



Date: December 21, 2011

Deliver To: City of Fremont

From: Eric Girod, P.E., BKF Engineers

Subject: South Fremont / Warm Springs Area Studies
Utility Infrastructure Impacts and Mitigations Analysis

BKF Engineers has prepared an analysis of the anticipated utility infrastructure improvements associated with the South Fremont / Warm Springs Area Study Land Use Alternatives. The improvements identified below represent an "order of magnitude" study to help establish a general understanding of the potential infrastructure and associated costs required to facilitate development.

In order to document that utility infrastructure anticipated for each land use alternative we first developed conceptual infrastructure demands for domestic water, sanitary sewer, and storm drain based on proposed land uses and densities. We then met with the respective utility districts to present our findings and confirm if adequate infrastructure was in place or if additional infrastructure mitigation was required to support the proposed uses. These results were reviewed in conjunction with the transportation infrastructure improvements identified in Fehr & Peers memorandum to identify the nature of the necessary improvements and where they should be implemented within each alternative. Improvements were ultimately documented and assigned costs by priority grouping (see Infrastructure Cost Analysis Summary).

The Study Area benefits from a well developed regional water, sewer, and storm infrastructure network that in general has sufficient capacity to accommodate the proposed land uses and densities. New utility infrastructure improvements are therefore substantially limited to extending facilities to the various development parcels within new streets or streets identified by the traffic study to be improved.

A priority system was developed by Fehr & Peers in conjunction with the City to identify improvements considered necessary to facilitate development within the Study Area as well as improvements that are less critical and may benefit the area as it becomes more fully developed. Street cross-sections for the proposed roadway network served as the basis for the bulk of the cost analysis. Costs per linear foot of street infrastructure were estimated from presumed pipe sizes, street widths, landscape improvements, and other street improvements using recent unit cost information. Note that the analysis did not take into consideration costs associated with land acquisition to establish public right of way for the new roadways. At the request of the City, a contingency for the Tesla Frontage Road land acquisition was provided as described below.

Our below analysis utilizes the format developed by Fehr & Peers and the City to document the proposed infrastructure costs. The analysis provides order of magnitude cost summaries for each improvement "Tier" by Alternative and include Soft Costs for design, Inspection, Staking, Construction Administration, and Project Management.

Interchange Improvements

Fehr & Peers identified three freeway interchanges that will likely require modification to facilitate the Study Area build out. Although their report identifies in general terms some potential interchange modifications that could benefit the Study Area, additional more detailed traffic studies along with geotechnical and structural analysis is necessary to fully scope the necessary improvements. As such our costing of each interchange reflects only a gross "order of magnitude" cost based on the assumed complexity of each intersection in relation to one another. For example, the costs associated with the I-680 / Auto Mall Parkway Interchange are higher than the I-680 / Mission Boulevard Interchange to reflect an anticipated more complex scope of improvements. A \$20 Million base cost was identified in a Project Study Report associated with the I-680 / Mission Boulevard interchange and used as a reference point for the other two interchanges.

Local Street and Intersection Improvements

The Fehr & Peers report identifies two existing intersections for potential upgrades to support the ultimate buildout of the Study Area. These intersections identified for additional improvements are South Grimmer Boulevard / Warm Springs Boulevard and Fremont Boulevard / South Grimmer Boulevard. As specific improvements required to cost these intersection upgrades are not yet defined, BKF assigned a generic lump sum dollar amount for each intersection as a place holder. The lump sum reflects industry average signal and street construction costs associated with typical intersection improvements.

Local Street Connections and New Streets

Several new local streets as well as modifications to existing streets are proposed to enhance street connectivity and facility access within the Study Area. City of Fremont Standard Details for Street Geometrics was used to determine appropriate cross-sections for proposed roadways. We used standard design practices to then establish the quantity and type of improvements anticipated for each new roadway section on a linear foot basis. New streets are anticipated to require full sewer, storm, water, and underground joint trench facilities. In addition, 4% of the impervious street improvements is allocated for water quality treatment measures and costed on a square foot basis.

Two existing streets are also identified in the Fehr & Peers study to be modified in order to support the development of the Study Area. The first proposed improvement is the conversion of approximately 7,300 linear feet of private frontage road within the former NUMMI parcel to a public roadway. This roadway is referred to in the Fehr & Peers report as the Tesla Frontage Road. The road currently consists of concrete asphalt pavement approximately 44' wide with concrete and asphalt berms on portions of both sides of the roadway. The majority of the roadway has no storm drains or curb. For the purposes of this cost exercise we assumed that the roadway structural section would be sufficient to support the proposed traffic loads and therefore limited the new surface improvements to constructing curb, gutter, sidewalk, asphalt pavement overlay, and landscape improvements.



