Appendix 3: East Downtown Visalia Park and Infrastructure Master Plan, Draft Final Technical Report, A3-1
Circulation and Wet Utilities

Prepard by Provost & Pritchard
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EST. 1968
PROVOST & PRITCHARD INC
ENGINEERING GROUP
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Prepared by:

Mr. John Dutton, P.E. & Mr. James Funk, P.E.

3500 W. Orchard Court
Visalia, CA 93277
Phone: (559) 636-1166
Fax: (559) 636-1177

East Downtown Visalia Park and Infrastructure Master Plan

Final Technical Report

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General

The Infrastructure Master Plan presented in this Technical Report is based on the "East Downtown Visalia – A Strategic Plan for 2025" adopted by the City Council of the City of Visalia. The Strategic Plan has been adapted to the specific needs of the East Downtown Visalia Parks and Infrastructure Master Plan based on input from the public, commissions, committees and City Council through various workshops and presentations. The designers/engineers have taken the information gathered at the public meetings to assist in creating the Infrastructure Master Plan (IMP) that follows. Appendix A – "Mixed-Use Neighborhoods" shows the various proposed land uses considered when analyzing the circulation and infrastructure components contained in this Master Plan document.

This Technical Report is presented in a format based on the various infrastructure components of the Master Plan which include Circulation, Storm Sewer System, Sanitary Sewer System, Water System and a Cost Summary. Appendix B – "Existing Water, Sewer and Storm Drain Facilities" shows the existing infrastructure and the existing street network in the Master Plan study area. The land area that the IMP covers is from Bridge Street on the west to Ben Maddox Way on the east and Goshen/Murray Avenue on the north to Mineral King Avenue on the south. An aerial photograph of the Master Plan area is included with this report (see Appendix C – "Aerial Overview.")

It is anticipated that the improvements noted in the Technical Report will be constructed over several years and that consideration for blending new infrastructure with existing was considered when proposing improvements. As noted in the 2025 Strategic Plan, several existing sites that are developed will remain in their current configuration. Access, parking, road configuration and wet utilities must acknowledge these sites. Proposed improvements need to allow those existing sites to remain and function as new

development, infill development and redevelopment of "opportunity sites" occurs.

In addition to proposing specific infrastructure improvements, this Technical Report also addresses estimated costs of the improvements. The infrastructure proposed in this report is required to support the proposed land uses noted in the 2025 Strategic Plan. The costs are based on a combination of reimbursement costs the City has generated for the development community and costs available from other City of Visalia or California Water Service Company Master Plan documents. A summary of costs is presented at the end of this report.

Circulation

The existing street network in the IMP area is a grid system with Streets running generally north and south and Avenues running generally east and west. Although from an aerial view the grid system is evident, several streets within the grid have missing segments. Where opportunities exist, the street grid system has been extended to complete missing portions. The addition of the missing segments will allow greater access to parcels within the Master Plan Area and increase the opportunity for on-street parking and pedestrian circulation. At some locations the missing road segments are either not extended or the road alignment includes curves to avoid existing buildings or stands of trees.

Union Pacific Railroad owns the main line railroad track that extends across the City of Visalia. The line is active with freight trains operated by San Joaquin Valley Railroad. In the east downtown area, the main line runs in the Oak Avenue alignment to Burke Street then turns southeast and crosses Center Avenue west of Ben Maddox Way. An active spur line branches off the main line track east of Burke Street that turns northeast from the main line and terminates west of Ben Maddox Way. The rail line and its active user(s) along with the California Public Utility Commission CPUC) will need to be included in the initial design processes as the proposed circulation elements are implemented.

In addition to the active rail line and spur, Jennings Ditch and Mill Creek cross the IMP area. In its current state, Jennings Ditch is primarily used by the City as a storm drainage conveyance feature delivering storm water runoff to Mill Creek while Mill Creek is a significant channel running east to west that carries both storm flows and irrigation flows through the city. Several mature Oak trees line the banks of both Jennings Ditch and Mill Creek that were consider when choosing street alignments in the IMP area.

The circulation network is shown in Exhibit 1 – "Preferred Alternative" with existing roadways shown in lighter gray and new roadways shown in darker gray. Exhibit 2 is a key map for the various street sections shown in Figures 1 - 8 included with the report. A cost report (Table 1) has been prepared that calculates the estimated value of the new streets, the construction of Ben Maddox Way and Goshen/Murray Avenue, and the reconfiguration of Main Street and Santa Fe Street within the limits of the Master Plan Area.

The backbone of the circulation system, the collector and arterial streets, are constructed to some degree within the Master Plan area. Mineral King, a City of Visalia designated arterial status roadway, is fully developed along the south boundary while Ben Maddox Way (arterial status) and Goshen/Murray Avenue and Santa Fe Street (collector status) are partially built.

The cross section for Ben Maddox Way includes an additional five feet to allow landscaping of an otherwise concrete median strip. The condition occurs because of anticipated left-turn pockets on Ben Maddox Way at School Avenue and Goshen Avenue creating back to back left-turn pockets. Typically, a seven foot median is constructed adjacent to left-turn pockets in a ninety foot street section with the median poured solid with concrete. The Master Plan proposes an additional five feet to allow enough width to plant appropriate median island trees along Ben Maddox Way between School Avenue and Goshen Avenue. Upon completion of the construction of the Ben Maddox Way raised median island Center Street at Ben Maddox Way would be limited to right-turn movements only. The existing ability for a left-turn movement from Ben Maddox Way onto Center Avenue would be eliminated in favor of the lengthened left-turn pocket and movement at Main Street and a new left-turn pocket at School Avenue.

The Master Plan includes a cross section of Goshen Avenue that contains a raised median island west of Ben Maddox Way to protect an existing Oak tree. Due to the location of the intersecting north-south streets along the south of side of Goshen Avenue on either side of the Oak tree the raised median island may be extended to restrict movements or shortened (preferred) to allow all direction left-turn movements. West of the Oak tree, Goshen Avenue is proposed to have a City standard eighty-four foot right of way section.

Main Street and Burke Street, significant streets in the IMP area, are existing roadways whose characters will change with the development of the 2025 Strategic Plan. Main Street exists as a seventy-three foot right of way between Bridge Street and Burke Street. Main Street is a sixty-six foot or less right of way east of Burke Street. Santa Fe Street is an existing sixty-six foot right of way between Mineral King Avenue and Center Street.

Main Street and Santa Fe Street improvement costs are included based on the following assumptions: curb and gutter remaining on one side, removing curb and gutter on the other side, milling the existing pavement and constructing the sections shown in Figures 1 - 8. In cross section "D1" the sidewalk is reduced to ten-feet so diagonal parking can be accommodated on one side. Cross section "D2" allows for a seventeen foot wide sidewalk / landscape area on one side with parallel parking on both sides of the street. Regarding Main Street, the City will need to determine, on a case by case basis, which street cross section is appropriate as development occurs.

In the Master Plan, School Avenue becomes an important east-west route not only for vehicles but for bicycles too as School Avenue is extended to Ben Maddox Way. Once constructed, School Avenue will form the northern edge of the proposed Civic Center site (Oak Avenue, Tipton Street, School Avenue and Burke Street.) Because of the active spur line east of Burke Street completion of School Avenue east of Jennings Ditch may wait until the spur line can be removed. In the interim, School Avenue can be extended across Jennings Ditch to the street (shown as Cotta Street) along the eastern edge of the proposed park. The alignment of School Avenue at Ben Maddox way was selected due to possible future signalization of the intersection and the location of parcel lines on the east side of Ben Maddox Way. The School Avenue intersection is approximately equal distance between Main Street and Goshen Avenue with a possible future extension of School Avenue to the east of Ben Maddox Way.

Local streets found in the downtown Master Plan area are typically sixty-six foot right of way with a forty-six foot curb to curb width. Several variations of striping plans are being proposed for the sixty-

six foot local street (see Figures 1-8.) New striping would support diagonal parking on one side of the centerline with parallel parking on the other, or striped bike lanes with parallel parking on both sides of the centerline, or a traditional double yellow stripe along the street centerline. Other street right of way widths exist and are included in the IMP street sections.

Several existing streets that currently terminate are proposed to be extended to increase the density of the grid providing better access for both pedestrians and vehicles to parcels within the Master Plan area. The extension of the grid will provide additional space for on-street parking which will help reduce vehicular speed creating a pedestrian friendly environment. Furthermore, the new streets will allow possibilities for additional store fronts or building access points. In addition, several new streets in the northeast quadrant of the plan area are being proposed to allow development of currently under-utilized land and to create the framework for the parks and open spaces.

In addition to vehicular circulation, the Infrastructure Master Plan looks at and recognizes the importance of pedestrian and bicycling as alternative modes of transportation and addresses their needs in regard to circulation in the area. Review of the Exhibits and Figures shows the location of bike paths and sidewalks. The proposed bike paths that are shown on Exhibit 1 allow for connection to a larger network of bike paths. For example, in the Master Plan area School Avenue is a designated bike route, and with the exception of the Tulare County Library block, School Avenue could be a bike route that would connect with Recreation Park and the Santa Fe bike route to the west. In the East Downtown area, School Avenue would connect to the proposed Civic Center complex as well as the open space/park areas adjacent to Jennings Ditch and Mill Creek. Next, within the Master Plan area Santa Fe Street is not proposed to have a striped bike lane but will be signed for shared use with bicycles. This is consistent with the design proposed for the Santa Fe Overcrossing project at State Route 198. Santa Fe Street provides a major connection north and south of the downtown area with the eventual bike connection to the St. Johns River trail and Tulare County's Santa Fe corridor bike trail that will eventually connect to the City of Tulare's Rails to Trails bike path.

Table 1 - Road Improvement Costs

Unit Cost Calculations

Street R/W (ft)	Item		Unit Cost per lf
66	Concrete C&G machine pour		$20.00
	Asphalt Concrete ($0.50 /sf in), 42' pavement , 3" AC		$63.00
	Aggregate Base Rock CL II ($0.20 /sf in), 42' pavement, 6" AB		$50.40
	Signing & Striping		$4.50
		SUBTOTAL	$137.90
	Engineering Design/Construction Management	*15.0%*	*$20.69*
	Contingency	*20.0%*	*$27.58*
		TOTAL	$187.00
84	Concrete C&G (machine pour)		$20.00
	Asphalt Concrete ($0.50 /sf in), 60' pavement , 3" AC		$90.00
	Aggregate Base Rock CL II ($0.20 /sf in), 60' pavement, 9" AB		$108.00
	Signing & Striping		$4.50
		SUBTOTAL	$222.50
	Engineering Design/Construction Management	*15.0%*	*$33.38*
	Contingency	*20.0%*	*$44.60*
		TOTAL	$301.00
110	Concrete C&G (machine pour)		$20.00
	Asphalt Concrete ($0.50 /sf in), 68' pavement , 4" AC		$136.00
	Aggregate Base Rock CL II ($0.20 /sf in), 68' pavement, 12" AB		$163.20
	Median curb (machine pour)		$18.50
	Median irrigation w/trees and mulch		$42.35
	Median Street lighting system (300' spacing)		$25.55
	Signing & Striping		$4.50
		SUBTOTAL	$410.10
	Engineering Design/Construction Management	*15.0%*	*$61.52*
	Contingency	*20.0%*	*$82.02*
		TOTAL	$554.00

Table 1 (continued) - Road Improvement Costs			
Unit Cost Calculations			
Santa Fe	Curb and Gutter removal - one side only		$3.00
	Mill AC Pavement - 42' wide existing street		$10.50
	Concrete C&G (machine pour) - one side only		$10.00
	Asphalt Concrete ($0.50 /sf in), 48' pavement , 3" AC		$72.00
	Aggregate Base Rock CL II ($0.20 /sf in), 48' pavement, 9" AB		$86.40
	Signing & Striping		$4.50
		SUBTOTAL	$172.90
	Engineering Design/Construction Management	*15.0%*	$25.94
	Contingency	*20.0%*	$34.58
		TOTAL	$234.00
Main St	Curb and Gutter removal - one side only		$3.00
73	Mill AC Pavement - 48' wide existing street		$12.00
	Concrete C&G (machine pour) - one side only		$10.00
	Asphalt Concrete ($0.50 /sf in), 46' pavement , 3" AC		$69.00
	Aggregate Base Rock CL II ($0.20 /sf in), 46' pavement, 9" AB		$82.80
	Signing & Striping		$4.50
		SUBTOTAL	$166.30
	Engineering Design/Construction Management	*15.0%*	$24.95
	Contingency	*20.0%*	$33.26
		TOTAL	$225.00
Main St	Curb and Gutter removal - one side only		$3.00
66	Mill AC Pavement - 42' wide existing street		$10.50
	Concrete C&G (machine pour) - one side only		$10.00
	Asphalt Concrete ($0.50 /sf in), 36' pavement , 3" AC		$54.00
	Aggregate Base Rock CL II ($0.20 /sf in), 36' pavement, 9" AB		$64.80
	Signing & Striping		$4.50
		SUBTOTAL	$133.30
	Engineering Design/Construction Management	*15.0%*	$20.00
	Contingency	*20.0%*	$26.66
		TOTAL	$180.00

Table 1 – "Road Improvement Costs" includes a summary of the unit prices generated for various right of way widths, approximate centerline lengths of proposed new roadways and estimated costs of the roadway improvements based on the calculated unit prices. The improvements included in the cost estimate are items found between the curbs and do not contain areas outside the curb (on the sidewalk side.) The prices do include design and construction management as well as a contingency factor. The unit prices do not include fees associated with environmental processing requirements or right of way acquisition costs, if either is required.

