE quadrant (outdated specifications)

Gold Dust Way / E. William Street

Necessary Improvements:

- Modify pedestrian push buttons/locations/signs/mounting heights
- Reconfigure signal heads for northbound/southbound FYA
- Update equipment for new configuration and phasing changes

Optional Improvements:

- Replace aging internally illuminated street name sign on southeast quadrant pole
- Install new detection system

Interconnect Conduit for Future Fiber Optic Communications

We understand communications to the signal systems are currently provided via radio.

Optional Improvements:

- Construct interconnect conduit or multi-duct with tracer wire and pull ropes from Carson Street to Saliman Road with other utility work (joint trench)
- Construct pull boxes/splice vaults as appropriate for the conduit installation limits

Interconnect Conduit for Future Fiber Optic Communications

Necessary Improvements:

- Replace NDOT Count Stations along the corridor (4 total)

RECOMMENDATIONS

The E. William Street project should include all “necessary” work items listed above and “optional” items as selected/directed by the City based on available funding and overall project priorities.

The necessary improvement construction costs are preliminarily estimated at \$556,700.

The total construction cost for all optional items is preliminarily estimated at \$996,550.

The total construction cost for all contemplated traffic signal work (including all optional items) is preliminarily estimated at \$1,553,250. A detailed cost breakdown by location is attached.