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Underground improvements for the Tesla Roadway conversion include extending a 12" sewer main approximately 650 feet north within the existing roadway, south of future Parcel 3 (as identified in the Land Use Alternatives by Perkins + Will). In addition new joint trench, storm drain facilities, and a 12" water main are programmed into the cost estimate and are assumed to be constructed outside of the existing pavement section. Treatment requirements are anticipated to be limited to only the new sidewalk and therefore treatment facilities can be programmed directly into the adjacent landscape median strip. Additionally, negotiations between the City and owner of the private roadway will need to occur for the City to acquire the land necessary to establish public right of way. At this time we have included a place holder land cost per square foot as a footnote only outside the estimate totals. We've assumed a 65' right of way over 7,300 lineal feet of road. The land cost unit price is based on a similar land transfer agreement between an industrial land owner and Bay Area City and is provided only as a place holder. The ultimate land price will need to be negotiated between the two parties and may vary significantly from what the current place holder based on actual or perceived land values at the time of the negotiations.

The second roadway modification proposes to extend the existing improvements on Old Warm Springs Boulevard through Lopes Court and to the Union Pacific Rail Road. An existing 28' wide asphalt roadway will be widened to a standard 2-lane City roadway with sidewalk, and Class II bike lanes on both sides. Storm drain, water main and joint trench extensions are anticipated for the full length of roadway widening improvements. Sufficient sewer facilities within the roadway currently exist and are not anticipated to require mitigation.

Transit, Bicycle, Pedestrian Improvements

Various transit, bicycle, and pedestrian improvements both within and outside the Study Area are identified in the Fehr & Peers report to help mitigate low transit accessibility and to enhance the Area pedestrian and bicycle access. Similar to our methodology for assigning cost values to the previously mentioned interchanges and intersection improvements we have assigned place holder order of magnitude costs for those improvements that require more detailed analysis. These include bus stop enhancements, structural pedestrian crossings, and intersection modifications pedestrian upgrades. Costs provided are based on our experience with similar improvements.



SOUTH FREMONT/WARM SPRINGS AREA STUDIES
INFRASTRUCTURE COST ANALYSIS
 12/21/2011 (revised 2/3/12)

ITEM	DESCRIPTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	UNITS	UNIT COST	QUANTITY	COST	
A INTERCHANGE IMPROVEMENTS									
1	I-680 / Mission Boulevard Interchange	Tier 1	Tier 1	Tier 1	LS	\$20,000,000	1	\$20,000,000	
2	I-680 / Auto Mall Parkway Interchange	Tier 1	Tier 1	Tier 1	LS	\$30,000,000	1	\$30,000,000	
3	I-880 / Fremont Boulevard Interchange	Tier 1	Tier 1	Tier 1	LS	\$15,000,000	1	\$15,000,000	
INTERCHANGE SUBTOTAL								\$65,000,000	
B LOCAL STREET AND INTERSECTION IMPROVEMENTS									
1	South Grimmer Boulevard / Warm Springs Boulevard	Tier 1	Tier 1	Tier 1	LS	\$300,000	1	\$300,000	
2	Fremont Boulevard / South Grimmer Boulevard	Tier 1	Tier 1	Tier 1	LS	\$300,000	1	\$300,000	
LOCAL STREET AND INTERSECTION SUBTOTAL								\$600,000	
C NEW TRAFFIC SIGNALS									
1	Fremont Boulevard / Ingot Street	Tier 1	Tier 1	Tier 1	EA	\$250,000	1	\$250,000	
2	South Grimmer Boulevard / New N/S Road (Parcel 1)	Tier 1	Tier 1	Tier 1	EA	\$250,000	1	\$250,000	
3	Warm Springs Boulevard / Reliance Way	Tier 1	Tier 1	Tier 1	EA	\$250,000	1	\$250,000	
4	Warm Springs Boulevard / Corporate Way	Tier 1	Tier 1	Tier 1	EA	\$250,000	1	\$250,000	
NEW TRAFFIC SIGNAL SUBTOTAL								\$1,000,000	
D LOCAL STREET CONNECTIONS AND NEW STREETS									
1	2-Lane Research Avenue extension to BART and Grimmer	Tier 1	Tier 1	Tier 1	LF	\$2,000	2820	\$5,600,000	
2	3-Lane Tesla Frontage Road conversion	Tier 1A	Tier 1A	Tier 1A	LF	\$1,300	7300	\$9,500,000	
3	4-Lane Ingot Street Boulevard Extension (Fremont Boulevard to BART)	Tier 1	Tier 1	Tier 1	LF	\$2,700	2600	\$7,000,000	
4	2-Lane Lopes Court Widening (UPRR to Travis Place)	Tier 1A	Tier 1A	Tier 1A	LF	\$1,300	2300	\$3,000,000	
5	2-Lane Parcel 1 N-S Extension (Ingot extension to S Grimmer Blvd)	Tier 1	Tier 1	Tier 1	LF	\$2,000	1300	\$2,600,000	
LOCAL STREET CONNECTIONS AND NEW STREET SUBTOTAL								\$27,700,000	
E TRANSIT, BICYCLE, PEDESTRIAN IMPROVEMENTS									
1	Bus Stop Enhancements (shelters, benches, lighting)	Tier 1	Tier 1	Tier 1	LS	\$100,000	1	\$100,000	
2	BART west side pedestrian access bridge	Tier 1A	Tier 1A	Tier 1A	LS	\$11,000,000	1	\$11,000,000	
3	Pedestrian Improvements at key intersections	Tier 1	Tier 1	Tier 1	LS	\$250,000	1	\$250,000	
4	Tesla Factory canal bike/ped pathway	N/A	Tier 2	Tier 2	LF	\$120	7600	\$912,000	
5	Bike/Ped I-880 Bridge Crossing	N/A	Tier 1	Tier 1	LS	\$15,000,000	1	\$15,000,000	
6	Railroad Alignment Pathway	N/A	Tier 2	Tier 2	LF	\$120	5300	\$636,000	
7	CL II bike path extension on Fremont Boulevard (Ingot to I-880)	Tier 2	Tier 2	Tier 2	LF	\$250	2500	\$625,000	
TRANSIT, BICYCLE, PEDESTRIAN IMPROVEMENTS SUBTOTAL								\$28,523,000	
TOTAL CONSTRUCTION COST								\$122,823,000	
								Design, Soft Costs, Mapping (at 15%)	\$18,423,450
								Inspection, Staking, C/A (at 10%)	\$12,282,300
								Project Management (at 5%)	\$6,141,150
GRAND TOTAL								\$159,669,900	

