

# PROJECT SUMMARY

## VISION

A PEDESTRIAN UNDERPASS OF FOOTHILL DRIVE AIMED TO DEVELOP A SAFE AND ACCESSIBLE ALTERNATIVE TO THE EXISTING AT-GRADE CROSSWALK, AND ENCOURAGE NON-VEHICULAR MODES OF TRAVEL IN THE VICINITY



## INTENDED USERS

- TRAVELERS FOR BUSINESS & RECREATIONAL PURPOSES
- ACCESSIBLE FOR ALL NON-VEHICULAR MODES & ALL ABILITIES
- SHORT TRIPS TO AND FROM LOCAL REGIONS:

- ① UNIVERSITY OF UTAH
- ② RESEARCH PARK
- ③ NEW HIGH DENSITY RESIDENCES
- ④ VETERAN AFFAIRS FACILITIES
- ⑤ SURROUNDING NEIGHBORHOODS
- ⑥ FOOTHILL TRAIL SYSTEM
- ⑦ FORT DOUGLASS & DORMS
- ⑧ UNIVERSITY ATHLETIC EVENTS

## PROJECT TEAM & CONTACT INFO

ALL RELEVANT DESIGN & CALCULATIONS PERFORMED BY SPRING 2023 CVEEN 4910 CAPSTONE CLASS

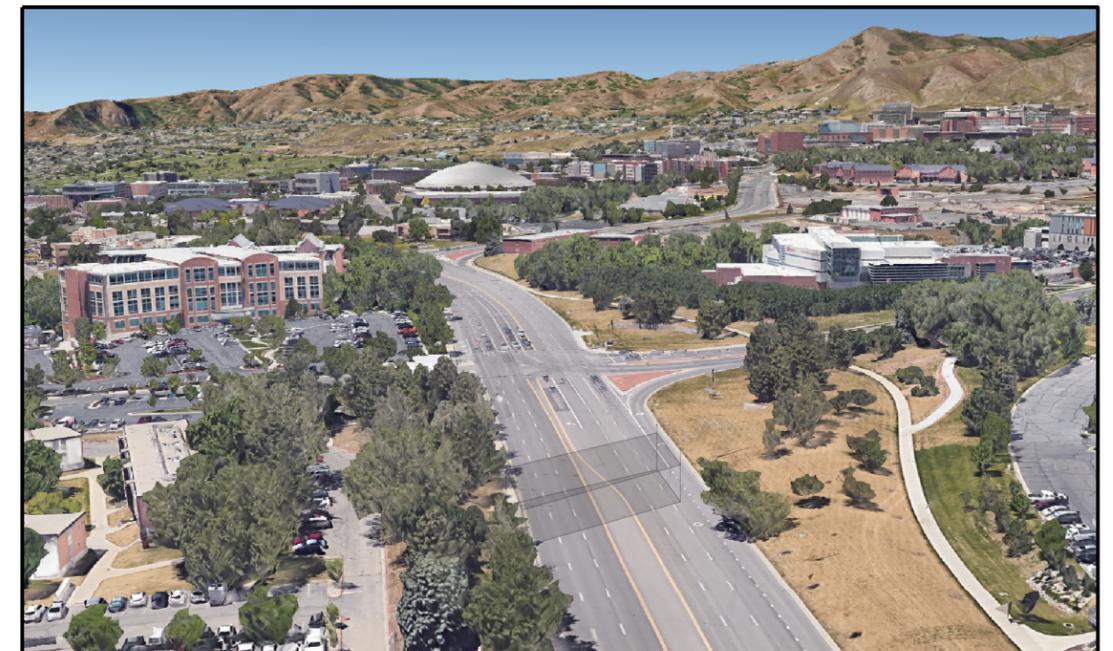
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## GOALS & NEEDS

- REDUCE VOLUME ON FOOTHILL DRIVE BY INCREASING AVAILABLE OPTIONS OF TRAVEL FOR SHORT TRIPS IN THE AREA
- INCREASE ACCESSIBILITY BETWEEN AREAS IN THE VICINITY
- INCREASE SAFETY FOR PEDESTRIANS, CYCLISTS, AND OTHER NON-MOTORISTS
- COLLABORATION WITH STAKEHOLDERS AND INTEREST GROUPS TO BETTER INTEGRATE UNDERPASS INTO FUTURE TRAIL SYSTEM & PUBLIC TRANSPORT
- WORK TOWARDS TURNING FOOTHILL DRIVE INTO A "COMPLETE STREET"

## STAKEHOLDERS

- SALT LAKE CITY
- UTAH DEPARTMENT OF TRANSPORTATION
- UNIVERSITY OF UTAH
- RED BUTTE CREEK STEERING COMMITTEE
- VETERAN AFFAIRS