E. WILLIAM STREET FEASIBILITY STUDY
PRELIMINARY FINDINGS
 PREPARED FOR CARSON CITY

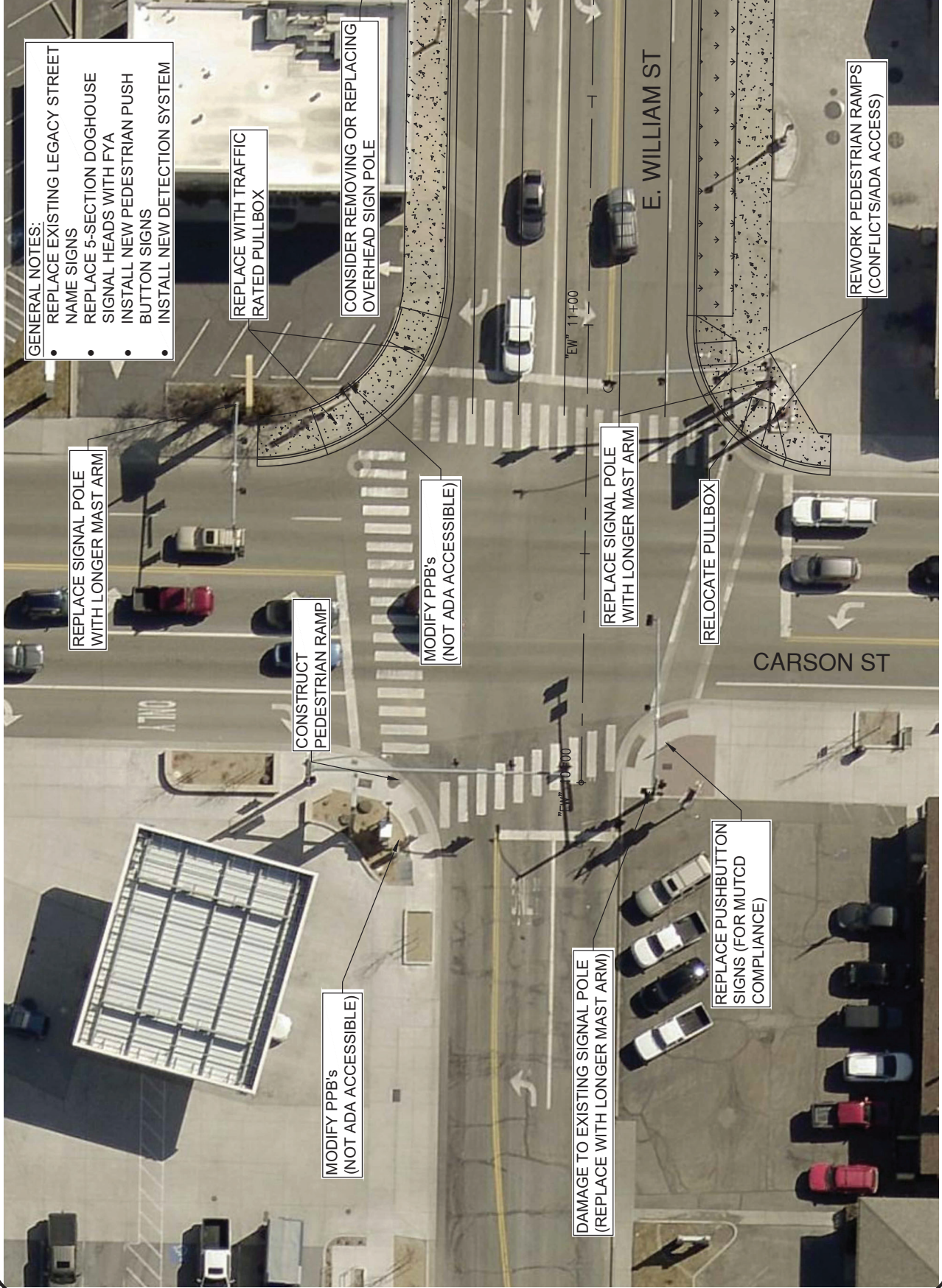


**CARSON STREET
 CONCEPTUAL
 SIGNAL
 MODIFICATIONS**

Project # 21-122

Date JUNE 16, 2022

Sheet TS-1



GENERAL NOTES:

- REPLACE EXISTING LEGACY STREET NAME SIGNS
- REPLACE 5-SECTION DOGHOUSE SIGNAL HEADS WITH FYA
- INSTALL NEW PEDESTRIAN PUSH BUTTON SIGNS
- INSTALL NEW DETECTION SYSTEM

REPLACE SIGNAL POLE WITH LONGER MAST ARM

REPLACE WITH TRAFFIC RATED PULLBOX

CONSIDER REMOVING OR REPLACING OVERHEAD SIGN POLE

CONSTRUCT PEDESTRIAN RAMP

MODIFY PPB's (NOT ADA ACCESSIBLE)