Table 1 (continued) - Road Improvement Costs			
Street Segment Costs			
Length (ft)	Street	Unit Cost per lf	Cost
	66 ft right of way		
980	Oak Avenue - Tipton St. to Burke St.	$173.00	$169,540.00
860	Murray St. - Burke St. to Ben Maddox Way	$173.00	$148,780.00
1250	School Avenue - Burke St. to Ben Maddox Way	$173.00	$216,250.00
40	School Avenue culvert crossing - Jennings Ditch		$300,000.00
680	School Avenue - Tipton St. to Burke St.	$173.00	$117,640.00
1000	Willow St. - Tipton St. to Burke St.	$173.00	$173,000.00
650	Liberty St. Mineral King Ave. to Acequia Ave.	$173.00	$112,450.00
600	Clark St. - Mineral King Ave. to Acequia Ave.	$173.00	$103,800.00
520	Bradley St - Main St. to Goshen Ave.	$173.00	$89,960.00
920	Edison St. - Main St. to Goshen Ave.	$173.00	$159,160.00
1090	Cotta St.	$173.00	$188,570.00
	84 ft right of way		
3100	Goshen/Murray Ave. - Bridge St. to Ben Maddox Way	$287.00	$889,700.00
	110 ft right of way		
1600	Ben Maddox Way - Goshen Ave. to Main St.	$541.00	$865,600.00
	Miscellaneous		
1155	Santa Fe St. - Willow Ave. to Alley n/o Center Ave.	$234.00	$270,270.00
1700	Main St. - Bridge St. to Burke St.	$226.00	$382,500.00
1340	Main St. - Burke St. to Ben Maddox Way	$180.00	$241,200.00
		TOTAL	$4,420,420.00

Storm Sewer System

The existing storm sewer system collects lot and street runoff in gutters that flow to drop inlets (D.I.'s) where the water is then conveyed via pipes to various discharge points along Mill Creek (see Appendix D - "Existing Storm Drain Facilities" map.) Based on separating the existing developed areas within the Master Plan boundary into six (6) service areas or zones (see Appendix E - "Storm Drain Facilities" map) the Master Plan analyzed each area based on proposed land uses in the Strategic Plan. The rational method was used for computing flows for both 2-year and 10-year reoccurring rain events using City of Visalia Master Plan runoff coefficients. A combination of pipe diameters and pipe slopes is presented in Table 2 in an effort to allow the City flexibility in selecting the best fit combination when replacing existing pipelines. The highlighted slopes are those greater than 0.0099.

A physical assessment of the existing pipes condition was not performed as part of the analysis. The results of the storm sewer analysis are summarized in the Table 2 - "Storm Sewer Analysis" below.

Table 2 - Storm Sewer Analysis

Zone	segment	ex. pipe size (in)	Run-off coeff. (c)	Tc (min.)	Rainfall Intensity (I) 2-year event	Rainfall Intensity (I) 10-year event	Tributary Area (ac)	Flow Q (cfs) (2-year)	Flow Q (cfs) (10-year)	Manning's n	slope (based on pipe diameter - 2-year event) 12	15	18	24	slope (based on pipe diameter - 10-year 15	18	24	Notes
3	Acequia Ave. - Tipton St. to Liberty St.	10	0.75	22.5	0.64	1.05	16.7	8.0	13.1	0.013	0.0500	0.0152	0.0058	0.0012	0.0410	0.0155	0.0033	1
4	Liberty St. - Mineral King Ave. north	15	0.75	30	0.47	0.8	15.9	5.6	9.5	0.013	0.0246	0.0075	0.0028	0.0006	0.0217	0.0082	0.0018	2
4	Acequia Ave. - Burke St. west	10	0.75	20.9	0.67	1.1	6.6	3.3	5.4	0.013	0.0086	0.0026	0.0010	0.0002	0.0071	0.0027	0.0006	3
4	Liberty St. - Acequia Ave. north	18	0.75	36.4	0.45	0.75	46.1	15.6	25.9	0.013	0.1897	0.0577	0.0218	0.0047	0.1603	0.0606	0.0131	4
5	Burke St. - Main St. north	none	0.75	23.3	0.62	1.03	5.2	2.4	4.0	0.013	0.0046	0.0014	0.0005	0.0001	0.0038	0.0015	0.0003	5
5	Burke St. - Center Ave. north	unknown	0.75	25.7	0.59	0.98	17.0	7.5	12.5	0.013	0.0443	0.0135	0.0051	0.0011	0.0372	0.0141	0.0030	6
6	Easement east of Edison - Cotta Ct. north	12	0.95	26.1	0.55	0.73	8.0	4.2	5.5	0.013	0.0137	0.0042	0.0016	0.0003	0.0075	0.0028	0.0006	7
	Revised based on pipe (new) in Burke St. - Mineral King north to Mill Creek																	
4	Liberty St. - Mineral King Ave. north	15	0.75	21.8	0.66	1.07	4.0	2.0	3.2	0.013	0.0031	0.0009	0.0004	0.0001	0.0025	0.0009	0.0002	8
4	Liberty St. - Acequia Ave. north	18	0.75	28.2	0.5	0.85	30.1	11.3	19.2	0.013	0.0998	0.0304	0.0115	0.0025	0.0878	0.0332	0.0072	9
5	Burke St. - Mineral King Ave. north	none	0.75	25.4	0.56	0.95	11.9	5.0	8.5	0.013	0.0196	0.0060	0.0023	0.0005	0.0171	0.0065	0.0014	10
5	Burke St. - Main St. north	none	0.75	33.6	0.46	0.78	24.6	8.5	14.4	0.013	0.0564	0.0172	0.0065	0.0014	0.0494	0.0187	0.0040	11

Notes

1 Runoff coefficient "C" value based on 1/2 RHD & 1/2 CBD development
2 based on new line in Burke Street taking 1/2 aea between Acequia and Main Street to north
3 based on new line in Burke Street taking 1/2 aea between Acequia and Main Street to north
4 assumes 1/2 block on south side of Main St flows to north in new Burke St. line
5 new storm line in Buke St from Main St. to Center St.
6 new storm line in Buke St from Center St. to Mill Creek
7 existing 12" dia line appears to be undersized
8 removes trib area east of Burke St.
9 removes trib area east of Burke St.
10 new line that extends to Mineral King
11 new storm line in Buke St from Mineral King to Mill Creek

In general, the existing storm sewer pipe system south of Mill Creek is undersized with several storm sewer lines recommended for upsizing (see Exhibit 3.) The IMP analysis was confirmed based on conversations with City collection system maintenance workers who recalled areas south of Mill Creek that experience minor flooding during typical rain events. The flooding areas include Center Avenue at Burke Street, Main Street at Burke Street, Tipton Street at Mineral King Avenue and Bradley Street at Acequia Avenue (see Appendix E.)

A new storm sewer line in Burke Street between Mineral King Avenue and Mill Creek is proposed to resolve several of the flooding issues along Burke Street. The Master Plan area north of Mill Creek is served by a larger storm sewer master plan line in Burke Street that has sufficient capacity to serve new development (infill and redevelopment) in existing service areas. The master plan Burke Street storm sewer line from the north discharges into Mill Creek and serves areas outside the Master Plan area. The City owns a storm basin at Tipton Street north of Race Avenue that is being developed that is expected to take conveyed storm water runoff north of the Master Plan boundary.

In addition to upsizing the storm sewer lines, the IMP recommends the City upgrade the existing drop inlets to allow for initial treatment of the runoff flow. Although not currently a requirement, oils and large debris would be collected at the D.I.'s before the water is discharged into Mill Creek. It is anticipated that in the near future storm water runoff will be required to have some level of treatment before being discharged into Mill Creek or Jennings Ditch. Table 3 includes cost for twenty-six D.I. locations along the replaced or upsized pipe routes (see Exhibit 3.) The D.I. costs include upgrading the existing D.I. to the current City Standard D.I. (G.O. type) and installing a separate container that would restrict trash and oils from entering the pipe system.

In addition to upsizing the storm sewer lines, the IMP recommends the City upgrade the existing drop inlets to allow for initial treatment of the runoff flow. Although not currently a requirement, oils and large debris would be collected at the D.I.'s before the water is discharged into Mill Creek. It is anticipated that in the near future storm water runoff will be required to have some level of treatment before being discharged into Mill Creek or Jennings Ditch. Table 3 includes cost for twenty-six D.I. locations along the replaced or upsized pipe routes (see Exhibit 3.) The D.I. costs include upgrading the existing D.I. to the current City Standard D.I. (G.O. type) and installing a separate container that would restrict trash and oils from entering the pipe system.

The undeveloped area (generally the northeast quadrant) contained in the Master Plan area was excluded from the traditional analysis. The IMP proposes that the northeast area be served by Low Impact Development (LID) design techniques including graded swales and bio-retention basins. As the open space and park areas adjacent to Jennings Ditch and Mill Creek develop the use of LID design should be incorporated into the planning of the storm sewer system to minimize the amount of flow that is directed directly into the creek and ditch. Additionally, the Infrastructure Master Plan recommends that the City encourage infill development and redevelopment projects in existing service areas to consider using LID design techniques to reduce the flow into gutters that ultimately flows into Mill Creek.

Costs associated with implementing the IMP storm sewer improvements are noted in Table 3 – "Storm Sewer System Improvements" below. The costs noted include design, construction management and contingency costs. The amounts do not include costs associated with environmental processing or right of way acquisition.

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Table 3 - Storm Sewer System Improvements

Street		proposed pipe diameter	quantity	units	unit cost	total cost
Acequia Avenue						
	Tipton St to Liberty St	18"	350	LF	$87	$30,450
Liberty Street						
	Acequia Ave to Mill Creek	24"	820	LF	$109	$89,380
Burke Street						
	Mineral King Ave to Main St	15"	1015	LF	$76	$77,140
	Main St to Mill Creek	18"	495	LF	$87	$43,065
Easement east of Edison						
	Acequia Ave to Mill Creek	15"	550	LF	$120	$66,000
Replace Drop Inlets			26	EA	$6,500	$169,000
	Subtotal					*$475,035*
	Contingency				*10.0%*	*$47,504*
	Engineering Design/Construction Management				*15.0%*	*$71,255*
					TOTAL:	$593,794

Sanitary Sewer System

The sanitary sewer system analysis is divided into two areas: 1) sanitary sewer trunk lines and 2) local sanitary sewer lines. The trunk line analysis was performed by Akel Engineering who prepared the City's 2005 Collection System Master Plan Update. The trunk line report is contained in Appendix F of this IMP and notes the method used to analyze the Master Plan area based on the change in zoning proposed in the 2025 Strategic Plan. Akel Engineering's report notes the pipe lines that need to be replaced based on the 2025 Strategic Plan's proposed land uses for the East Downtown expansion area (Appendix A.) Table 4 – "Trunk Line Sanitary Sewer System Improvements" contains an estimated cost to install the proposed infrastructure. The costs noted include design, construction management and contingency costs. The amounts do not include costs associated with environmental processing or right of way acquisition.