TIER 1A IMPROVEMENTS			
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Total Construction Costs	\$23,500,000	\$23,500,000	\$23,500,000
Design, Soft Costs, Mapping (at 15%)	\$3,525,000	\$3,525,000	\$3,525,000
Inspection, Staking, C/A (at 10%)	\$2,350,000	\$2,350,000	\$2,350,000
Project Management (at 5%)	\$1,175,000	\$1,175,000	\$1,175,000
TIER 1A GRAND TOTAL	\$30,550,000	\$30,550,000	\$30,550,000
TIER 1 IMPROVEMENTS			
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Total Construction Costs	\$82,150,000	\$97,150,000	\$97,150,000
Design, Soft Costs, Mapping (at 15%)	\$12,322,500	\$14,572,500	\$14,572,500
Inspection, Staking, C/A (at 10%)	\$8,215,000	\$9,715,000	\$9,715,000
Project Management (at 5%)	\$4,107,500	\$4,857,500	\$4,857,500
TIER 1 GRAND TOTAL	\$106,795,000	\$126,295,000	\$126,295,000
TIER 2 IMPROVEMENTS			
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
Total Construction Costs	\$625,000	\$2,173,000	\$2,173,000
Design, Soft Costs, Mapping (at 15%)	\$93,750	\$325,950	\$325,950
Inspection, Staking, C/A (at 10%)	\$62,500	\$217,300	\$217,300
Project Management (at 5%)	\$31,250	\$108,650	\$108,650
TIER 2 GRAND TOTAL	\$812,500	\$2,824,900	\$2,824,900

Notes:

- 1 Estimate based on Fehr & Peers November 17, 2011 South Fremont / Warm Springs Area Studies Transportation Infrastructure Improvements and associated Land Use Alternative Tier 1 Improvement Exhibits
- 2 All storm drain, sanitary sewer, water and joint trench are included in \$/LF cost for new roads
- 3 Cost associated with Item D2 (Tesla Frontage Road) does not include land acquisition costs (estimated ROM of \$6M)

**SOUTH FREMONT/WARM SPRINGS ROADWAY INFRASTRUCTURE
ORDER OF MAGNITUDE COSTS**

ITEM	DESCRIPTION	UNIT	UNIT PRICE	ENGINEER'S ESTIMATE		COMMENTS
				QUANTITY (per lin ft)	COST	
2-LANE COMMERCIAL/INDUSTRIAL STREETS						
			ROW	72		12' travel lanes, center 12' combined turn lane, 5' CL II bike lanes, 6.5' landscape strips, 6' sidewalks
			Pavement	43		
			Landscape	13		
			Sidewalk	12		
			Curb/Gutter L/S Median	4 0		
A	2-LANE COMMERCIAL/INDUSTRIAL STREETS					
1	6" Sanitary Sewer and Stubs for future laterals	LF	60.00	1/5	\$ 12	
2	12" Sanitary Sewer	LF	120.00	4/5	\$ 96	
3	Sanitary Sewer Manhole	EA	5,000.00	1/200	\$ 25	
4	12" Water Line (w/valves)	LF	150.00	1	\$ 150	
5	Fire Hydrant Assembly	EA	5,000.00	1/250	\$ 20	
6	12" RCP Storm Drain Pipe - Class III	LF	100.00	1/5	\$ 20	
7	36" RCP Storm Drain Pipe - Class III	LF	200.00	4/5	\$ 160	
8	Storm Drain Manhole	EA	5,000.00	1/200	\$ 25	
9	Storm Drain Catch Basin	EA	3,000.00	2/75	\$ 80	
10	Joint Trench - Gas, Tel., CATV, Electric	LF	125.00	1	\$ 125	
11	Street Lights and Pull Box Assemblies	EA	5,000.00	1/75	\$ 67	
12	Landscape and Irrigation	SF	8.00	13	\$ 104	
13	Street Trees	EA	1,000.00	1/15	\$ 67	
14	Sidewalk (including rock)	SF	5.00	12	\$ 60	
15	Curb & Gutter/Vertical Curb	LF	25.00	2	\$ 50	
16	Subgrade Preparation	SF	0.50	47	\$ 24	
17	Asphalt Concrete (AC) - 6.5"	TONS	100.00	1 5/8	\$ 163	
18	Aggregate Base (AB) - 20"	TONS	50.00	4 1/2	\$ 224	
19	Striping	LF	1.00	4	\$ 4	
20	Signage	EA	250.00	1/30	\$ 8	
21	Storm Water BMP's (Biofiltration)	SF	20.00	2 1/3	\$ 47	
22	Earthwork - Cut to Fill	CY	5.00	2 2/3	\$ 13	
			SUBTOTAL		\$ 1,544	
			Contingency -- 25%		\$ 386	
NOTES	1 Does not include right of way acquisition costs					
2-LANE COMMERCIAL/INDUSTRIAL STREETS			TOTAL		2,000	