REPLACE SIGNAL POLE WITH LONGER MAST ARM

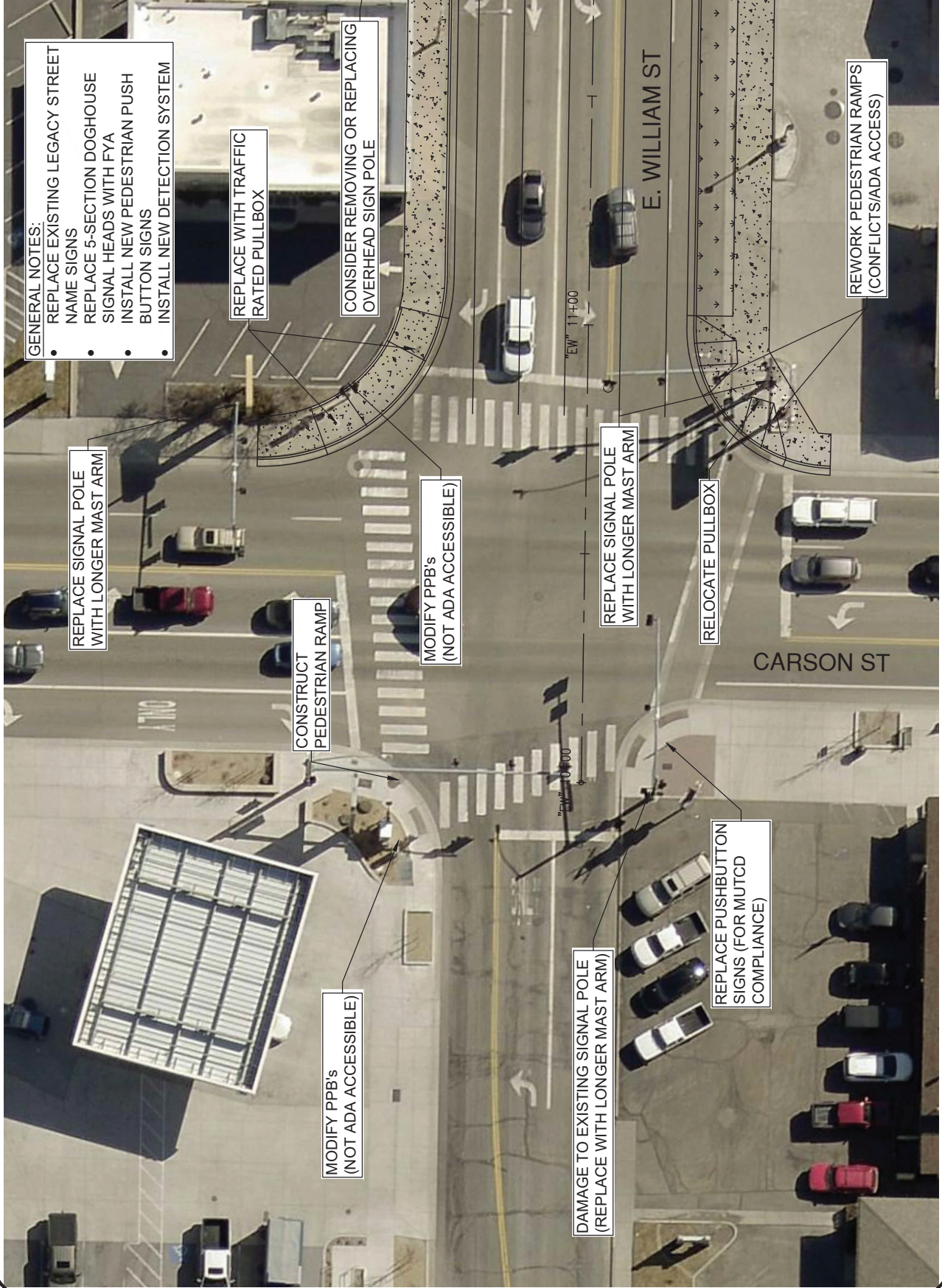
RELOCATE PULLBOX

REWORK PEDESTRIAN RAMPS (CONFLICTS/ADA ACCESS)

MODIFY PPB's (NOT ADA ACCESSIBLE)

DAMAGE TO EXISTING SIGNAL POLE (REPLACE WITH LONGER MAST ARM)

REPLACE PUSHBUTTON SIGNS (FOR MUTCD COMPLIANCE)