Table 4 - Trunk Line Sanitary Sewer System Improvements

Street		proposed pipe diameter (in)	length (ft)	unit cost	units	cost
Mineral King Avenue						
	Ranch St. to Divisadero Ave.	42	3400	$270	LF	$918,000
	Divisadero Ave. to Stevenson St.	30	2950	$213	LF	$628,350
	Stevenson St. to Locust Ave.	30	1950	$213	LF	$415,350
	Garden Avenue extension to Burke St.	24	2000	$153	LF	$306,000
Burke Street						
	Mineral King Ave to Main St.	24	900	$155	LF	$139,500
				TOTAL:		$2,407,200

As an alternative to the proposed trunk line improvements, the City may want to consider other solutions to upsizing pipes to convey the anticipated flows. One example would be the use of "gray water" reclamation techniques. A second example would be a treatment plant in the general Master Plan area that may allow the existing trunk line pipes to forgo upsizing while producing treated water that could be used for a water feature, for recharge, or for other beneficial uses. It is recommended that these water conservation concepts be evaluated further with regard to land use compatibility, available treatment methods, implementation and funding strategies.

The existing Master Plan area is served by several six inch and eight inch diameter local sanitary sewer lines. The local lines are shown in Appendix G – "Existing Sanitary Sewer Facilities" map. An analysis

was performed using three scenarios for the anticipated land uses that calculates serviceable acres for various pipe sizes and pipe slopes using Manning's "n" values ranging from 0.011 to 0.015. The three development scenarios are: 1) low density residential (310 gallons per residential unit), 2) medium density residential (1300 gallons per day per acre,) and 3) high density residential (2500 gallons per day per acre.) A summary of the analysis is contained in Table 5 – "Sanitary Sewer Analysis" of this report. Based on a typical downtown block size (approximately two and one half acres) and the extent of the existing sanitary sewer infrastructure the existing lines are sufficient to support, in general, the types of development proposed in the Strategic Plan.

City staff can use the information in the analysis to determine, at the time of development, if a specific pipe has sufficient size and slope to serve a specific use. Although a field assessment of the existing pipes condition was not performed the use of various Manning "n" values allows for some deterioration to the flow characteristics of the pipes.

All new sanitary sewer pipe installed should be eight inch diameter or larger. Exhibit 4 is included that shows the location and size of new sanitary sewer lines proposed.

Table 6 – "Sanitary Sewer System Improvements" includes a cost summary that estimates the additional costs for the new local sanitary sewer lines. The costs noted include design, construction management and contingency costs. The amounts do not include fees associated with environmental processing costs or right of way acquisition cost, if either is required.

Table 5 - Sanitary Sewer Analysis

					Serviceable acreage			
			Based on Low Density Residential - 310 gal/Single Family Unit		Based on Medium Density Residential - 1300 gal/day/ac (2005 S.S.M.P. - Table 3.6))		Based on High Density Residential - 2500 gal/day/ac (2005 S.S.M.P. - Table 3.6))	
Pipe dia	n	slope	SFU (pipe 1/2 full)	SFU (pipe 2/3 full)	Gross Serviceable Acres (pipe 1/2 full)	Gross Serviceable Acres (pipe 2/3 full)	Gross Serviceable Acres (pipe 1/2 full)	Gross Serviceable Acres (pipe 2/3 full)
6	0.015	0.005	137	-	32.8	-	17.0	-
6	0.013	0.005	161	-	38.4	-	20.0	-
6	0.015	0.006	151	-	36.1	-	18.8	-
6	0.013	0.006	178	-	42.4	-	22.0	-
8	0.015	0.003	243	-	57.8	-	30.1	-
8	0.013	0.003	285	-	68.0	-	35.4	-
8	0.015	0.0035	265	-	63.1	-	32.8	-
8	0.013	0.0035	310	-	74.0	-	38.5	-
8	0.015	0.004	286	-	68.3	-	35.5	-
8	0.013	0.004	336	-	80.1	-	41.6	-
10	0.015	0.003	469	-	111.8	-	58.2	-
10	0.013	0.003	551	-	131.3	-	68.3	-
10	0.015	0.0035	513	-	122.3	-	63.6	-
10	0.013	0.0035	600	-	143.0	-	74.4	-
10	0.015	0.004	552	-	131.7	-	68.5	-
10	0.013	0.004	646	-	154.1	-	80.1	-
12	0.015	0.0025	730	1213	174.2	289.3	90.6	150.4
12	0.013	0.0025	856	1422	204.2	339.1	106.2	176.3
12	0.015	0.003	807	1342	192.5	320.1	100.1	166.4
12	0.013	0.003	948	1576	226.0	375.8	117.5	195.4
12	0.015	0.0035	880	1464	209.8	349.0	109.1	181.5
12	0.013	0.0035	1032	1715	246.0	408.9	127.9	212.6

Table 6 - Sanitary Sewer System Improvements

Street		proposed pipe diameter	length (ft)	unit cost	units	cost
School Avenue						
	Liberty St to Burke St	8"	700	$36	LF	$25,200
	Burke St to Ben Maddox Way	8"	1400	$41	LF	$57,400
Mineral King Avenue						
	Bridge St to Burke St	24"	1675	$95	LF	$159,125
Murray Avenue						
	Burke St to Edison St	8"	500	$52	LF	$26,000
	Cotta St to Ben Maddox Way	8"	375	$49	LF	$18,375
Willow Avenue						
	Tipton St to Burke St	8"	1050	$44	LF	$46,200
Liberty Street						
	Mineral King Ave to Willow Ave	8"	400	$31	LF	$12,400
Clark Street						
	Mineral King Ave to Willow Ave	8"	400	$31	LF	$12,400
Bradley Street						
	Goshen Ave to Murray Ave	8"	325	$42	LF	$13,650
Edison Street						
	Goshen Ave to School Ave	8"	740	$41	LF	$30,340
Cotta Street						
	Goshen Ave to School Ave	8"	875	$35	LF	$30,625
	School Ave to Center Ave	8"	350	$42	LF	$14,700
	Subtotal					*$446,415*
	Contingency			*10.0%*		*$44,642*
	Engineering Design/Construction Management			*15.0%*		*$66,962*
				TOTAL:		$558,019

Water System

California Water Service Company (CWSC,) a private company, provides the water services for the City of Visalia. The information contained in this report is derived from "Water Supply and Facilities Master Plan For the Visalia District" by Boyle Engineering Corporation, dated February 2005 and conversation with Mr. Mike Markarian in the Visalia CWSC office.

Currently, the Master Plan area is served by a potable water well located on Acequia Avenue east of Burke Street. The domestic well is nearing its service life (CWSC Well No. 7-01.) Therefore, CWSC is actively seeking a new well site in the downtown area that would also contain a large, above ground storage tank (approximately 1.5 million gallons.) The existing CWSC water system is shown in Appendix H - "Existing California Water Service Facilities" map contained in this report. CWSC will design new and upsized water lines as development or redevelopment take place. Payment for the water system improvements noted in this report is expected to follow current CWSC policies and procedures.

New water lines (eight inch diameter minimum) are shown on the included Exhibit 5 and are generally located in the undeveloped portion of the Master Plan area (northeast quadrant) and those areas where new streets are being extended in existing developed areas. A twelve inch diameter backbone water system is shown that surrounds the Master Plan area. Exact requirements for the backbone system is undetermined at the time of this report; however, for planning purposes costs associated with the twelve inch lines is included. A twelve inch line is anticipated to connect the new well site with the surrounding backbone system or the existing twelve inch line in Main Street.

Table 7 - Water System Improvements

Street		proposed pipe diameter	length (ft)	unit cost	units	cost
School Avenue						
	Tipton St to Burke St	8"	1000	$80	LF	$80,000
	Burke St to Ben Maddox Way	8"	1400	$80	LF	$112,000
Willow Avenue						
	Tipton St to Burke St	8"	1050	$80	LF	$84,000
	Bradley St to Oakhurst St	8"	275	$80	LF	$22,000
Murray Avenue						
	Burke St to Edison St	8"	500	$80	LF	$40,000
	Cotta St to Ben Maddox Way	8"	365	$80	LF	$29,200
Center Avenue						
	Edison St to tie-in east of Burke St	8"	540	$90	LF	$48,600
Liberty Street						
	Acequia Ave to Mineral King Ave	8"	655	$80	LF	$52,400
Clark Street						
	Acequia Ave to Mineral King Ave	8"	655	$80	LF	$52,400
Burke Street						
	School Ave to tie-in south of Goshen Ave	8"	270	$90	LF	$24,300
	Acequia Ave to Mineral King Ave	8"	685	$90	LF	$61,650
Bradley Street						
	Goshen Ave to Murray Ave	8"	325	$80	LF	$26,000
	Center Ave to Main St	8"	350	$80	LF	$28,000
Edison Street						
	Goshen Ave to School Ave	8"	750	$80	LF	$60,000
	Center Ave to Main St	8"	350	$80	LF	$28,000
Cotta Street						
	Goshen Ave to School Ave	8"	875	$80	LF	$70,000
	School Ave to Center Ave	8"	350	$80	LF	$28,000
	Subtotal					*$846,550*
	Contingency			*10.0%*		*$84,655*
	Engineering, Planning, Design and Inspection			*15.0%*		*$126,983*
				TOTAL:		$1,058,188

Costs associated with the proposed water system improvements were derived from Table 12-2 contained in the Boyle Engineering report and adjusted for current bid prices (2007.) Table 7 & 8 summarize the proposed Water System improvement costs. For existing roadways, the unit costs include the various construction and non-construction items listed in the Boyle report. Where new streets are proposed the unit costs excludes "Resurfacing and Traffic Control" items.

Table 8 - Water System Improvements

Backbone Grid System

Street		proposed pipe diameter	length (ft)	unit cost	units	cost
Murray Avenue						
	Santa Fe St to Burke St	12"	1450	$115	LF	$166,750
Goshen Avenue						
	Burke St to Ben Maddox Way*	12"	1350	$115	LF	$155,250
Ben Maddox Way						
	Goshen Ave to Mineral King Ave	12"	2640	$115	LF	$303,600
Mineral King Ave						
	Ben Maddox Way to Santa Fe St	12"	2750	$115	LF	$316,250
Santa Fe St						
	Mineral King Ave to Murray Ave	12"	2325	$115	LF	$267,375
	Subtotal					*$1,209,225*
	Contingency			*10.0%*		*$120,923*
	Engineering, Planning, Design and Inspection			*15.0%*		*$181,384*
				Total:		$1,511,531
				TOTAL:		$2,569,719

Cost Summary

For planning purposes the estimated costs of the Infrastructure Master Plan improvements have been summarized below. These costs include both costs typically borne by the development community and those cost the City would typically fund. The report does not try to distinguish which costs belong to which party but relies on current City and California Water Service Company policies and procedures for staff to use to determine responsible parties.

Table 5 - Cost Summary

	Item	Cost
	Circulation	$4,428,420
	Storm Sewer System	$593,794
	Sanitary Sewer System	
	Local Sanitary Sewer Lines	$558,019
	Trunk Line Sanitary Sewer lines	$2,407,200
	Water System	
	Distribution System	$1,058,188
	Backbone Grid System	$1,511,531
	TOTAL	**$10,557,151**

Acknowledgement

Provost & Pritchard Engineering Group, Inc. would like to acknowledge the following people for the dedication and support they provided in preparing the Infrastructure Master Plan: Mrs. Sharon Sheltzer - City of Visalia (retired), Project Manager; Mr. Ricardo Noguera, City of Visalia, Housing and Economic Development Director; Mr. Rick Smith - City of Visalia, Collection System Maintenance Supervisor; Mr. Mike Markarian - California Water Service Company, Supervisor; Mr. Tony Akel, Akel Engineering; Mr. Blake Sanborn, EDAW, Inc., Project Assistant and Ms. Alma Du Solier – EDAW, Inc., Project Manager.