## ORGANIZATION & PARTICIPANTS

- CVEEN 4910 CAPSTONE CLASS PERFORMS ALL RELEVANT DESIGN WORK AND CALCULATIONS
- MENTORSHIP AND DESIGN RESOURCES PROVIDED BY CITY OF SALT LAKE, CVEEN 4910 INSTRUCTIONAL STAFF, AND OUTSIDE CONSULTANTS (PARAMETRIX, CONETEC, AGECE)
- ALL DESIGN TO BE APPROVED BY UDOT, AS FEDERAL FUNDING WOULD BE DISTRIBUTED BY UDOT

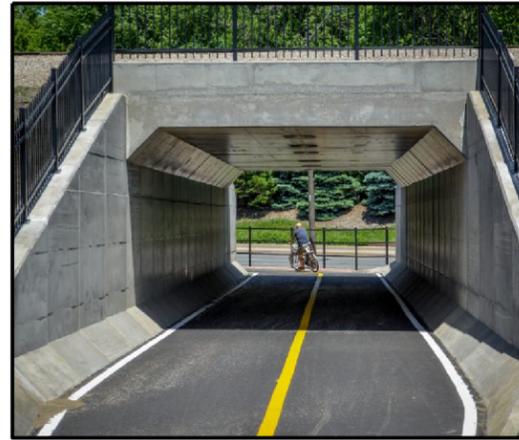


# PROJECT CRITERIA

## CRITERIA SYSTEMS

THE DESIGN CONSIDERS MULTIPLE CRITERIA SYSTEMS TO ENSURE HIGH DESIRABILITY AND FUNCTIONALITY

CRITERIA SYSTEM	CRITERIA SYSTEM	
<b>ENVISION</b> 	PROJECT ASSESSES SUSTAINABILITY BY CONSIDERING QUALITY OF LIFE, LEADERSHIP, RESOURCE ALLOCATION, NATURAL WORLD, AND CLIMATE RESILIENCE	 <b>SUSTAINABLE</b>
<b>CPTED</b> CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN	WITH NATURAL LIGHTING, OPEN ATMOSPHERE, AND LONG SIGHT DISTANCES, THE DESIGN DISCOURAGES CRIME AND INCREASES COMFORT	 <b>SAFE</b>
 AMERICANS WITH DISABILITIES ACT	THE PROJECT DESIGN MEETS ADA FRIENDLY DESIGN STANDARDS SUCH AS SLOPES AND DIMENSIONS TO ENHANCE ACCESSIBILITY	 <b>INCLUSIVE</b>

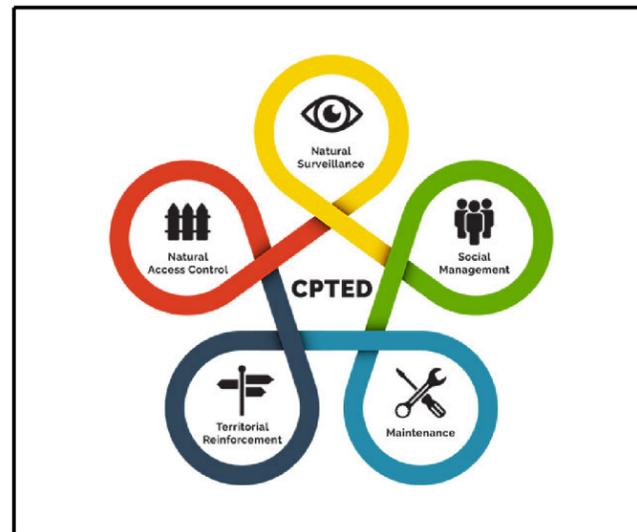


## DECISION CRITERIA

- DESIGN MUST BE SAFER AND EQUALLY OR MORE DESIRABLE TO USE THAN THE EXISTING AT-GRADE CROSS-WALK
- ALL TRAIL PATHS SHALL BE AT A 5% GRADE OR LESS TO MAINTAIN SMOOTH TRANSITIONS AND ENABLE ADA USERS TO ACCESS
- INTEGRATE CPTED, COMMUNITY ART, LANDSCAPING, ENVISION ELEMENTS, AND AESTHETIC APPEAL INTO THE DESIGN TO ADD AND PRESERVE VALUE OF THE PROJECT AREA
- REDUCE COSTS WHERE POSSIBLE, WITHOUT COMPROMISING QUALITY OF FINAL PRODUCT

## DESIGN CRITERIA

- DESIGN MUST NOT NEGATIVELY IMPACT UDOT RIGHT OF WAY, AND EXISTING VEHICLE TRAFFIC CONDITIONS MUST NOT BE ALTERED
- AREA OF DESIGN IS TO OCCUR ON UNIVERSITY OF UTAH PROPERTY AND UDOT RIGHT OF WAY
- SOME UNDERGROUND UTILITIES WILL REQUIRE RELOCATION. UTILITIES SHALL BE RETURNED TO ORIGINAL OR IMPROVED FUNCTIONALITY.
- DESIGN MUST EFFECTIVELY CONVEY/RETAIN STORMWATER
- CITY, COUNTY, UDOT, AND FEDERAL ENGINEERING STANDARDS ARE TO BE FOLLOWED



## CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

"A MULTI-DISCIPLINARY APPROACH OF CRIME PREVENTION THAT USES URBAN AND ARCHITECTURAL DESIGN AND THE MANAGEMENT OF BUILT AND NATURAL ENVIRONMENTS.