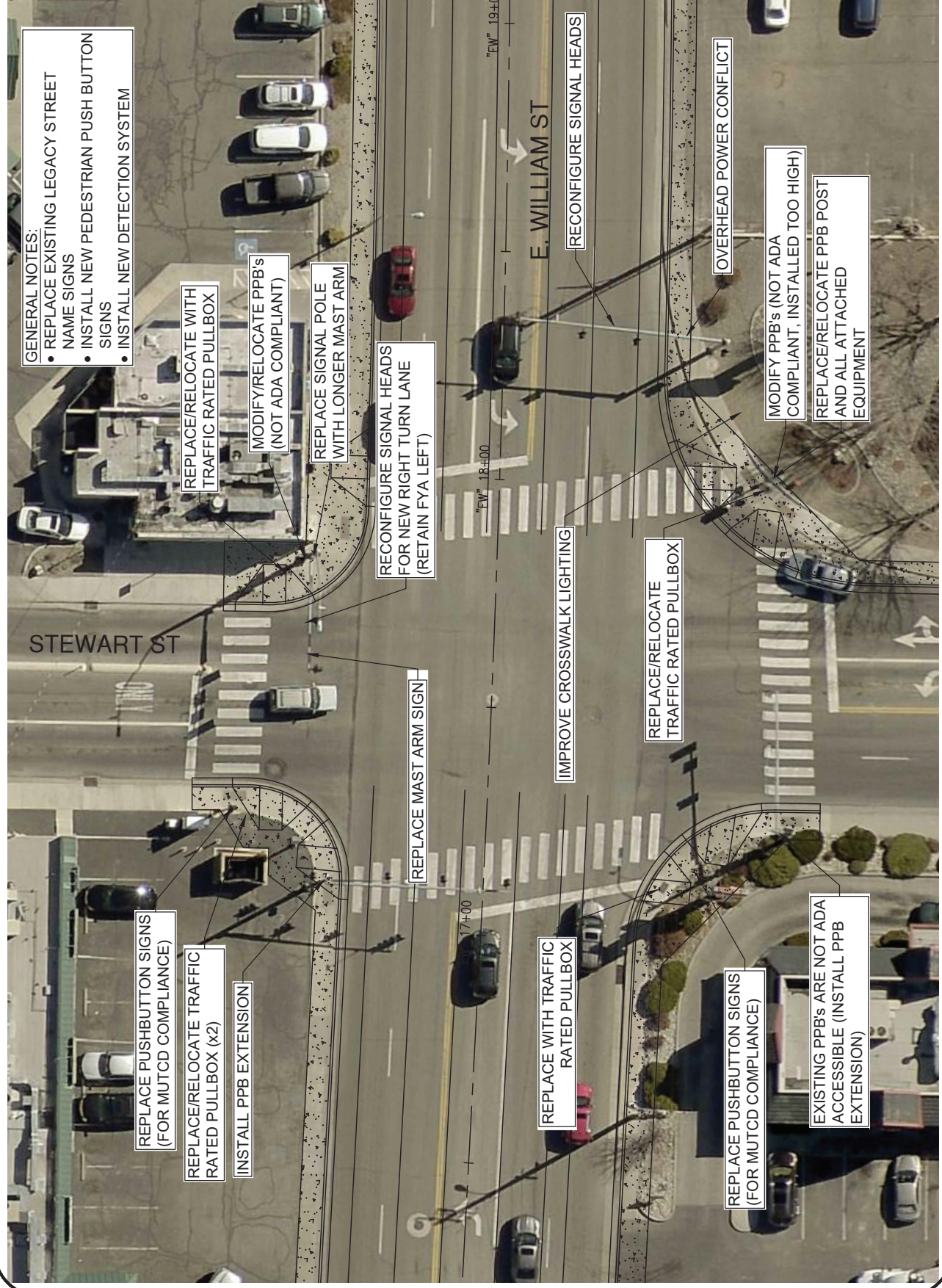
**E. WILLIAM STREET FEASIBILITY STUDY
PRELIMINARY FINDINGS
PREPARED FOR CARSON CITY**