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ITEM	DESCRIPTION	UNIT	UNIT PRICE	ENGINEER'S ESTIMATE		COMMENTS
				QUANTITY (per lin ft)	COST	
2-LANE URBAN STREETS WITH PARALLEL PARKING						
			ROW	76		11' travel lanes, 5' CL II bike lanes, 8' parking, 14' sidewalks, with tree pockets
			Pavement	45		
			Landscape	0		
			Sidewalk	27		
			Curb/Gutter L/S Median	4 0		
B	2-LANE URBAN STREETS WITH PARALLEL PARKING					
1	6" Sanitary Sewer and Stubs for future laterals	LF	60.00	1/5	\$ 12	
2	12" Sanitary Sewer	LF	120.00	4/5	\$ 96	
3	Sanitary Sewer Manhole	EA	5,000.00	1/200	\$ 25	
4	12" Water Line (w/valves)	LF	150.00	1	\$ 150	
5	Fire Hydrant Assembly	EA	5,000.00	1/250	\$ 20	
6	12" RCP Storm Drain Pipe - Class III	LF	100.00	1/5	\$ 20	
7	36" RCP Storm Drain Pipe - Class III	LF	200.00	4/5	\$ 160	
8	Storm Drain Manhole	EA	5,000.00	1/200	\$ 25	
9	Storm Drain Catch Basin	EA	3,000.00	2/75	\$ 80	
10	Joint Trench - Gas, Tel., CATV, Electric	LF	125.00	1	\$ 125	
11	Street Lights and Pull Box Assemblies	EA	5,000.00	1/75	\$ 67	
12	Street Trees	EA	1,000.00	1/15	\$ 67	
13	Sidewalk (including rock)	SF	5.00	27	\$ 135	
14	Curb & Gutter/Vertical Curb	LF	25.00	2	\$ 50	
15	Subgrade Preparation	SF	0.50	49	\$ 25	
16	Asphalt Concrete (AC) - 6.5"	TONS	100.00	1 5/7	\$ 171	
17	Aggregate Base (AB) - 20"	TONS	50.00	4 2/3	\$ 234	
18	Striping	LF	1.00	4	\$ 4	
20	Signage	EA	250.00	1/30	\$ 8	
21	Storm Water BMP's (Biofiltration)	SF	20.00	3	\$ 61	
22	Earthwork - Cut to Fill	CY	5.00	2 4/5	\$ 14	
			SUBTOTAL		\$ 1,548	
			Contingency -- 25%		\$ 387	
2-LANE URBAN STREETS WITH PARALLEL PARKING			TOTAL		2,000	

**SOUTH FREMONT/WARM SPRINGS ROADWAY INFRASTRUCTURE
ORDER OF MAGNITUDE COSTS**

ITEM	DESCRIPTION	UNIT	UNIT PRICE	ENGINEER'S ESTIMATE		COMMENTS
				QUANTITY (per lin ft)	COST	
4-LANE PARKWAY						
			ROW	120		13' and 12' travel lanes, 5' CL II bike lanes, 8' parking, 6' sidewalks, 6.5' curb adjacent landscape strips, 18' median with 17' landscaping
			Pavement	70		
			Landscape	13		
			Sidewalk	12		
			Curb/Gutter	8		
			L/S Median	17		
C	4-LANE PARKWAY					
1	6" Sanitary Sewer and Stubs for future laterals	LF	60.00	1/5	\$ 12	
2	12" Sanitary Sewer	LF	120.00	9/10	\$ 108	
3	Sanitary Sewer Manhole	EA	5,000.00	1/200	\$ 25	
4	12" Water Line (w/valves)	LF	150.00	1	\$ 150	
5	Fire Hydrant Assembly	EA	5,000.00	1/250	\$ 20	
6	12" RCP Storm Drain Pipe - Class III	LF	100.00	2/5	\$ 40	
7	36" RCP Storm Drain Pipe - Class III	LF	200.00	4/5	\$ 160	
8	Storm Drain Manhole	EA	5,000.00	1/200	\$ 25	
9	Storm Drain Catch Basin	EA	3,000.00	2/75	\$ 80	
10	Joint Trench - Gas, Tel., CATV, Electric	LF	125.00	1	\$ 125	
11	Street Lights and Pull Box Assemblies	EA	5,000.00	2/75	\$ 133	
12	Landscape and Irrigation	SF	8.00	30	\$ 240	
13	Street Trees	EA	1,000.00	1/15	\$ 67	
14	Sidewalk (including rock)	SF	5.00	12	\$ 60	
15	Curb & Gutter/Vertical Curb	LF	25.00	4	\$ 100	
16	Subgrade Preparation	SF	0.50	78	\$ 39	
17	Asphalt Concrete (AC) - 6.5"	TONS	100.00	2 2/3	\$ 265	
18	Aggregate Base (AB) - 20"	TONS	50.00	7 2/7	\$ 365	
19	Striping	LF	1.00	5	\$ 5	
20	Signage	EA	250.00	1/30	\$ 8	
21	Storm Water BMP's (Biofiltration)	SF	20.00	3 3/5	\$ 72	
22	Earthwork - Cut to Fill	CY	5.00	4 4/9	\$ 22	
			SUBTOTAL		\$ 2,122	
			Contingency -- 25%		\$ 530	
4-LANE PARKWAY			TOTAL		2,700	