CPTED STRATEGISTS AIM TO REDUCE VICTIMIZATION, DETER OFFENDER DECISIONS THAT PRECEDE CRIMINAL ACTS, AND BUILD A SENSE OF COMMUNITY AMONG INHABITANTS SO THEY CAN GAIN TERRITORIAL CONTROL OF AREAS, REDUCE CRIME, AND MINIMIZE FEAR OF CRIME"

- ICA ASSOCIATION



## SUCCESSFUL OUTCOMES

- PEDESTRIANS, CYCLISTS, AND OTHER USERS SHALL BE ABLE TO CROSS FOOHIL DRIVE SAFELY AND WITHOUT INCONVENIENCE
- DESIGN ALLOWS ADA USERS TO HAVE EASY MOBILITY IN THE PROJECT AREA
- PROJECT PROVIDES A POTENTIAL CONNECTION TO THE FUTURE RED BUTTE CREEK TRAIL THAT CAN SEAMLESSLY INTEGRATE WITH FUTURE ENGINEERING PROJECTS
- ENCOURAGES TRAVELERS TO OPT FOR HUMAN-POWERED TRAVEL OVER PERSONAL VEHICLES

## BASIS OF DESIGN

- INTEGRATION OF STAKEHOLDER NEEDS AND DESIGN INPUT, INCLUDING ADA COMPLIANCE, CPTED DESIGN, AND SAFETY FOR USERS
- WITH "ENVISION ANALYSIS, ENCOURAGE USE OF SUSTAINABLE MATERIALS, LANDSCAPING, AND CONSTRUCTION METHODS
- EMPHASIS ON ACCESSIBILITY TO USERS OF ALL ABILITIES, INCLUDING USERS WITH DISABILITIES

# ALTERNATIVES & DESIGN PROCESS



## DESIGN SELECTION PROCESS

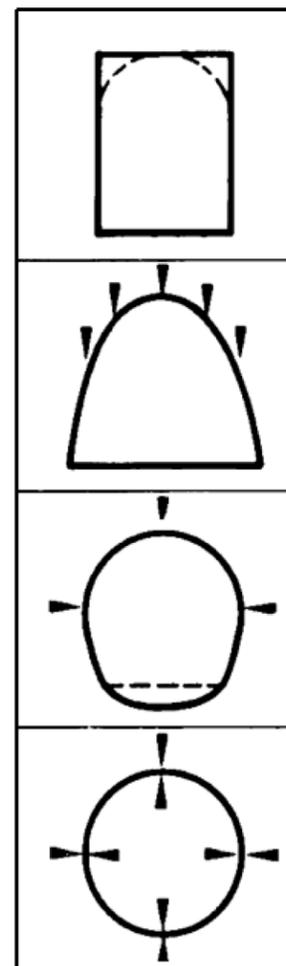
FOUR FEASIBLE LOCATIONS (DARK BLUE) WERE SELECTED FROM THE (CYAN) PROJECT AREA. EACH OF THESE ALTERNATIVES WERE QUALITATIVELY RANKED BASED ON THE OUTLINED CRITERIA.

## UNDERPASS DESIGN ALTERNATIVES

VARIOUS GEOMETRIES AND DIMENSIONS WERE ANALYZED. CONSIDERATIONS INCLUDED THE FOLLOWING:

- AVAILABLE HEADROOM
- COMFORT OF PASSING DISTANCE
- EASE OF CONSTRUCTION
- INTEGRATION WITH ROADWAY ABOVE

## CROSS SECTIONS



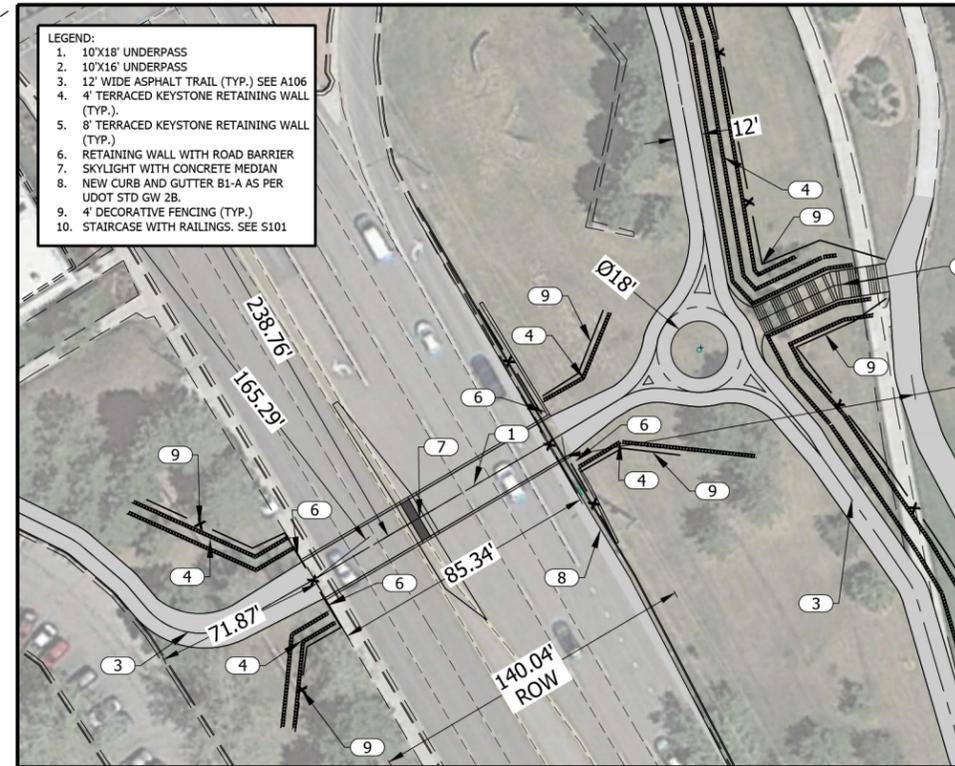
## EXISTING UTILITY MAP



## SPATIAL DESIGN CONSIDERATIONS

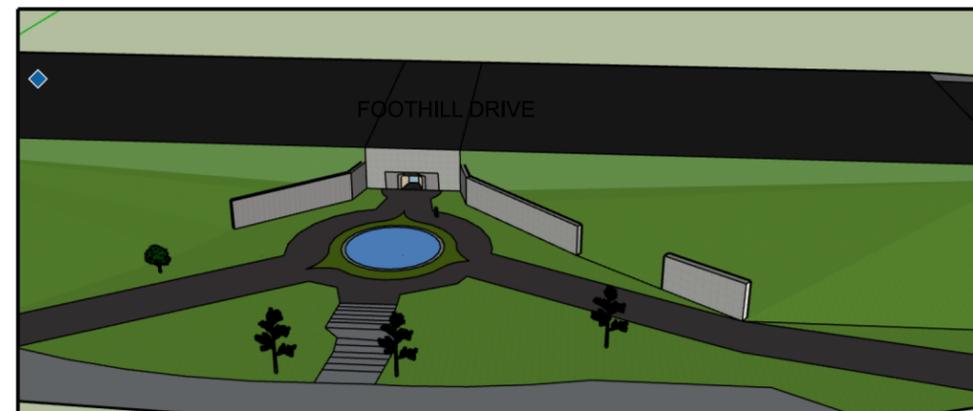
- **EXISTING UTILITIES**  
MINIMIZE INTERFERENCE WITH EXISTING UTILITIES, AND RELOCATE IF NECESSARY
- **EXISTING TERRAIN**  
LOCATIONS SHALL BE CHOSEN WHERE CUT AND FILL VOLUMES ARE MINIMIZED
- **AVAILABLE SPACE**  
SELECT AREAS WHERE SPACE ALLOW FOR DESIGN OF PATHING AND CONSTRUCTION
- **PROPERTY LINES**  
CONSIDER AND RESPECT ALL PROPERTY LINES  
NO PART OF THE PROJECT AREA SHALL OCCUR ON FEDERAL PROPERTY
- **PROXIMITY TO INTENDED USERS**  
SELECTED PROJECT LOCATION SHALL BE PROXIMAL TO THE INTENDED USERS AND POSE NO SIGNIFICANTLY INCREASED TRAVEL DISTANCE AS COMPARED TO THE EXISTING CROSSWALKS
- **CONSTRUCTION FEASIBILITY**  
THE DESIGN LOCATION SHALL ALLOW AMPLE SPACE FOR EQUIPMENT AND THE TEMPORARY TRAFFIC MANAGEMENT PLAN DURING LANE CLOSURES