Exhibits

Exhibit 1 - Preferred Alternative
Exhibit 2 - Preferred Alternative (Key Map)
Exhibit 3 - Storm Drain System
Exhibit 4 - Sanitary Sewer System
Exhibit 5 - Water System

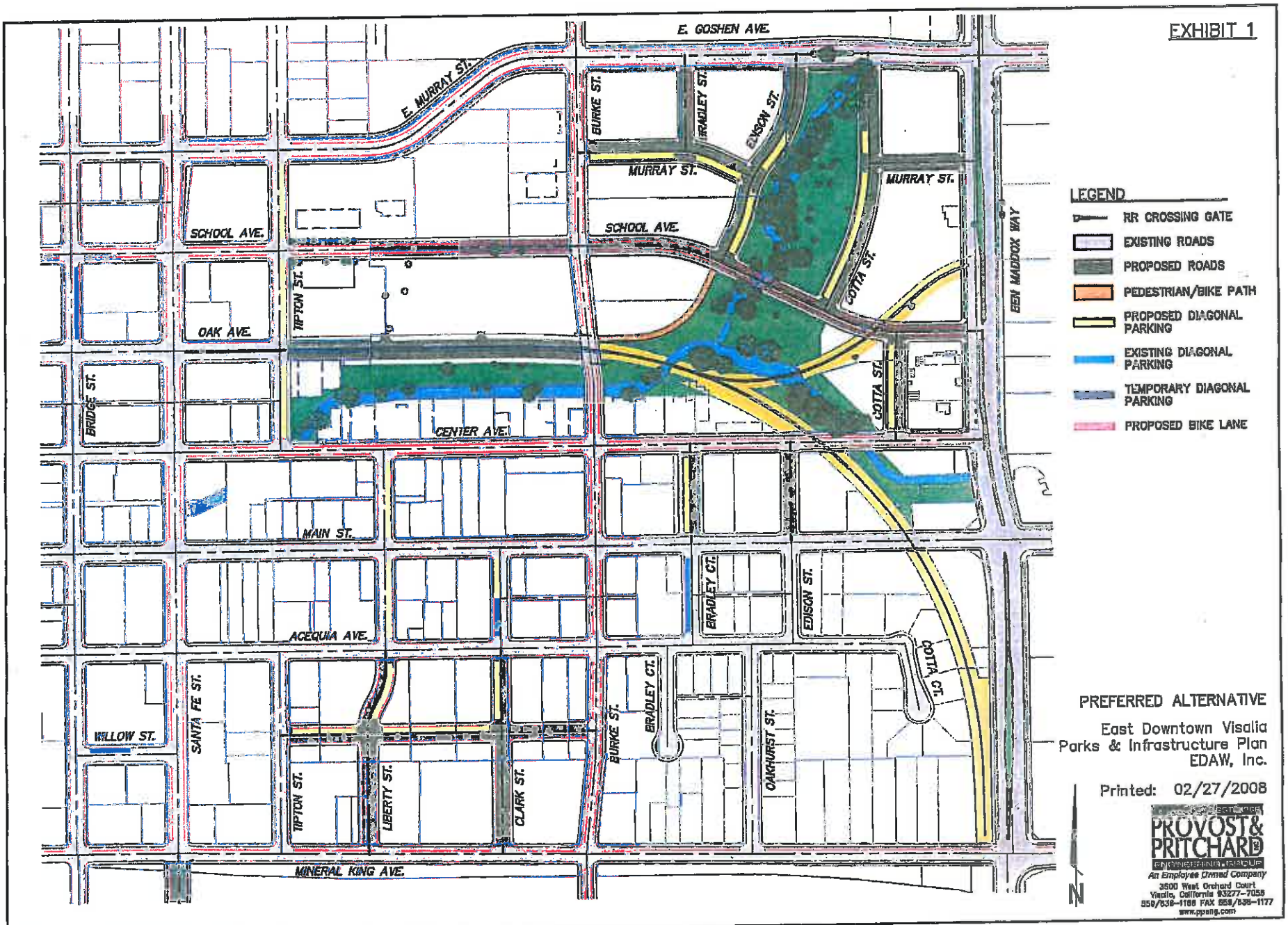

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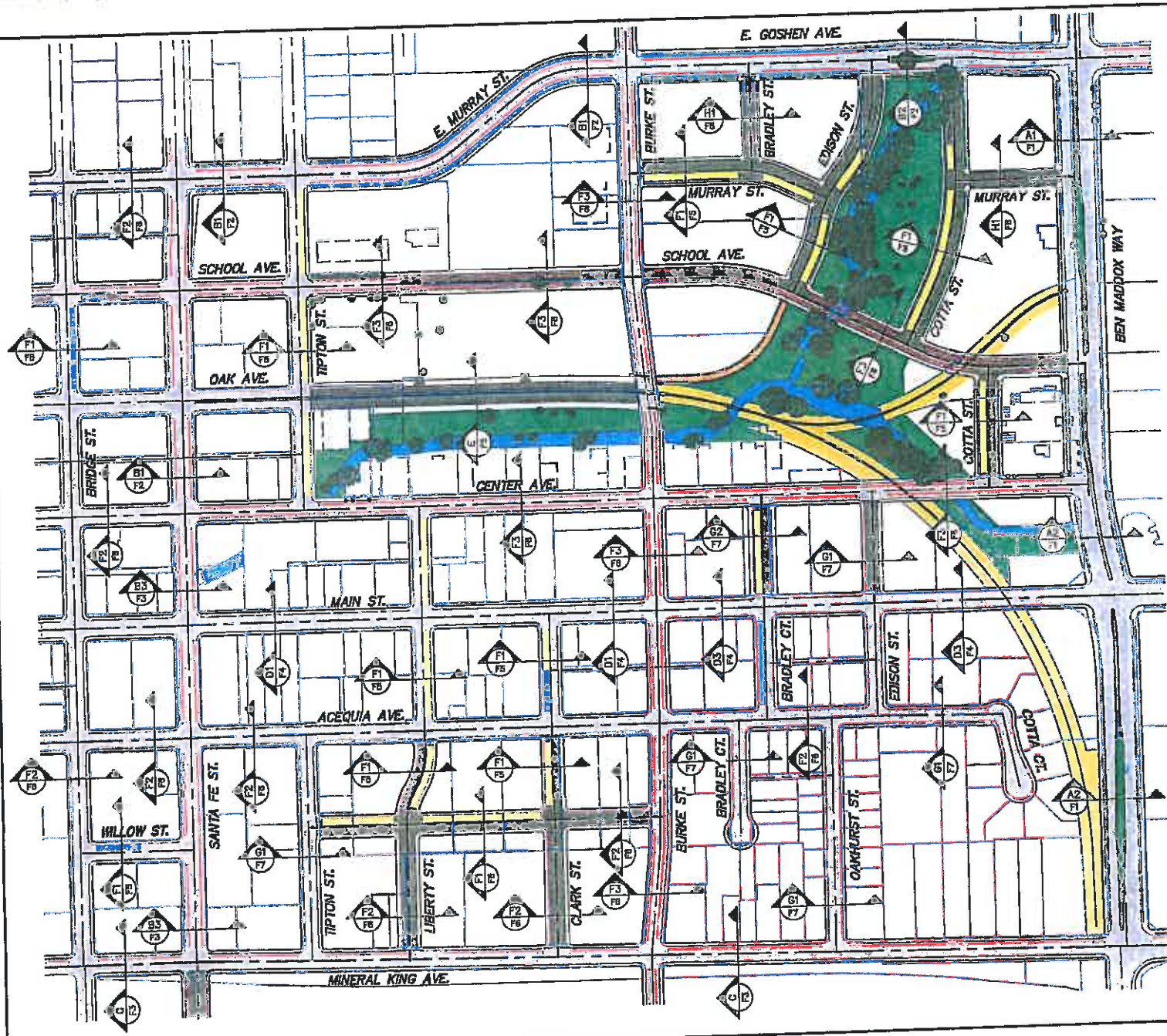
EXHIBIT 2



LEGEND

- RR CROSSING GATE
- EXISTING ROADS
- PROPOSED ROADS
- PEDESTRIAN/BIKE PATH
- PROPOSED DIAGONAL PARKING
- EXISTING DIAGONAL PARKING
- TEMPORARY DIAGONAL PARKING
- PROPOSED BIKE LANE
- A1 / F1 DETAIL NUMBER / FIGURE NUMBER

PREFERRED ALTERNATIVE

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3/18/2008 8:41 AM Y:\Clients\EDAW-1804\1804061 Visalia Civic Center Expansion\dwg\EXHIBIT\1804061-EX-Key_v20.dwg -Gabriel De Reynoso