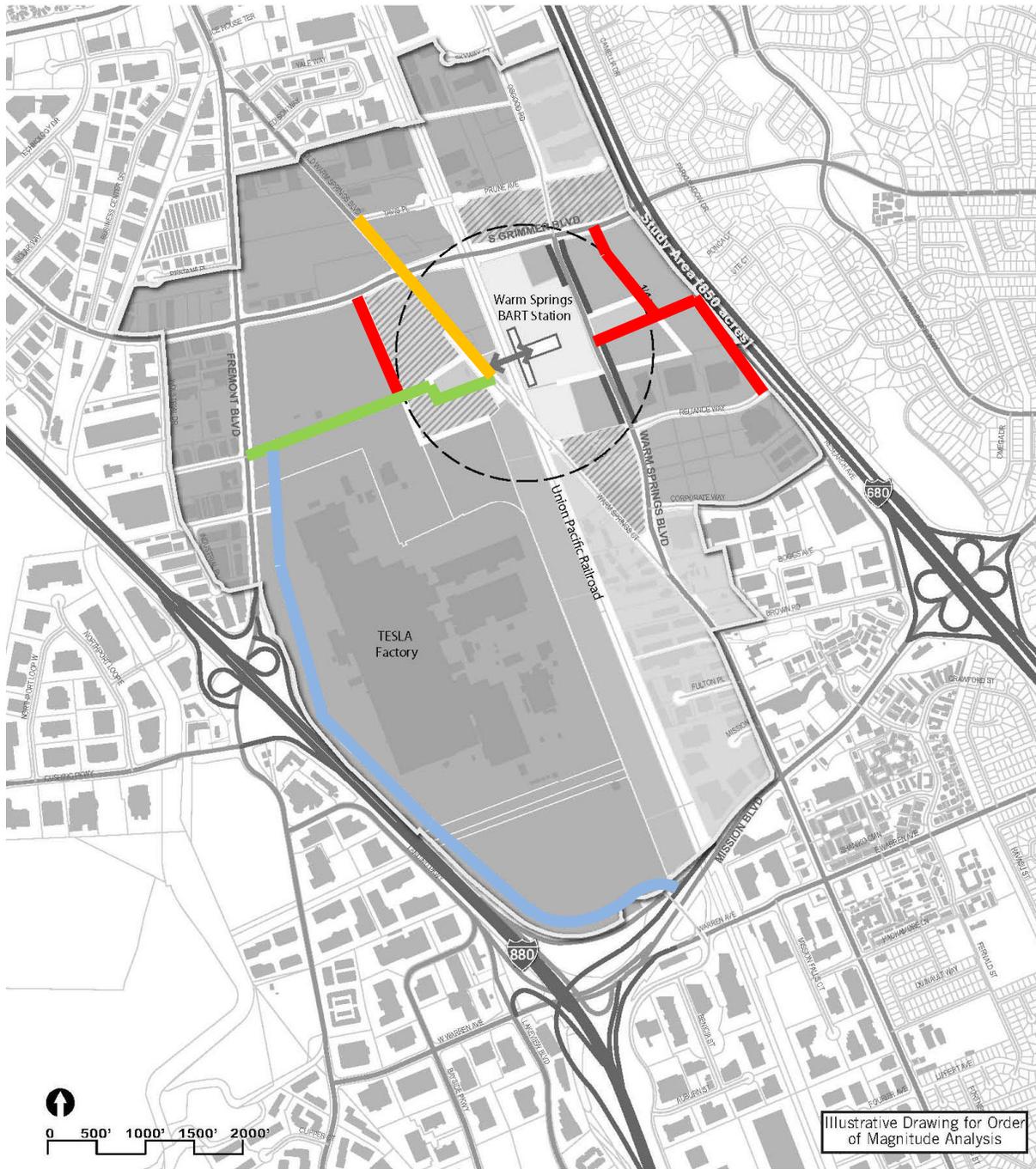
**SOUTH FREMONT/WARM SPRINGS ROADWAY INFRASTRUCTURE
ORDER OF MAGNITUDE COSTS**

ITEM	DESCRIPTION	UNIT	UNIT PRICE	ENGINEER'S ESTIMATE		COMMENTS
				QUANTITY (per lin ft)	COST	
3-LANE TESLA FRONTAGE ROAD CONVERSION						
	ROW			65		12' travel lanes, 5' CL II bike lanes, 6.5' landscape strips, 5' sidewalk on one side
	Pavement			44	(existing)	
	Pavement			43	(proposed)	
	Landscape			13		
	Sidewalk			5		
	Curb/Gutter			4		
	L/S Median			0		
D	3-LANE TESLA FRONTAGE ROAD CONVERSION					
1	12" Sanitary Sewer Extension (650 LF)	LF	250.00	1/11	\$ 23	Includes manholes; cut into existing CC roadway
2	12" Water Line (w/valves)	LF	200.00	5/6	\$ 167	Installed outside of CC roadway
3	Fire Hydrant Assembly	EA	5,000.00	1/250	\$ 20	
4	12" RCP Storm Drain Pipe - Class III	LF	100.00	1/5	\$ 20	
5	36" RCP Storm Drain Pipe - Class III	LF	200.00	2/3	\$ 133	Installed under new gutter on one side of street
6	Storm Drain Catch Basin	EA	3,000.00	1/75	\$ 40	
7	Joint Trench - Gas, Tel., CATV, Electric	LF	150.00	1	\$ 150	Installed outside of CC roadway
8	Street Lights and Pull Box Assemblies	EA	5,000.00	1/75	\$ 67	
9	Landscape and Irrigation	SF	8.00	13	\$ 104	
10	Street Trees	EA	1,000.00	1/15	\$ 67	
11	Sidewalk (including rock)	SF	5.00	5	\$ 25	
12	Curb & Gutter/Vertical Curb	LF	25.00	2	\$ 50	
13	Subgrade Preparation	SF	0.50	4	\$ 2	
14	2" Asphalt Pavement Overlay	TONS	100.00	1/2	\$ 50	Assumes no additional roadway structural mitigation required
15	Striping	LF	1.00	2	\$ 2	
16	Signage	EA	250.00	1/30	\$ 8	
17	Storm Water BMP's (Biofiltration)	SF	20.00	2	\$ 42	
18	CC Pavement Demo	SF	0.50	1	\$ 1	
	SUBTOTAL				\$ 970	
	Contingency -- 25%				\$ 242	
NOTES	<ul style="list-style-type: none"> 1 Assumes storm drain improvements under new curb/sidewalk 2 Does not include acquisition of drainage easements over Tesla parcel 3 Assumes treatment for new sidewalk within landscape planter 4 Does not include ROW acquisition costs (approx. 11 acres @ \$13sf = 6.2M) 					