# SELECTED DESIGN & EFFECTIVENESS



## EFFECTIVENESS

- CONNECTS PEDESTRIAN WALKWAYS TO RED BUTTE CREEK, ELIMINATING PEDESTRIAN & VEHICULAR INTERACTIONS
- ADA COMPLIANT DESIGN ENSURES THAT PEOPLE OF ALL ABILITIES CAN USE THE FACILITY
- CPTED ELEMENTS PRIORITIZE SAFETY AND COMFORT OF USERS THROUGH LIGHTING, PASSING SPACE, OPEN ATMOSPHERE
- EXPANDS TRAVEL OPTIONS, AND INTEGRATES WITH EXISTING PUBLIC TRANSIT, POTENTIALLY REDUCING PERSONAL VEHICULAR USE IN THE AREA
- WELL-PLANNED LANDSCAPING PRESERVES AND ENHANCES THE NATURAL AND BUILT ENVIRONMENT



## SUMMARY

- PROACTIVELY ANTICIPATES INCREASE IN COMMUTERS FROM NEW HIGH DENSITY DEVELOPMENTS ON SUNNYSIDE AVENUE AND MARIO CAPPECHI WAY
- PROVIDES A SAFE AND DESIRABLE ALTERNATIVE TO EXISTING AT-GRADE CROSSWALK AT FOOTHILL DRIVE
- REDUCES TRAVELERS' DEPENDENCY ON PERSONAL VEHICLES, AND INTEGRATES WITH EXISTING BUS STOPS FOR CONVENIENT TRAVEL
- INTENDED FOR BUSINESS, SCHOOL, RECREATION RELATED TRAVEL
- HOPES TO REDUCE SHORT VEHICLE TRIPS IN LOCAL AREA TO REDUCE CONGESTION ON FOOTHILL DRIVE
- AIMS TO ENHANCE ENVIRONMENTAL, AESTHETIC, AND RECREATIONAL VALUE OF THE AREA THROUGH LANDSCAPING AND SPACE UTILIZATION
- GEARED TOWARDS A SEAMLESS INTEGRATION WITH THE EXPECTED FUTURE RED BUTTE CREEK TRAIL