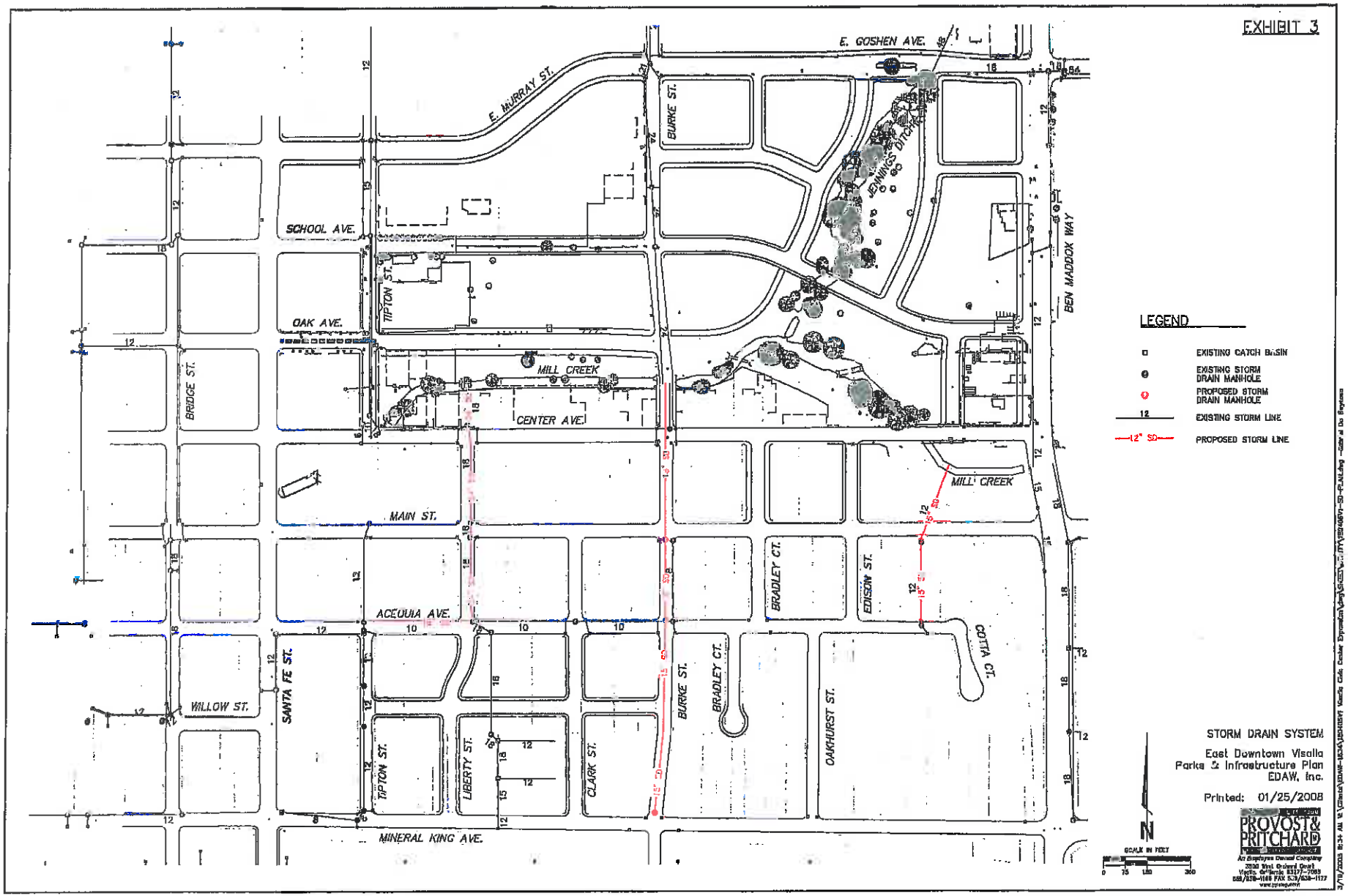
EXHIBIT 3
E. GOSHEN AVE.
E. MURRAY ST.
BURKE ST.
JENNINGS DITCH
BEN MADDOX WAY
SCHOOL AVE.
TIPTON ST.
OAK AVE.
MILL CREEK
CENTER AVE.
BRIDGE ST.
MAIN ST.
MILL CREEK
ACEQUIA AVE.
BRADLEY CT.
EDISON ST.
COTTA CT.
WILLOW ST.
SANTA FE ST.
BURKE ST.
BRADLEY CT.
OAKHURST ST.
TIPTON ST.
LIBERTY ST.
CLARK ST.
MINERAL KING AVE.
LEGEND
EXISTING CATCH BASIN
EXISTING STORM DRAIN MANHOLE
PROPOSED STORM DRAIN MANHOLE
EXISTING STORM LINE
PROPOSED STORM LINE
STORM DRAIN SYSTEM
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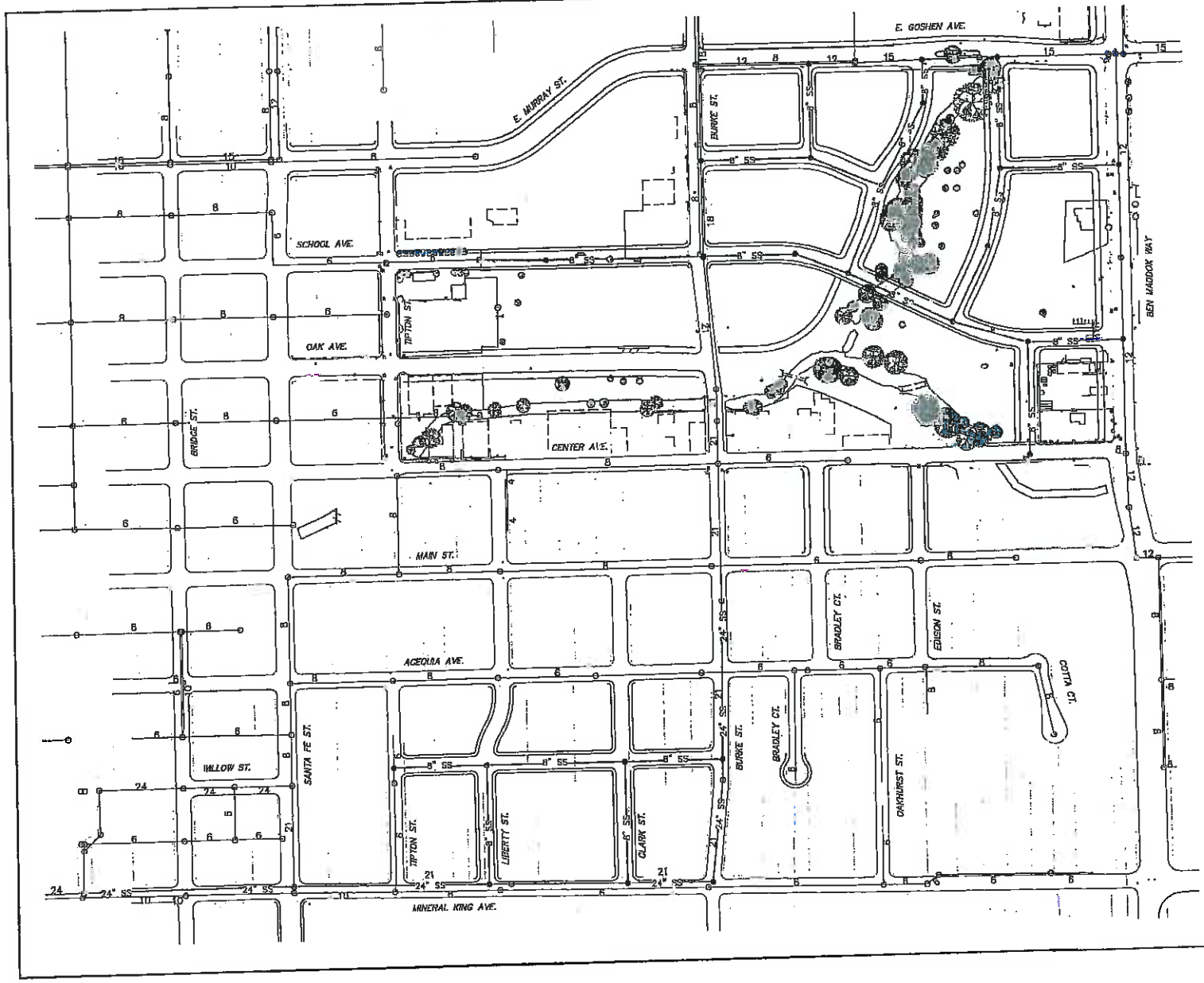
EXHIBIT 4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BURKE ST.
BEN MADDOX WAY
SCHOOL AVE.
OAK AVE.
TIPTON ST.
BRIDGE ST.
CENTER AVE.
MAIN ST.
ACEQUIA AVE.
WILLOW ST.
SANTA FE ST.
TIPTON ST.
LIBERTY ST.
CLARK ST.
BURKE ST.
BRADLEY CT.
BRADLEY CT.
EDISON ST.
OAKHURST ST.
COTTA CT.
MINERAL KING AVE.
LEGEND
EXISTING SEWER MANHOLE
PROPOSED SEWER MANHOLE
EXISTING SANITARY SEWER
PROPOSED SANITARY SEWER
SCALE IN FEET
SANITARY SEWER SYSTEM
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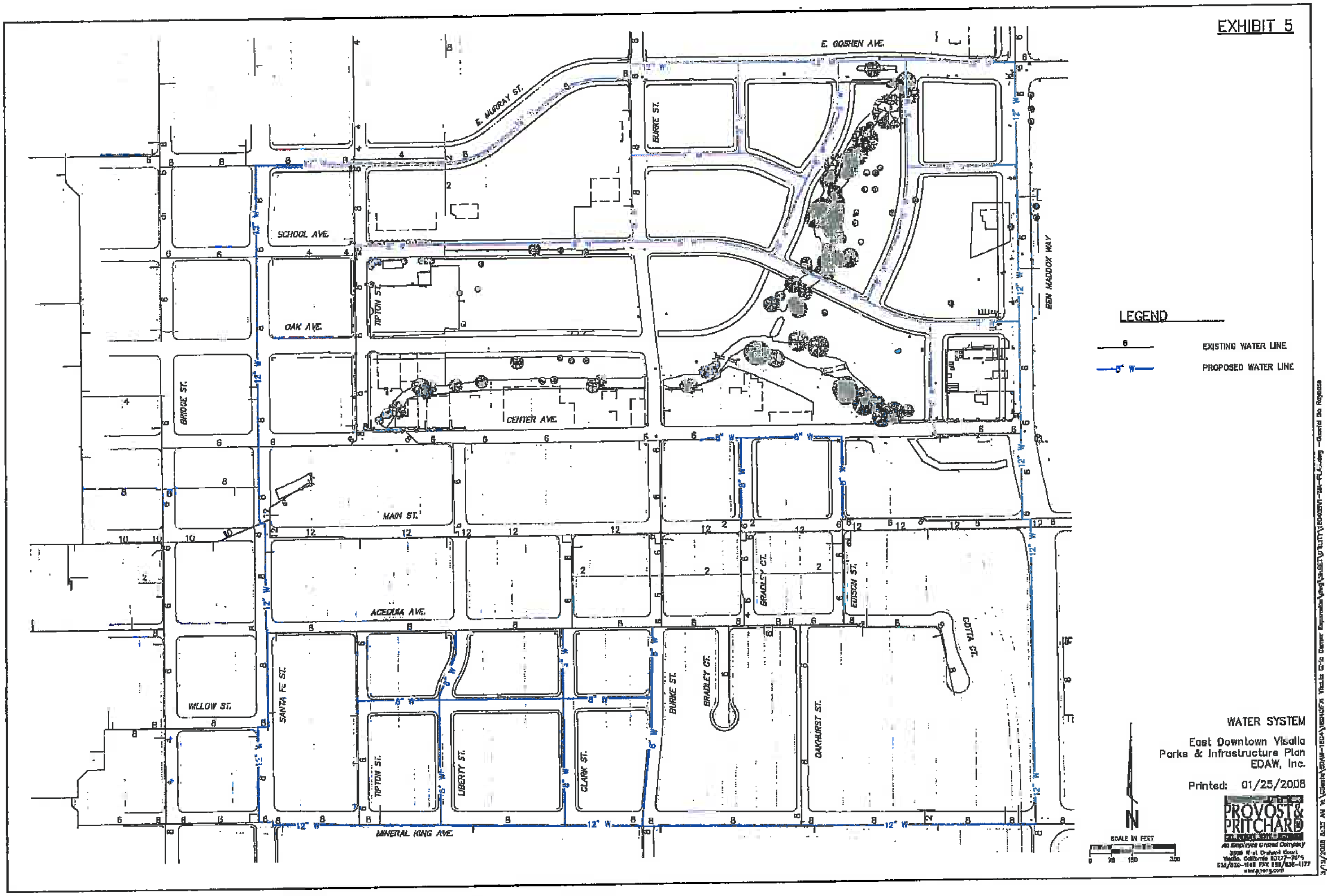
EXHIBIT 5
LEGEND
EXISTING WATER LINE
PROPOSED WATER LINE
WATER SYSTEM
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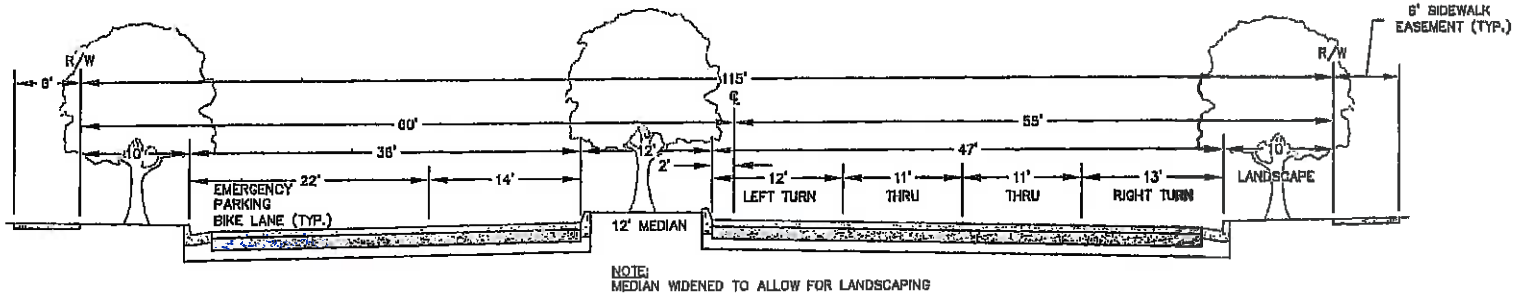
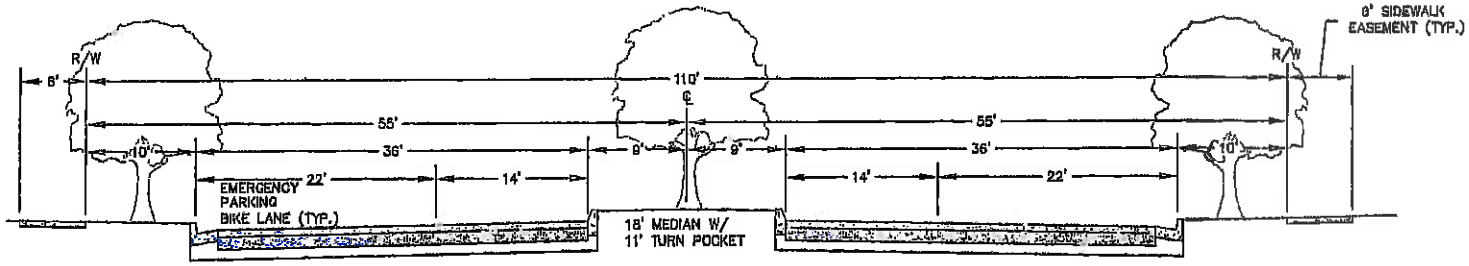
SCHOOL AVE.
OAK AVE.
CENTER AVE.
MAIN ST.
ACEQUIA AVE.
WILLOW ST.
MINERAL KING AVE.
BRIDGE ST.
TIPTON ST.
SANTA FE ST.
LIBERTY ST.
CLARK ST.
BURKE ST.
BRADLEY CT.
BRADLEY ST.
EDISON ST.
OAKHURST ST.
COTTA CT.
BEN MADDOX WAY