3-LANE TESLA FRONTAGE ROAD CONVERSION TOTAL					1,300	

**SOUTH FREMONT/WARM SPRINGS ROADWAY INFRASTRUCTURE
ORDER OF MAGNITUDE COSTS**

ITEM	DESCRIPTION	UNIT	UNIT PRICE	ENGINEER'S ESTIMATE		COMMENTS	
				QUANTITY (per lin ft)	COST		
2-LANE LOPES COURT WIDENING							
			ROW	72		12' travel lanes, center 12' combined turn lane, 5' CL II bike lanes, 6.5' landscape strips, 6' sidewalks	
			Pavement	28	(existing)		
			Pavement	43	(proposed)		
			Landscape	13			
			Sidewalk	12			
			Curb/Gutter	4			
			L/S Median	0			
E	2-LANE LOPES COURT WIDENING						
1	8" Water Line (with valves)	LF	100.00	1/2	\$ 50	Assumes new 8" main parallel to ex 20" distribution main	
2	Fire Hydrant Assembly	EA	5,000.00	1/250	\$ 20		
3	12" RCP Storm Drain Pipe - Class III	LF	100.00	1/5	\$ 20		
4	36" RCP Storm Drain Pipe - Class III	LF	200.00	1/5	\$ 40		
5	Storm Drain Manhole	EA	4,000.00	1/400	\$ 10		
6	Storm Drain Catch Basin	EA	3,000.00	2/75	\$ 80		
7	Joint Trench - Gas, Tel., CATV, Electric	LF	200.00	1	\$ 200		
8	Street Lights and Pull Box Assemblies	EA	5,000.00	1/75	\$ 67		
9	Landscape and Irrigation	SF	8.00	13	\$ 104		
10	Street Trees	EA	1,000.00	1/15	\$ 67		
11	Sidewalk (including rock)	SF	5.00	12	\$ 60		
12	Curb & Gutter/Vertical Curb	LF	25.00	2	\$ 50		
13	Subgrade Preparation	SF	0.50	19	\$ 10		
14	Asphalt Concrete (AC) - 6.5"	TONS	100.00	4/7	\$ 57		
15	Aggregate Base (AB) - 20"	TONS	50.00	1 4/7	\$ 78		
16	Striping	LF	1.00	4	\$ 4		
20	Signage	EA	250.00	1/30	\$ 8		
21	Storm Water BMP's (Biofiltration)	SF	20.00	2 1/3	\$ 47		
22	2" Asphalt Pavement Grind and Overlay	SF	2.00	28	\$ 56		Grind and overlay on existing street section
			SUBTOTAL		\$ 1,027		
			Contingency -- 25%		\$ 257		
NOTES							
	1 Assumes existing roadway section to remain with new 2" grind and overlay						
2-LANE LOPES COURT WIDENING			TOTAL		1,300		