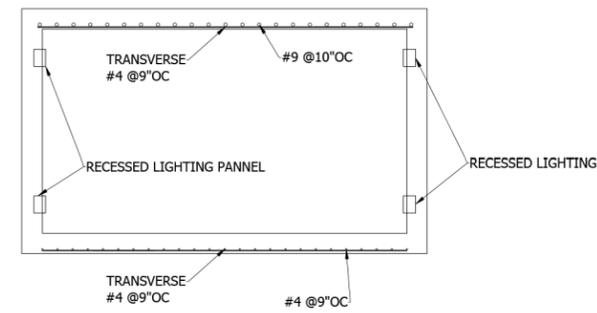
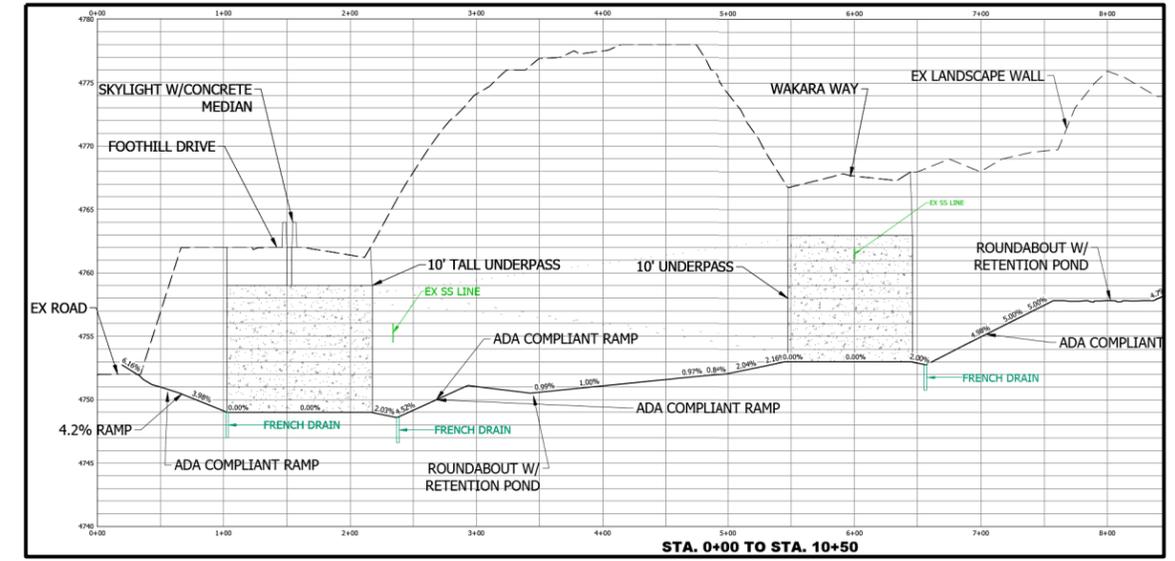
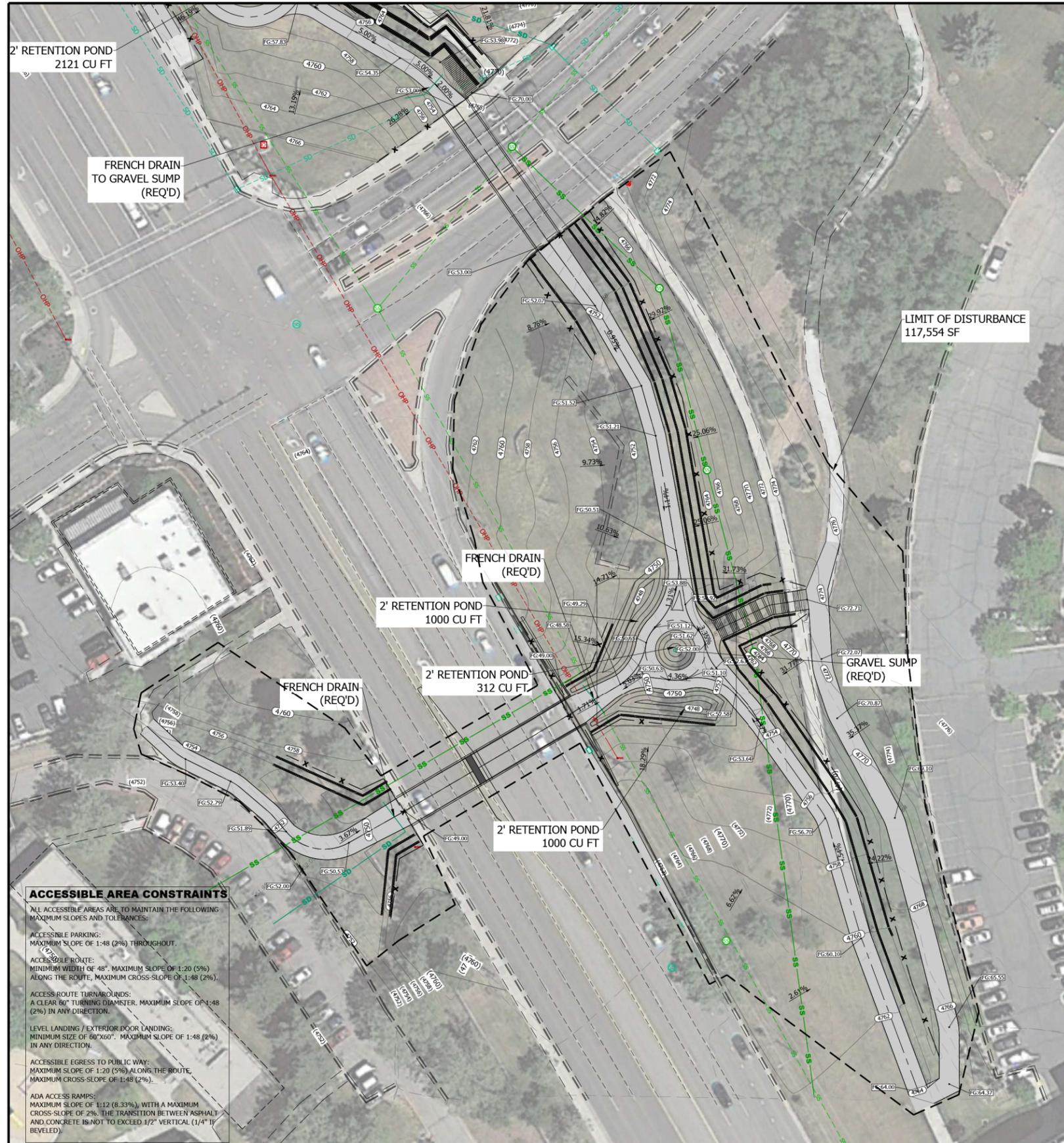
## PROPOSED DESIGN

- 10' X 18' CONCRETE BOX
- SKYLIGHT FROM CONCRETE MEDIAN & RECESSED LIGHTING PANELS FOR ENHANCED VISIBILITY
- SUNKEN ROUNDABOUT PLAZA TO FACILITATE TRAFFIC AND CREATE OPEN FEEL
- INCLUDES RETAINING WALLS, DETENTION BASINS, FENCES, AND NEW LANDSCAPING
- TO CONNECT TO NEIGHBORING WAKARA WAY UNDERPASS VIA 12' ASPHALT PATHING
- CONNECTION TO FUTURE BONNEVILLE SHORELINE TRAIL TO BE COMPLETED IN FUTURE
- EMPHASIS ON ADA ACCESSIBILITY, CPTED, PRESERVATION AND AUGMENTATION OF VALUE