Figures

FIGURE 1



A1 / F1 BEN MADDOX WAY – GOSHEN AVENUE TO CENTER STREET
SCALE: NTS



A2 / F1 BEN MADDOX WAY – CENTER STREET TO MINERAL KING
SCALE: NTS

BEN MADDOX WAY

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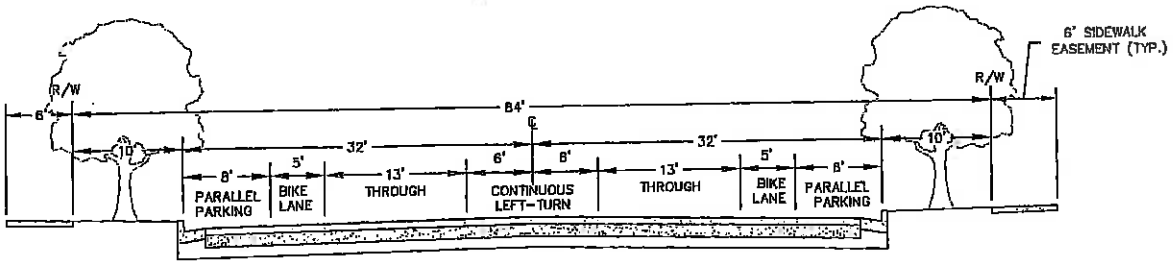
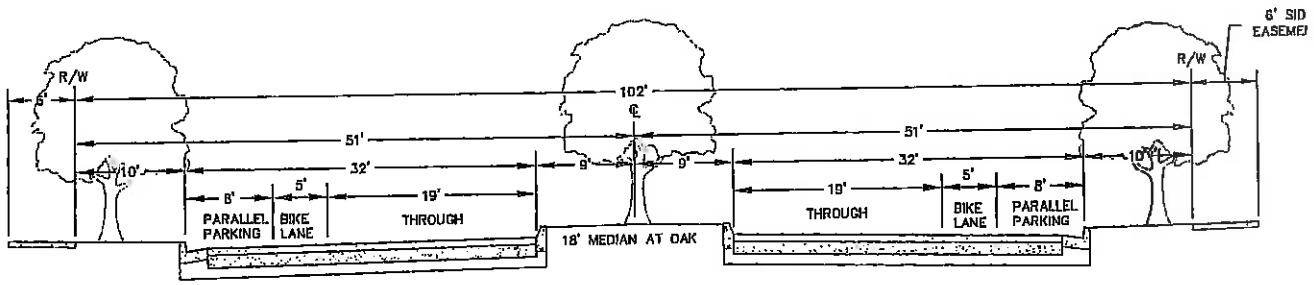
FIGURE 2



B1 / F2 GOSHEN AVENUE
SANTA FE STREET NORTH OF CENTER
SCALE: NTS



B2 / F2 GOSHEN AVENUE AT OAK TREE
SCALE: NTS

GOSHEN AVENUE

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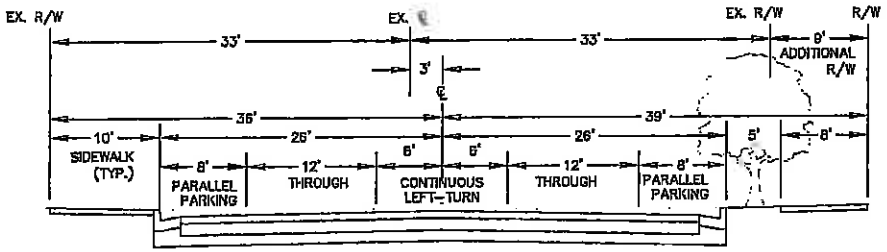
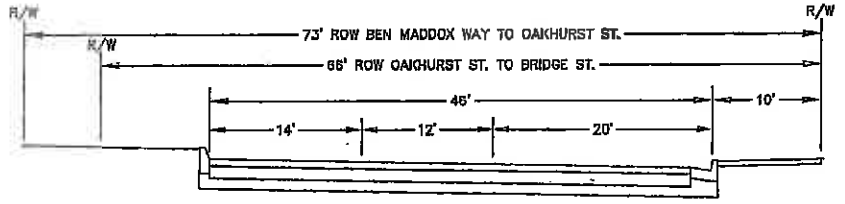
FIGURE 3



B3 / F3 SANTA FE STREET BETWEEN MINERAL KING AVENUE & CENTER STREET
SCALE: NTS (LOOKING NORTH)



C / F3 MINERAL KING – ONE WAY TRAFFIC
SCALE: NTS (LOOKING WEST)

SANTA FE STREET & MINERAL KING

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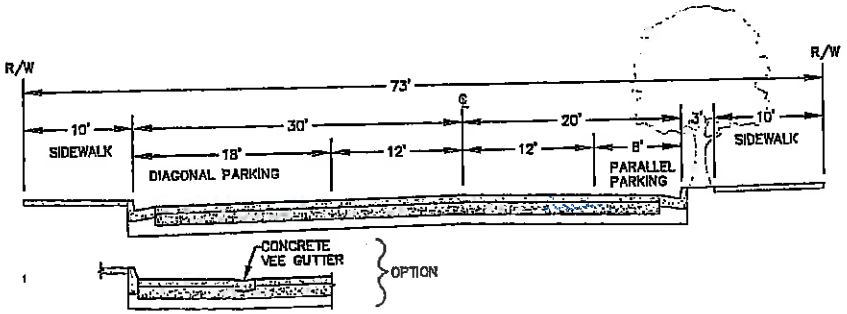
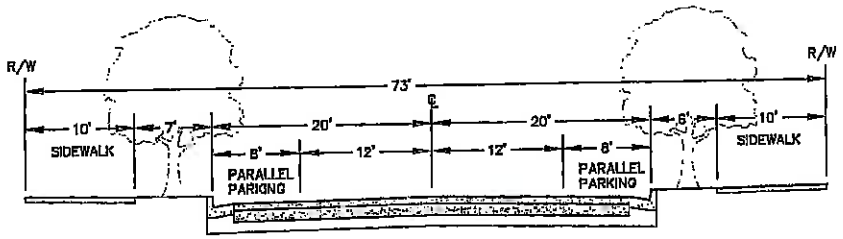
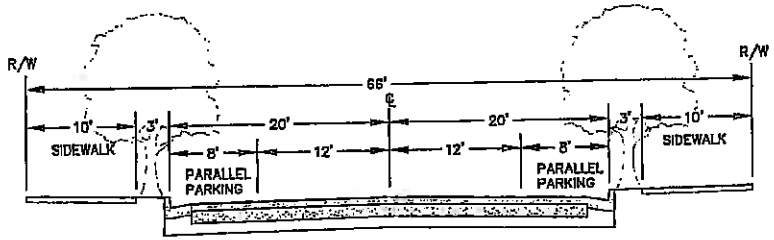
FIGURE 4



D1 / F4 MAIN STREET – SANTA FE STREET TO BURKE STREET
SCALE: NTS



D2 / F4 MAIN STREET – SANTA FE STREET TO BURKE STREET
SCALE: NTS



D3 / F4 MAIN STREET – BURKE STREET TO EAST
SCALE: NTS

MAIN STREET

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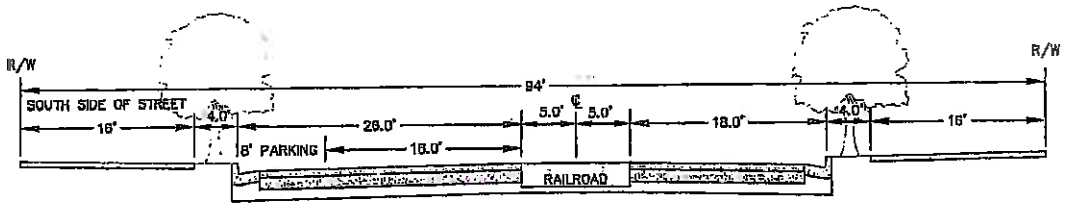
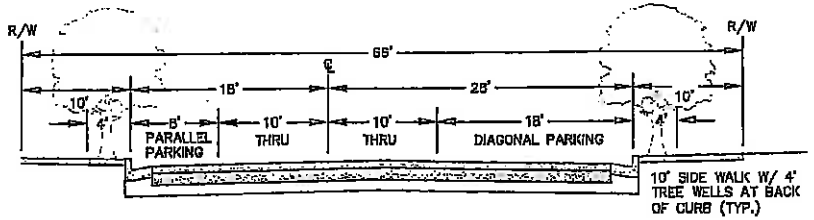
FIGURE 5



E/F5 OAK AVENUE – PARALLEL PARKING ON SOUTH SIDE
SCALE: NTS (BURKE STREET TO TIPTON STREET)



F1/F5 LOCAL STREET W/ DIAGONAL PARKING
SCALE: NTS

OAK AVENUE

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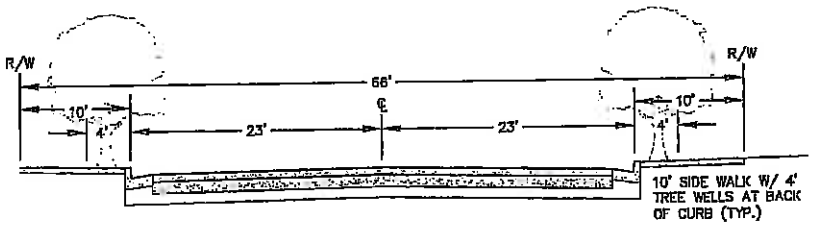
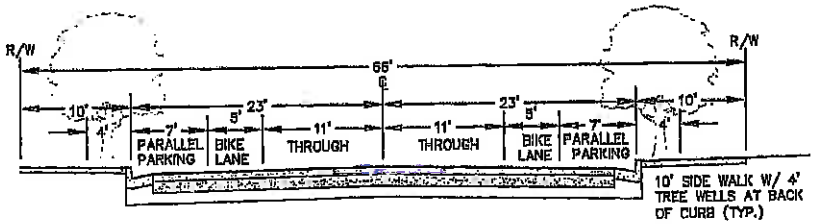
FIGURE 6



F2/F6 LOCAL STREET W/ PARALLEL PARKING BOTH SIDES
SCALE: NTS



F3/F6 LOCAL STREET W/ PARALLEL PARKING BOTH SIDES
SCALE: NTS

LOCAL STREETS

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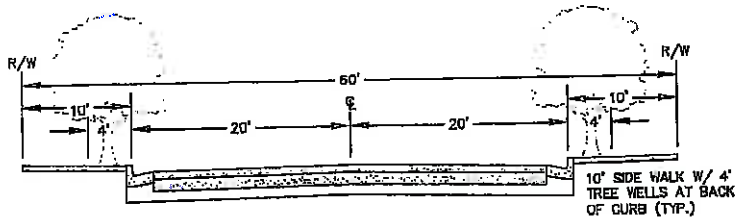
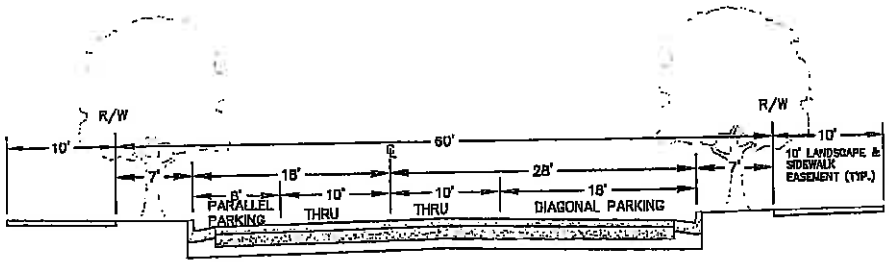
FIGURE 7



G1 / F7 LOCAL STREET W/ BIKE LANE & PARALLEL PARKING BOTH SIDES
SCALE: NTS



G2 / F7 LOCAL STREET W/ DIAGONAL PARKING & PARALLEL PARKING
SCALE: NTS

LOCAL STREETS

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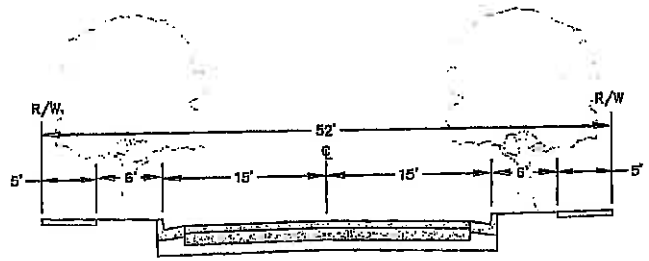
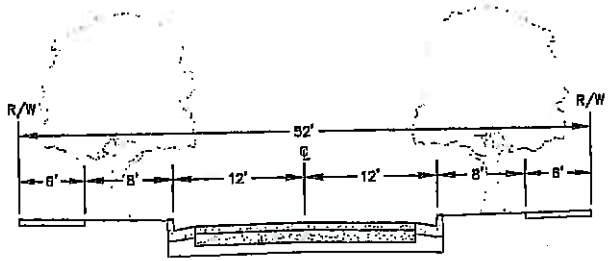
FIGURE 8