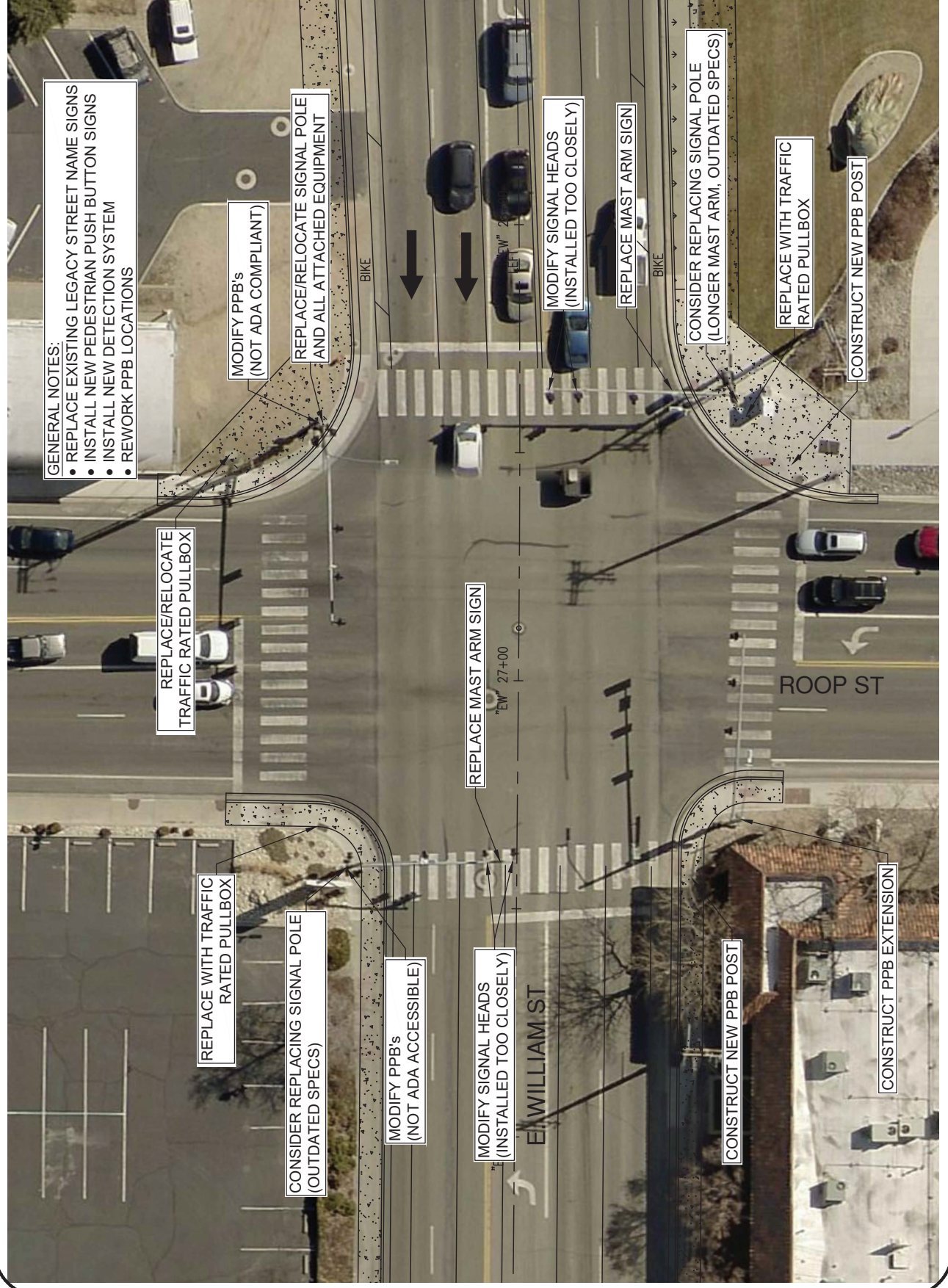


**STEWART STREET
CONCEPTUAL
SIGNAL
MODIFICATIONS**

Project # 21-022
Date JUNE 16, 2022
Sheet

TS-2





GENERAL NOTES:

- REPLACE EXISTING LEGACY STREET NAME SIGNS
- INSTALL NEW PEDESTRIAN PUSH BUTTON SIGNS
- INSTALL NEW DETECTION SYSTEM
- REWORK PPB LOCATIONS

REPLACE/RELOCATE TRAFFIC RATED PULLBOX

MODIFY PPB's (NOT ADA COMPLIANT)

REPLACE/RELOCATE SIGNAL POLE AND ALL ATTACHED EQUIPMENT

MODIFY PPB's (NOT ADA ACCESSIBLE)

MODIFY SIGNAL HEADS (INSTALLED TOO CLOSELY)

REPLACE MAST ARM SIGN

MODIFY SIGNAL HEADS (INSTALLED TOO CLOSELY)

REPLACE MAST ARM SIGN

CONSIDER REPLACING SIGNAL POLE (LONGER MAST ARM, OUTDATED SPECS)

REPLACE WITH TRAFFIC RATED PULLBOX

CONSTRUCT NEW PPB POST

REPLACE WITH TRAFFIC RATED PULLBOX

CONSIDER REPLACING SIGNAL POLE (OUTDATED SPECS)