## WORK DESCRIPTION

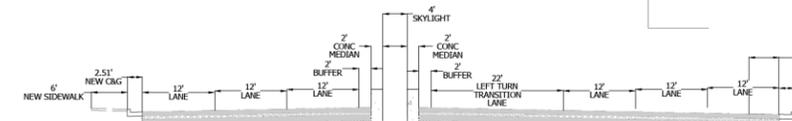
- EXCAVATION OF PROJECT AREA ON EITHER SIDE OF FOOTHILL DRIVE
- RETAINING STRUCTURES
- RELOCATION OF EXISTING UTILITIES AS NECESSARY AND INTEGRATION INTO UTILITY NETWORK
- REGRADING AND STORM WATER DETENTION/CONVEYANCE FEATURES
- TRAFFIC MANAGEMENT AND TEMPORARY PAVEMENT TO FACILITATE ACCEPTABLE VOLUME OF TRAFFIC
- CONCRETE BOX CONSTRUCTION UNDER FOOTHILL DRIVE, DONE IN 3 PHASES.
- REPAVING DAMAGED SECTION OF FOOTHILL DRIVE AND RESORATION OF STRIPING
- LANDSCAPING AND REVEGETATION

# ENGINEERING DESIGN

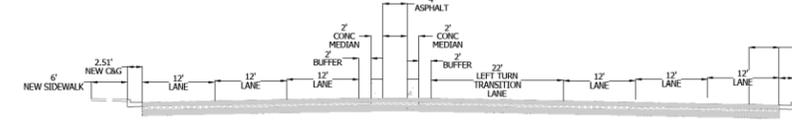


## DESIGN FEATURES

- RELOCATED STORM DRAIN AS SHOWN ON PLAN
- DETENTION BASINS IN ROUNDABOUT AND ON OUTER SIDE OF PATH
- TIERED RETAINING WALLS CREATE OPEN FEEL AND LANDSCAPING AREAS
- ELECTRIC LIGHTING SYSTEM AND MEDIAN SKYLIGHT ENSURE LIGHT AT ALL TIMES
- STAIRS LEADING UP TO EXISTING SIDEWALK PATHS
- SOUTHWEST TERMINUS OF UNDERPASS LEAVES POTENTIAL FOR CONNECTION TO FUTURE PATHING FROM ANTICIPATED RED BUTTE CREEK TRAIL



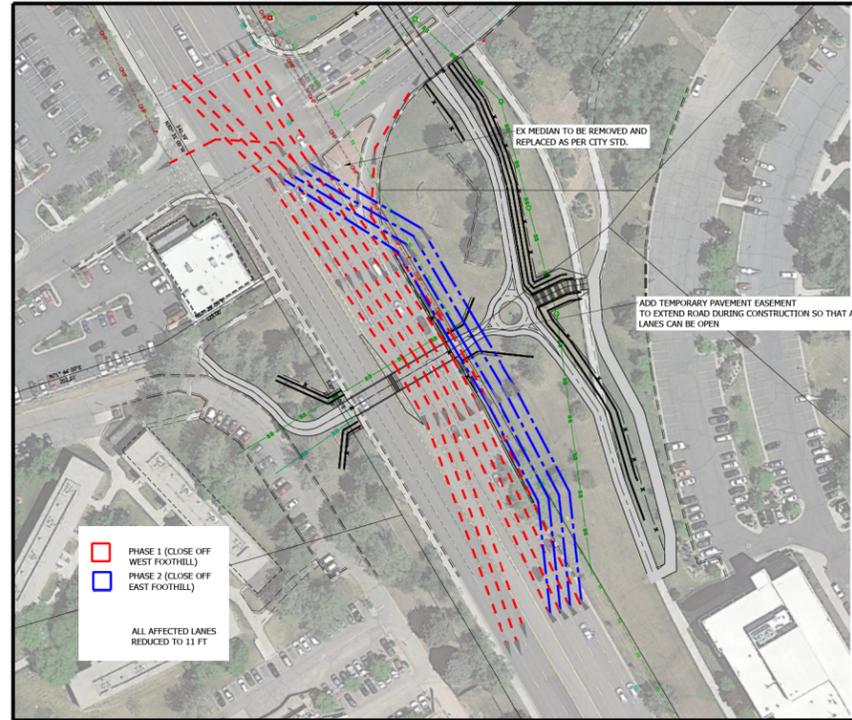
FOOTHILL DRIVE ROAD X-SECTION AT CENTERLINE