H1 / F8 CITY STANDARD – PARALLEL PARKING BOTH SIDES
SCALE: NTS



H2 / F8 MINOR STREET – NO PARKING
SCALE: NTS

MINOR STREETS

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Appendices

Appendix A - Mixed Use Neighborhoods
Appendix B - Existing Water, Sewer and Storm Drain Facilities
Appendix C - Aerial Overview
Appendix D - Existing Storm Drain Facilities
Appendix E - Storm Drain Facilities
Appendix F - Sewer Collection System Capacity Analysis Update
Appendix G - Existing Sanitary Sewer Facilities
Appendix H - Existing California Water Service Facilities

Appendix A

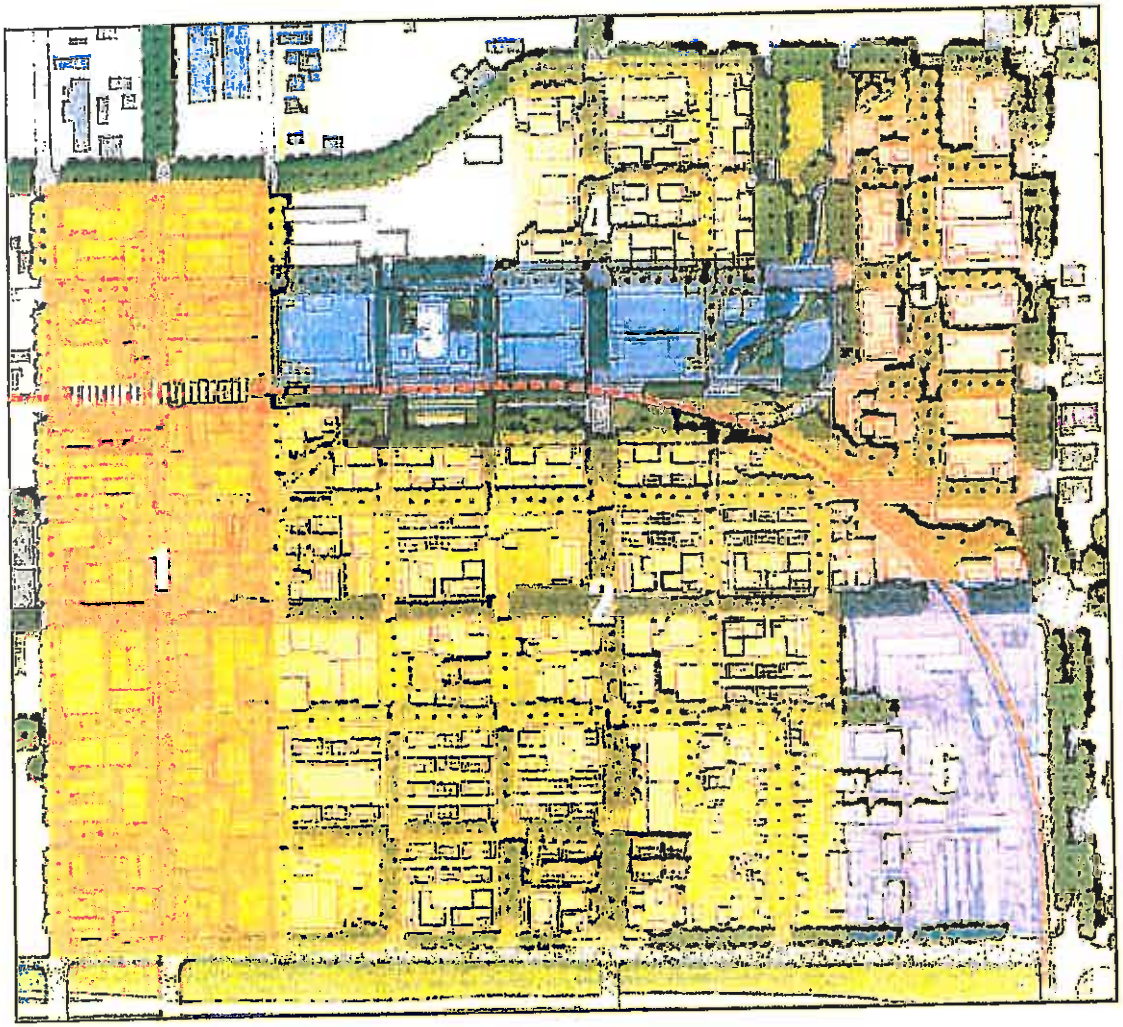
East Downtown Visalia Park
and Infrastructure Master Plan

Development Program Summary

1. Santa Fe	
Opp. Sites	10.52 acres
Residential	250 units
Commercial	206,000 SF
2. East Main	
Opp. Sites	19.63 acres
Residential	350 units
Commercial	106,000 SF
3. Civic Center	
Opp. Sites	10.00 acres
Office	280,000 sf
4. Central Park	
Opp. Sites	10.00 acres
Residential	400 units
Commercial	20,000 SF
5. Ben Maddox Business Center	
Opp. Sites	19.00 acres
Office	500,000 SF
6. East Acequia Service Commercial	
Opp. Sites	3.59 acres
Serv. Commercial	40,000 SF
Open Space	15.66 acres
TOTAL	
Opp. Sites	88.4 acres
Residential	1,000 units
Employment	1,152,000 SF

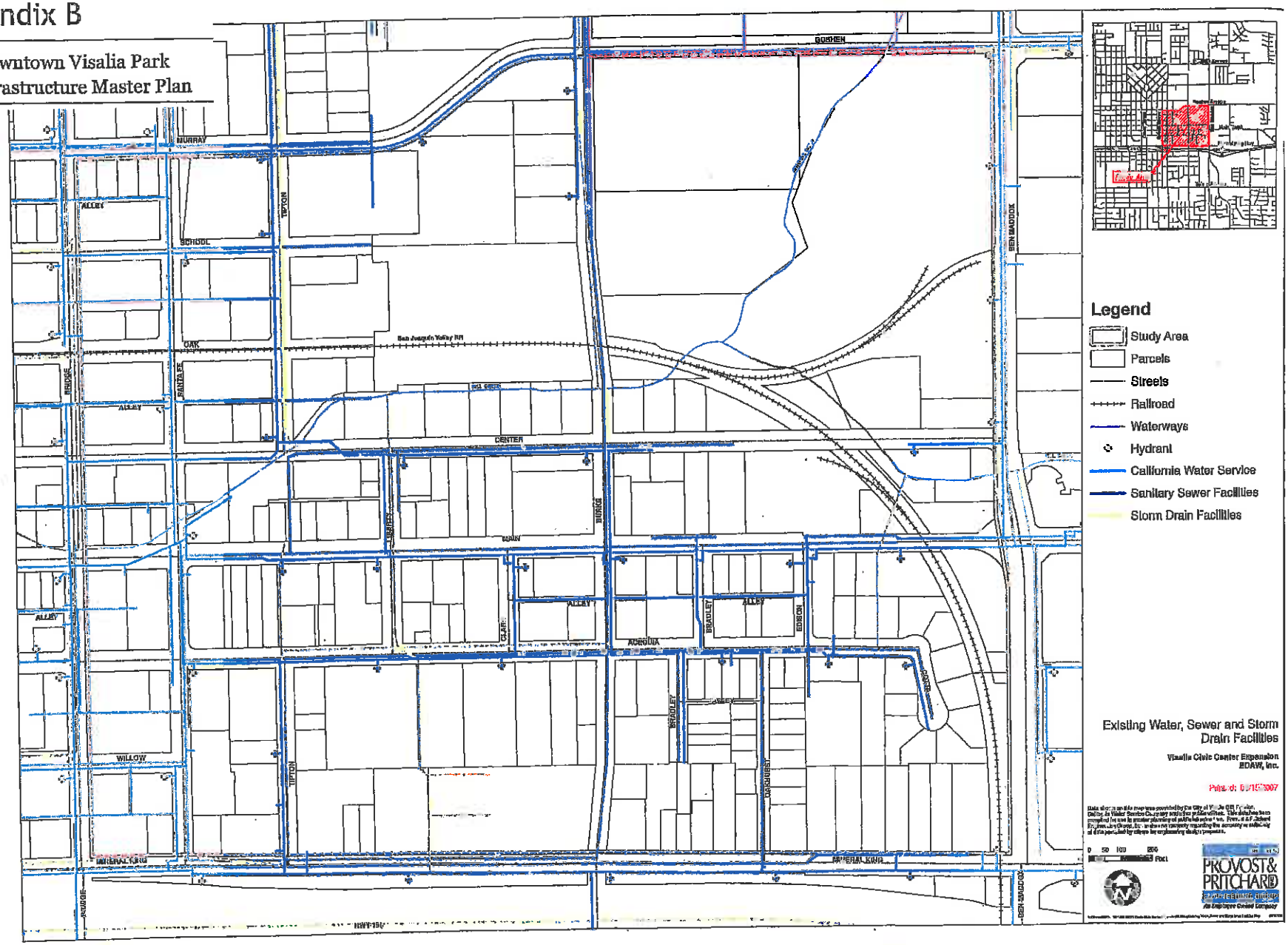
Mixed-Use Neighborhoods

The planning for East Downtown reinforces the community's sustained efforts to keep downtown as the physical and economic center of the city by complementing its retail and commercial function with residential, office and civic uses. Recommended planning strategies and supporting action plan provide a road map to accomplish the community's aspirations. By adopting this plan, the City has put in motion reinvestment activities that implement popular planning principles for East Downtown.