CONSTRUCT NEW PPB POST

CONSTRUCT PPB EXTENSION

ROOP ST

E. WILLIAM ST

EW 27+00

BIKE

BIKE

E. WILLIAM STREET FEASIBILITY STUDY
 PRELIMINARY FINDINGS
 PREPARED FOR CARSON CITY



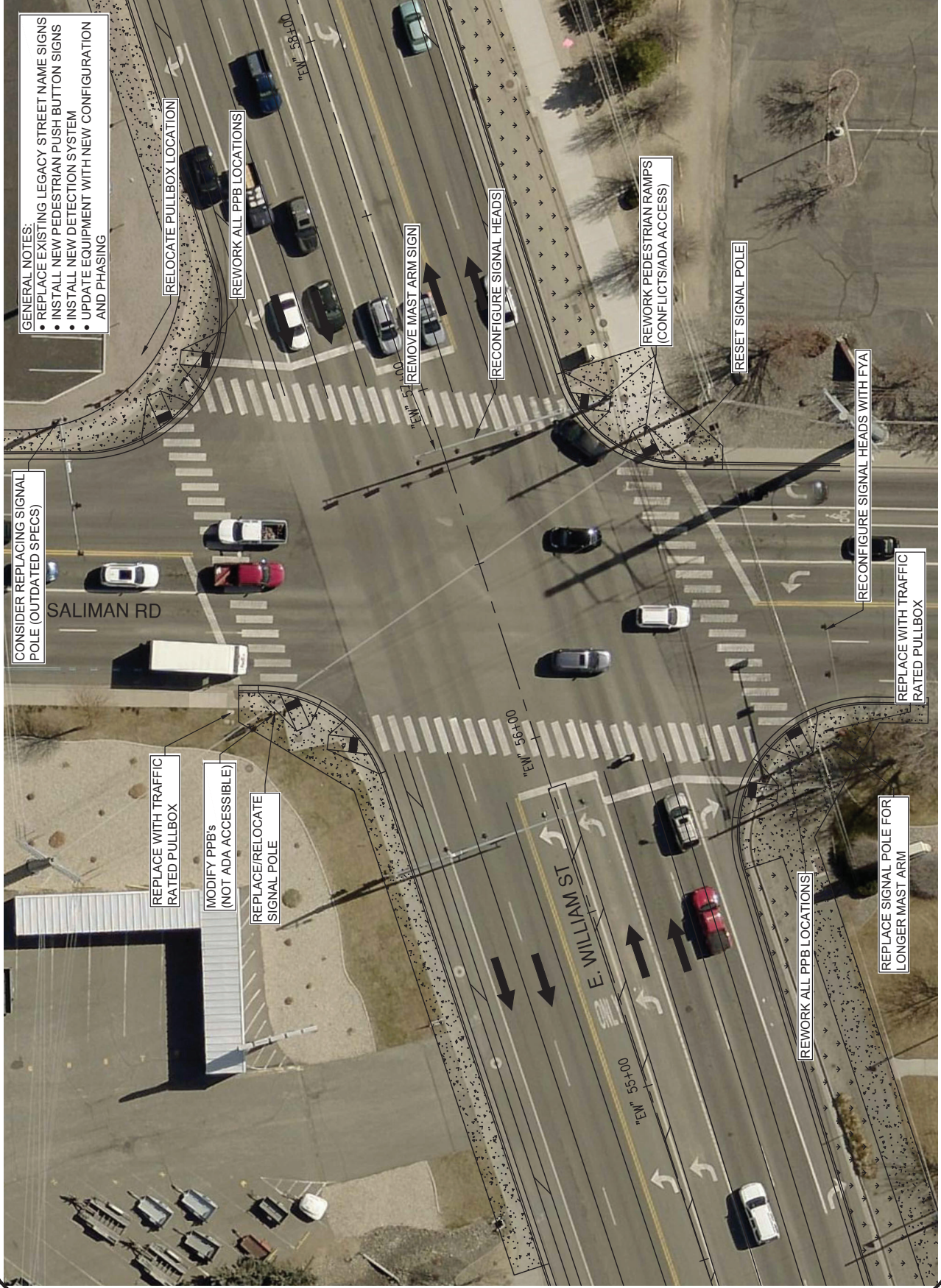
SALIMAN ROAD
 CONCEPTUAL
 SIGNAL
 MODIFICATIONS

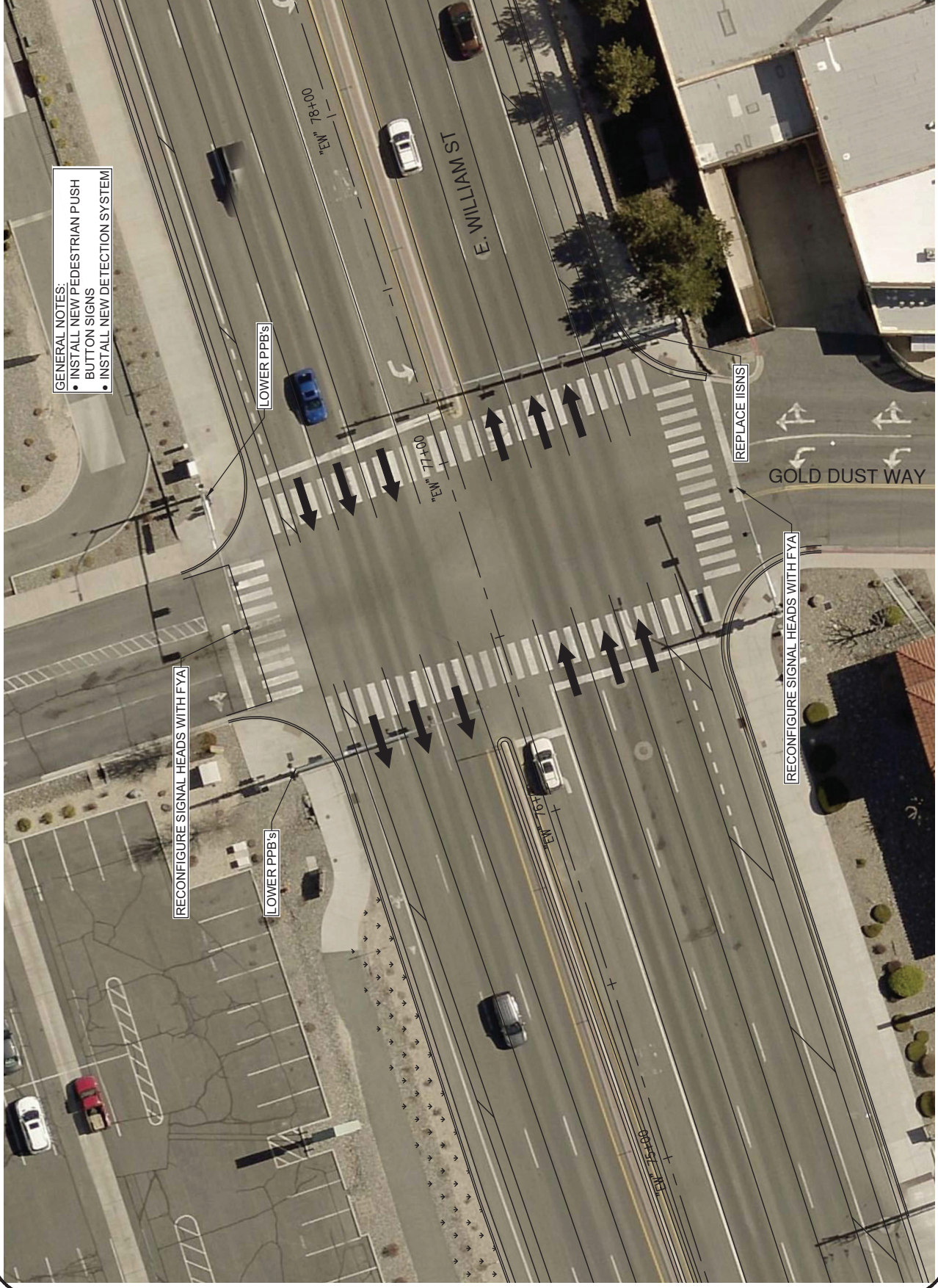
Project # 21-122

Date JUNE 16, 2022

Sheet

TS-4





GENERAL NOTES:

- INSTALL NEW PEDESTRIAN PUSH BUTTON SIGNS
- INSTALL NEW DETECTION SYSTEM

RECONFIGURE SIGNAL HEADS WITH FYA

LOWER PPB'S

LOWER PPB'S

REPLACE IIISNS

RECONFIGURE SIGNAL HEADS WITH FYA

E. WILLIAM ST

GOLD DUST WAY

"EW" 78+00

"EW" 77+00

"EW" 76+00

"EW" 75+00



TRAFFIC SIGNAL & INTERCONNECT - ENGINEER'S ESTIMATE OF PROBABLE COST

Preliminary

June 16 2022

ITEM #	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL	Carson St	Stewart St	Roop St	Sallman Rd	Gold Dust Way	NDOT Count Stations	Interconnect (Carson to Sallman)
Work Items												
1	Remove Pull Box, All Sizes	19	EA	\$400.00	\$7,600.00	3	5	3	3			
2	Remove Signal Pole (Foundation to Remain)	5	EA	\$2,500.00	\$12,500.00	3	1		1			
3	Remove Signal Pole and Foundation	3	EA	\$5,000.00	\$15,000.00	1		1	1			
4	Remove Pedestrian Push Button Sign	40	EA	\$150.00	\$6,000.00	8	8	8	8	8		
5	Remove Mast Arm Sign	3	EA	\$200.00	\$600.00	1		2				
6	Remove Street Name Sign	11	EA	\$500.00	\$5,500.00	1	3	3	3	1		
7	Remove Signal/Pedestrian Head	9	EA	\$500.00	\$4,500.00	3	1		1	4		
8	Remove Detection Camera	14	EA	\$500.00	\$7,000.00	1	3	3	3	4		
9	Relocate Pedestrian Push Button Stations	7	EA	\$3,000.00	\$21,000.00	2	3	1	1			
10	Adjust Pedestrian Push Button Height	4	EA	\$500.00	\$2,000.00					4		
11	Realign Existing Signal Heads	5	EA	\$1,000.00	\$5,000.00							
12	Reinstall Existing Equipment on New Signal Pole	6	EA	\$10,000.00	\$60,000.00	3	1	1	1			
13	New Detection System	5	LS	\$40,000.00	\$200,000.00	1	1	1	1	1		
14	4" HDPE SDR 11 Multiduct	5000	LF	\$35.00	\$175,000.00							5000
15	Additional Trench and Backfill (marginal cost increase to joint trench)	4500	LF	\$10.00	\$45,000.00							4500
16	3" PVC Conduit	800	LF	\$20.00	\$16,000.00	200	200	200	200			
17	Trench and Backfill	900	LF	\$150.00	\$135,000.00	100	100	100	100			500
18	Conductors	400	LF	\$10.00	\$4,000.00	100	100	100	100			
19	#7/7E Traffic Rated Pull Box	21	EA	\$5,000.00	\$105,000.00	3	5	3	3		5	2
20	#9/9E Traffic Rated Pull Box/Splice Vault	5	EA	\$8,000.00	\$40,000.00							5
21	Type 30/35/30-A/35-A Pole (Existing Foundation)	5	EA	\$33,000.00	\$165,000.00	3	1		1			
22	Type 30/35/30-A/35-A Pole and New Foundation	1	EA	\$37,000.00	\$37,000.00			1				
23	Replace Type 30/35 Pole (Outdated Specifications)	3	EA	\$37,000.00	\$111,000.00			2	1			
24	Type 1 Pole and Foundation	4	EA	\$4,000.00	\$16,000.00			2	2			
25	Improved Crosswalk Lighting	2	LS	\$25,000.00	\$50,000.00			1				
26	New Street Name Sign	17	EA	\$3,750.00	\$63,750.00	4	4	4	4	1		
27	# 12 AWG Tracer Wire & Pull Ropes	5000	LF	\$5.00	\$25,000.00							5000
28	New Pedestrian Push Button Sign	40	EA	\$750.00	\$30,000.00	8	8	8	8	8		
29	Sign, Mast Arm Mounted	8	EA	\$1,000.00	\$8,000.00	4	1	2	1			
30	1W4C Signal Head	14	EA	\$2,000.00	\$28,000.00	8			2	4		
31	Reset Signal Pole	1	EA	\$1,000.00	\$1,000.00							
32	Pedestrian Push Button Station Extension (Single)	3	EA	\$600.00	\$1,800.00			2	1			
33	Vehicle Loop Detector	40	EA	\$1,500.00	\$60,000.00						40	
34	Replace Pull Boxes, All Sizes	1	LS	\$40,000.00	\$40,000.00							
35	Contract Allowance	1	ALLOW	\$50,000.00	\$50,000.00							
TOTAL					\$1,553,250.00							