FOOTHILL DRIVE ROAD X-SECTION NORTH AND SOUTH OF UNDERPASS

# TRAFFIC MANAGEMENT & COST

## FOOTHILL DRIVE



- LANES WILL BE CLOSED IN 3 SEPARATE SECTIONS, WITH 8 LANES OF TRAFFIC OPEN THROUGHOUT CONSTRUCTION
- TEMPORARY ROAD TO BE BUILT ON UNIVERSITY OF UTAH PROPERTY
- ALTERNATE ROUTES PLANNED TO DIVERT TRAFFIC TO ACCOUNT FOR REDUCED LANE WIDTH
- PAVEMENT PATCHING AND SURFACING REQUIRED AFTER UNDERPASS INSTALLATION
- ESTIMATED 6 WEEK PERIOD OF CONSTRUCTION IMPACTS TO TRAFFIC
- TRAFFIC PATTERNS RETURN TO NORMAL
- FUTURE OPPORTUNITY TO ELIMINATE AT-GRADE CROSSWALK

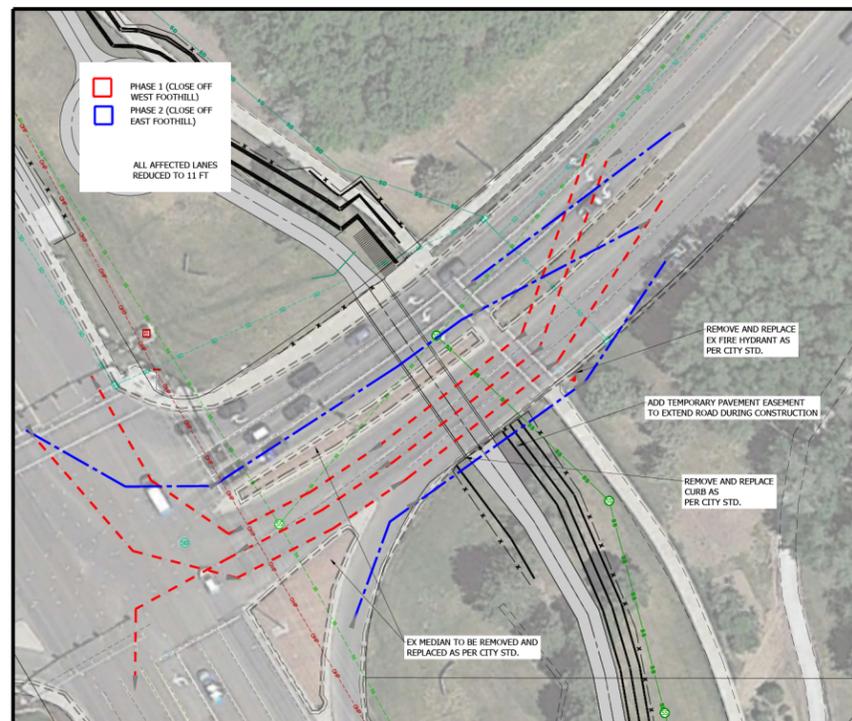
## ECONOMIC

- WHOLISTIC PRICE TAG APPROXIMATELY \$6.3M
- FEDERAL FUNDING ADMINISTERED BY UDOT
- FOCUS ON COST REDUCTION, WITH BUDGET FOR AESTHETIC ENHANCEMENT AND COMMUNITY VALUE SUCH AS SUNKEN PLAZA AND LANDSCAPING

## COST BREAKDOWN

Item	Units	Number	Cost/Number	Total Cost
Excavation	yd <sup>3</sup>	36000	\$50	\$1,800,000
Concrete	yd <sup>3</sup>	732	\$1,500	\$1,098,000
Repaving Road	mile	0.01	\$980,000	\$9,800
Construction and Traffic Management Plan	N/A	N/A	N/A	\$1,248,322
Labor	N/A	N/A	N/A	\$1,248,322
Sewer Line Relocation Cost	ft	420	\$250	\$105,000
Curb Relocation	ft	300	\$21	\$6,300
Asphalt Walkways	ft	540	\$35	\$18,900
Drain Water Line Relocation Cost	ft	77	\$250	\$19,250
Equipment Cost	N/A	N/A	N/A	\$60,000
Median w/ Skylight	ft <sup>2</sup>	255	\$8.00	\$2,040.00
Pavement Markings	ft	495	\$3.06	\$1,514.70
Contingency	%	10	N/A	\$624,161
Total Cost				\$6,241,609

## WAKARA WAY



- LANES WILL BE CLOSED IN 2 SEPARATE SECTIONS, WITH 3 LANES OF TRAFFIC OPEN THROUGHOUT CONSTRUCTION
- ALTERNATE ROUTES PLANNED TO DIVERT TRAFFIC TO ACCOUNT FOR REDUCED LANE WIDTH
- PAVEMENT PATCHING AND SURFACING REQUIRED AFTER UNDERPASS INSTALLATION
- ESTIMATED 4 WEEK PERIOD OF CONSTRUCTION IMPACTS TO TRAFFIC
- TRAFFIC PATTERNS RETURN TO NORMAL
- FUTURE OPPORTUNITY TO ELIMINATE AT-GRADE CROSSWALK

**FINAL COST: \$6.3M**