Land Use Alternative 1 (Innovation Center/Manufacturing) Utility Infrastructure Improvement Diagram

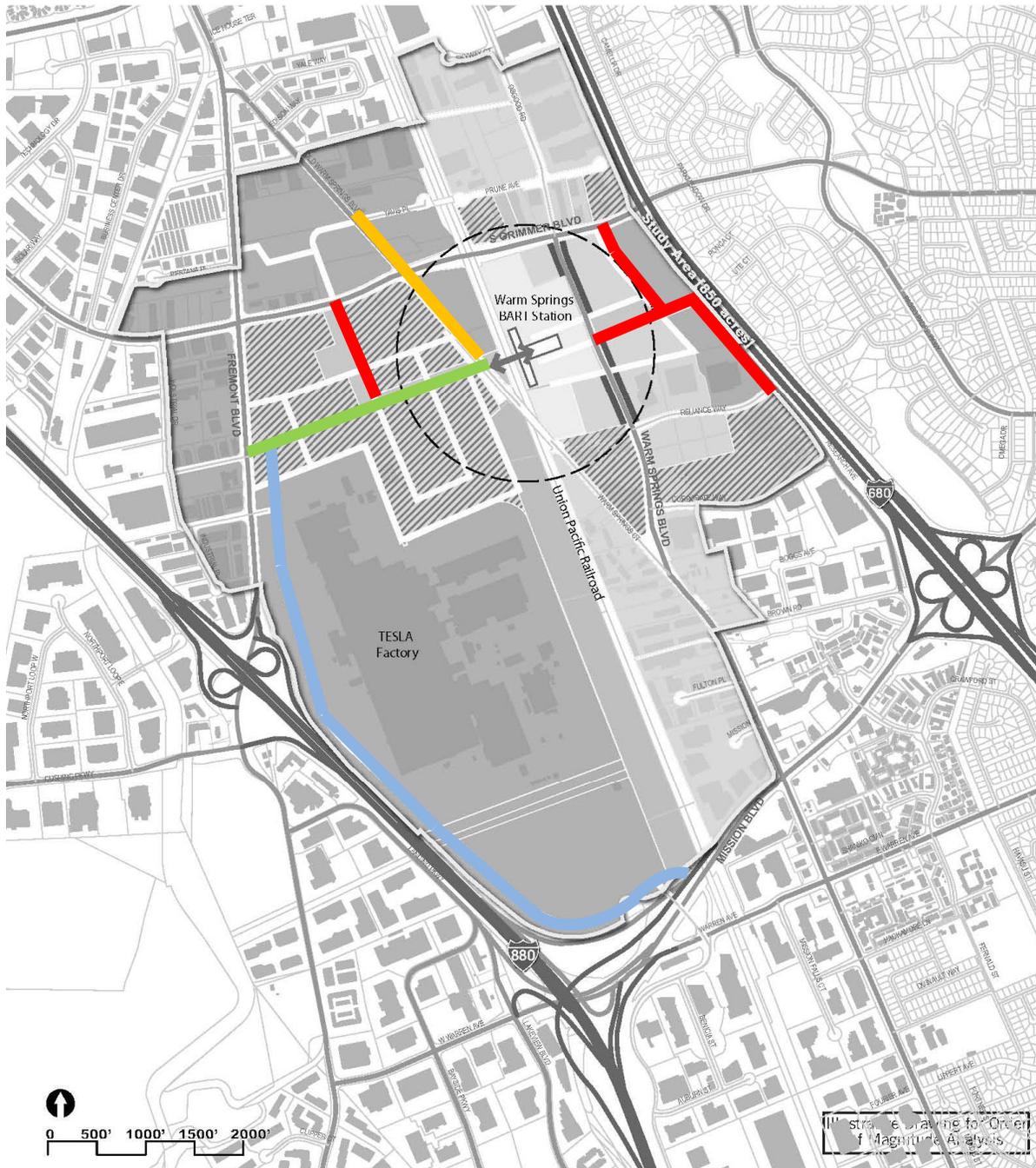


	UTILITY IMPROVEMENTS			
	Sewer Main	Water Main	Storm Drain	Joint Trench
New 2-Lane Road	FULL	FULL	FULL	FULL
New 4-Lane Road	FULL	FULL	FULL	FULL
2-Lane Tesla Frontage Road Conversion	650 LF	FULL	FULL	FULL
2-Lane Lopes Court Widening	N/A	HALF	HALF	FULL

Notes:

- "FULL" represents improvements required over full length of street
- "HALF" represents improvements required over half length of street
- "X LF" represents improvements required over a specific distance
- "N/A" represents no improvements required

Land Use Alternative 2 (Innovation Campus / Residential TOD) Utility Infrastructure Improvement Diagram

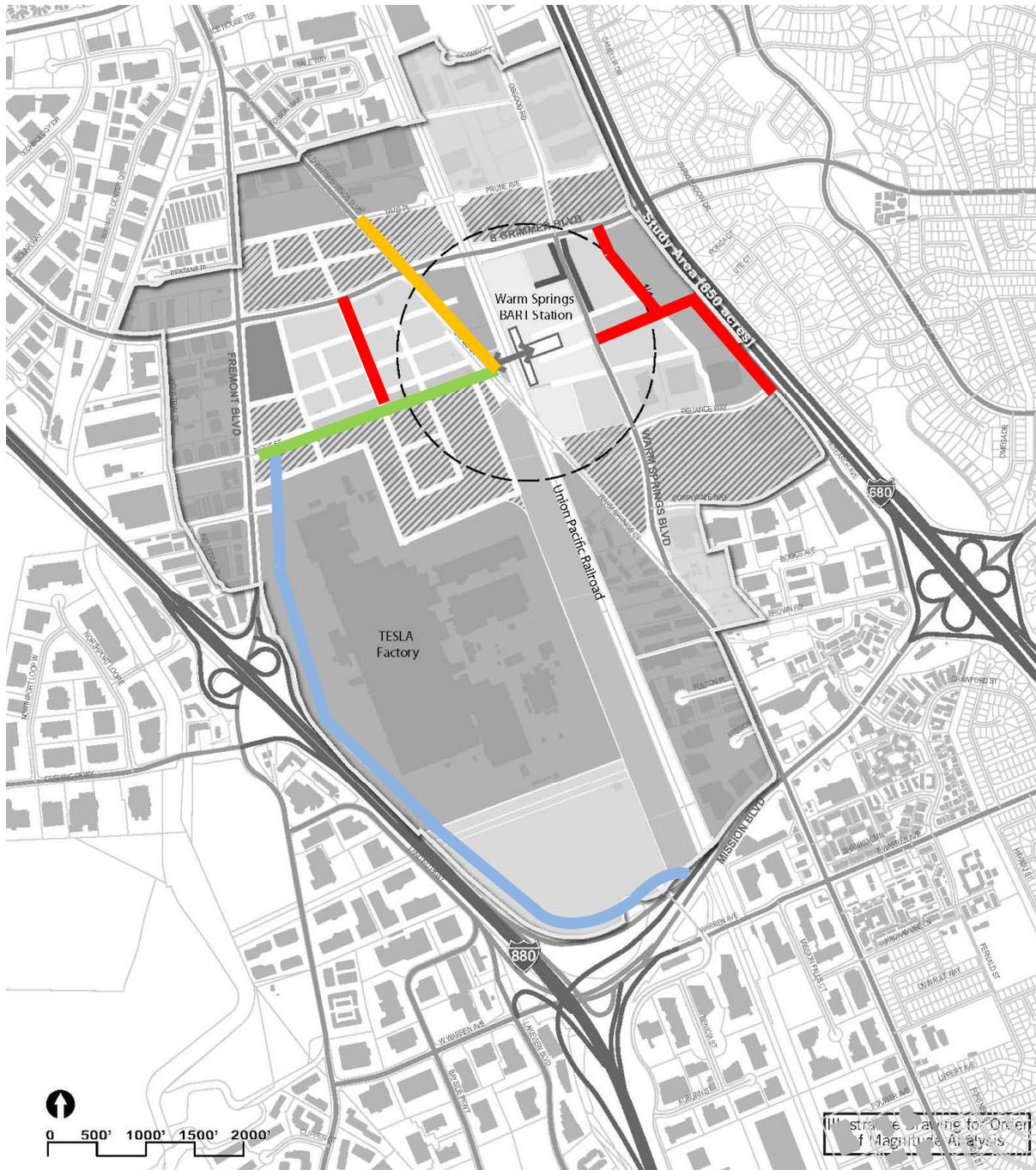


	UTILITY IMPROVEMENTS			
	Sewer Main	Water Main	Storm Drain	Joint Trench
New 2-Lane Road	FULL	FULL	FULL	FULL
New 4-Lane Road	FULL	FULL	FULL	FULL
2-Lane Tesla Frontage Road Conversion	650 LF	FULL	FULL	FULL
2-Lane Lopes Court Widening	N/A	HALF	HALF	FULL

Notes:

- "FULL" represents improvements required over full length of street
- "HALF" represents improvements required over half length of street
- "X LF" represents improvements required over a specific distance
- "N/A" represents no improvements required

Land Use Alternative 3 (Innovation District/Residential Mixed-Use) Utility Infrastructure Improvement Diagram



	UTILITY IMPROVEMENTS			
	Sewer Main	Water Main	Storm Drain	Joint Trench
New 2-Lane Road	FULL	FULL	FULL	FULL
New 4-Lane Road	FULL	FULL	FULL	FULL
2-Lane Tesla Frontage Road Conversion	650 LF	FULL	FULL	FULL
2-Lane Lopes Court Widening	N/A	HALF	HALF	FULL

Notes:

- "FULL" represents improvements required over full length of street
- "HALF" represents improvements required over half length of street
- "X LF" represents improvements required over a specific distance
- "N/A" represents no improvements required