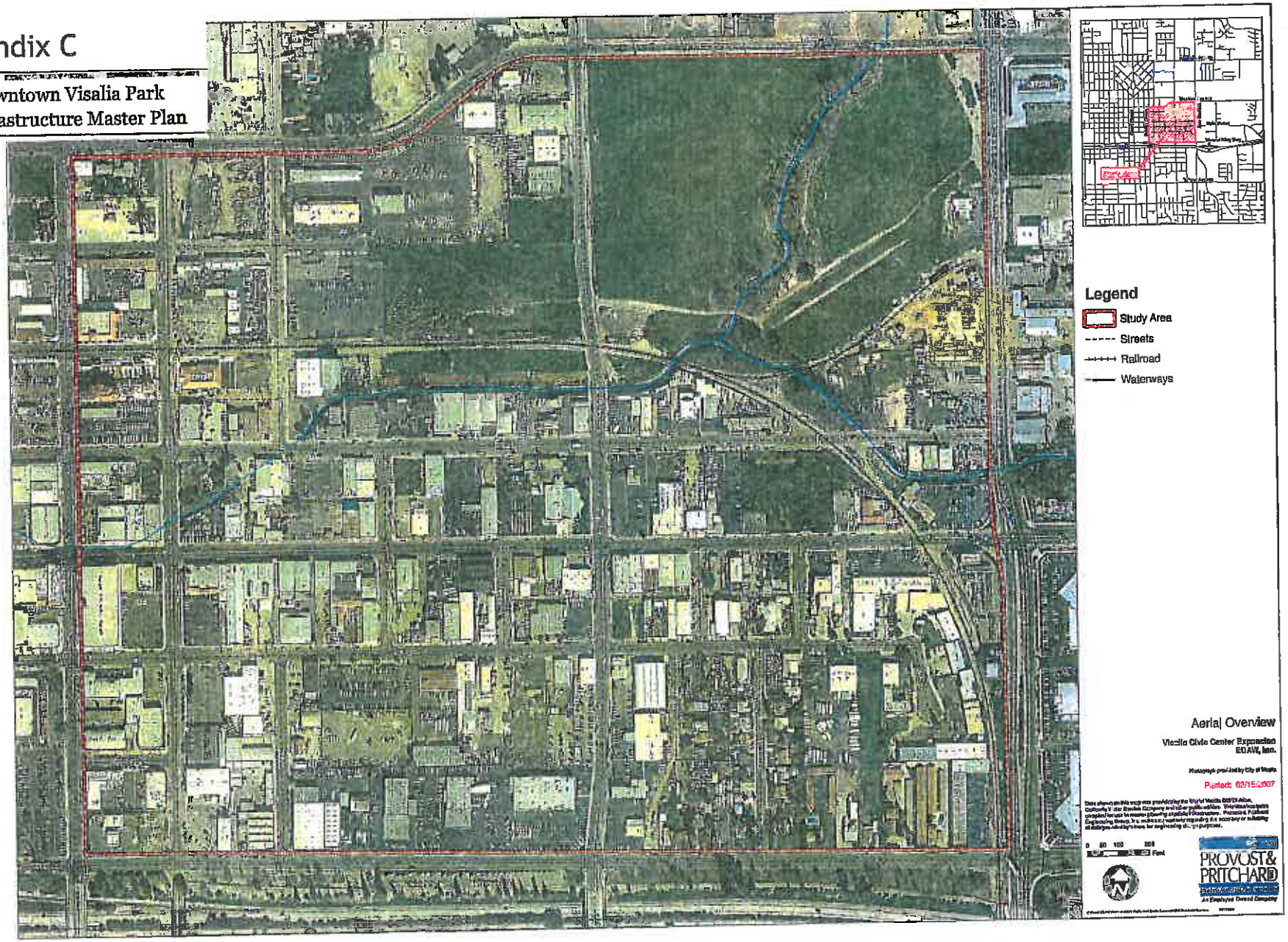
Appendix B

East Downtown Visalia Park and Infrastructure Master Plan



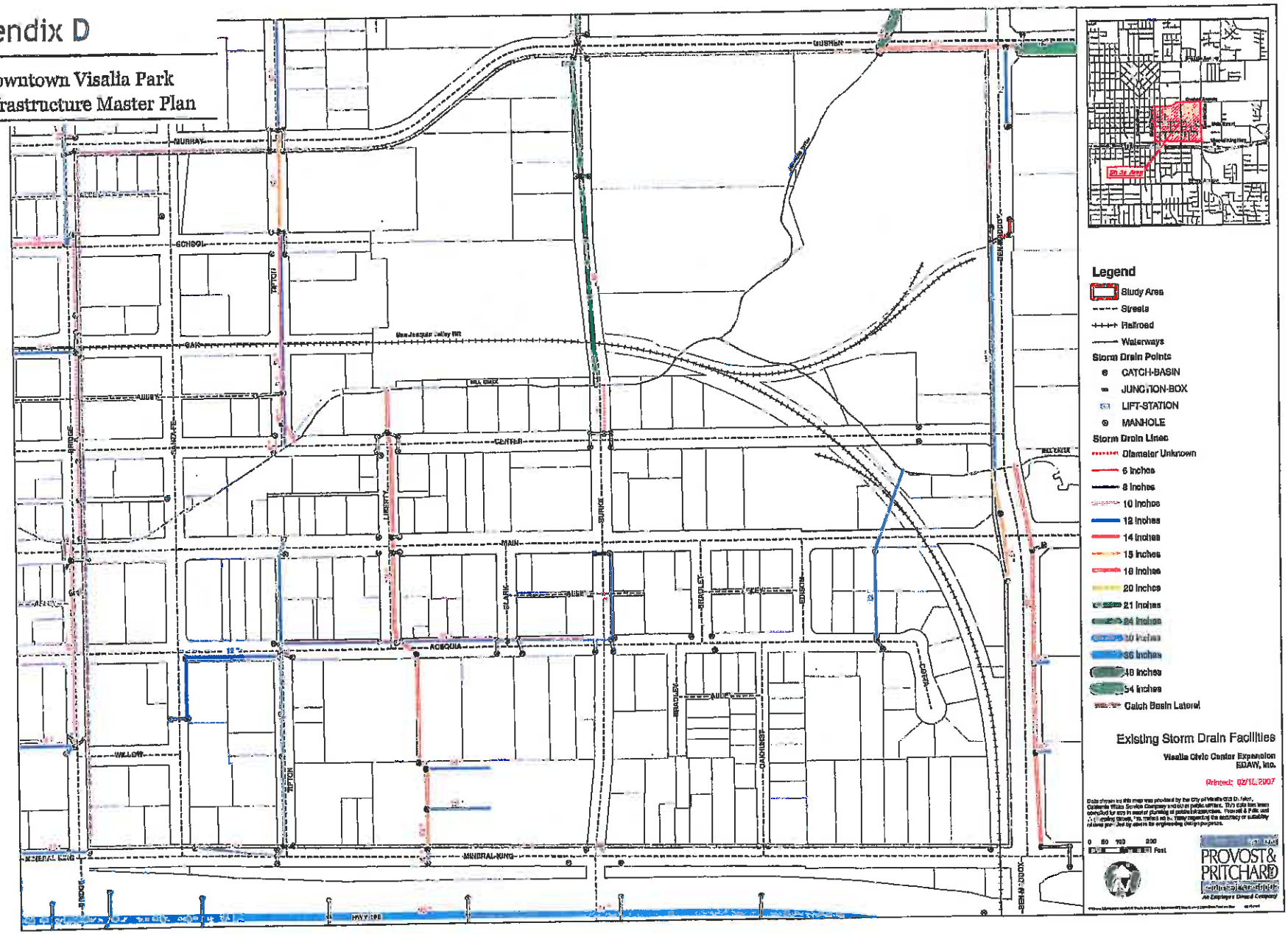
Appendix C

East Downtown Visalia Park and Infrastructure Master Plan



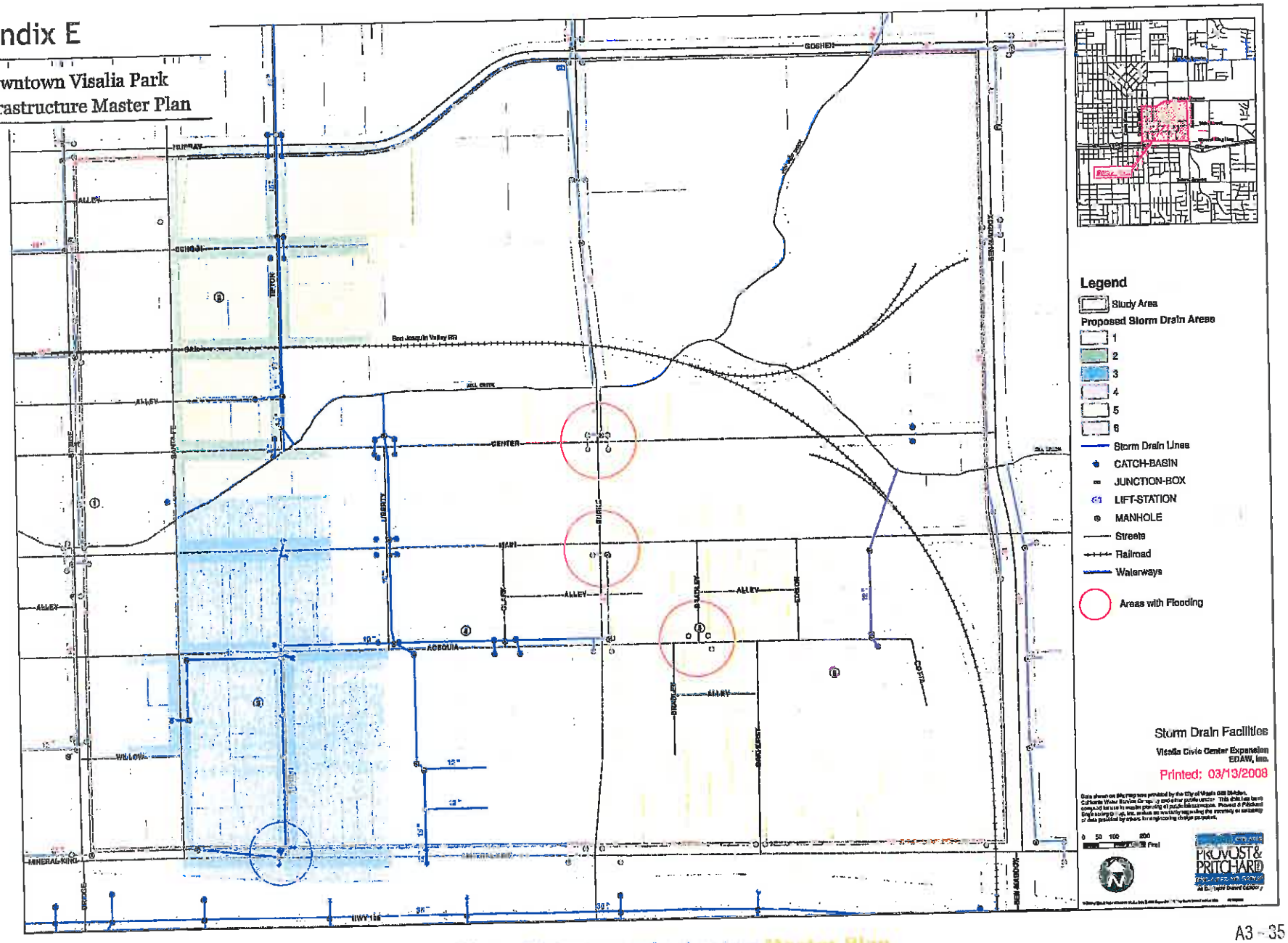
Appendix D

East Downtown Visalia Park and Infrastructure Master Plan



Appendix E

East Downtown Visalia Park and Infrastructure Master Plan



City of Visalia
Civic Center Expansion

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

FINAL DRAFT

November 9, 2007

PROVOST & PRITCHARD ENGINEERING GROUP

AKEL ENGINEERING GROUP, INC.

AKEL
ENGINEERING GROUP, INC.

November 9, 2007
07122

Provost and Pritchard
3500 West Orchard Court
Visalia, CA. 93277-1166

Attention: Mr. Jim Funk, PE

Subject: City of Visalia Civic Center Expansion – Sewer Collection System Capacity Analysis Update

Dear Jim:

We are pleased to submit this letter report which summarizes the review of the 2005 Sanitary Sewer Collection System Master Plan recommendations for the proposed Civic Center Expansion. The Letter Report includes the following sections:

- Background
- Project Description
- Sewer Flows
- Analysis Criteria
- Hydraulic Model
- Analysis and Recommendation

We extend our thanks to you, Vaughn Melcher, and John Dutton for assisting in collecting the critical information needed for this analysis.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Principal

TA

Enclosure: Draft Report

Akel Engineering Group, Inc.
7075 N. Howard Street; Suite 102; Fresno, California 93720 - P (559) 436-0600 - F (559) 436-0622

City of Visalia Civic Center Expansion

Sewer Collection System Capacity Analysis Update

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1.0 BACKGROUND

In December 2005, the City of Visalia, California published a Sanitary Sewer Collection System Master Plan (2005 SSMP), prepared by Carollo Engineers. The 2005 SSMP included recommendations and estimated capital costs for servicing future developments within the City with respect to sanitary sewer conveyance capabilities.

Since the publishing of the 2005 SSMP, a Civic Center Expansion Project (East Downtown Visalia Parks and Infrastructure Master Plan) has been proposed. Akel Engineering Group, Inc. (Akel) was retained by Provost and Pritchard (P&P) to conduct an analysis on the impact this proposed plan would have on wastewater flows within the area of interest and on the capacities of the downstream sewer collection system.

2.0 PROJECT DESCRIPTION

The study area consists of approximately 170 acres (**Figure 1**) and is located in Downtown Visalia, California. It is bound on the west by Bridge Street, on the east by Ben Maddox Way, on the north by East Goshen Avenue and on the south by Mineral King Avenue.

The Civic Center Expansion Plan includes rezoning the study area into several mixed use neighborhoods in addition to the rezoning for the Civic Center. The existing land use of the study area, as documented in the 2005 Sewer System Master Plan, consists of two categories: Central Business District and Commercial/Shopping. The land use categories and their estimated acreage are summarized on **Table 1** and shown on **Figure 2**. The existing zoning map is also shown on an exhibit prepared by Provost and Pritchard and attached in **Appendix A**.

The proposed project, consisting of a Mixed Use Neighborhood Redevelopment Zone, is comprised of six development sub-areas as shown on **Figure 3**. Each sub-area's currently proposed characteristics, including floor space (in square feet) for commercial development and number of dwelling units (D.U.) for residential developments, are summarized on **Table 2**. The proposed development sub-districts are shown on an exhibit prepared by Provost and Pritchard and attached in **Appendix B**.

3.0 SEWER FLOWS

The majority of the study area will be re-categorized into new sub-districts, and their new classifications will be generally consistent with a commercial or the high density residential land use designation. Sewer flows from the revised zoning categories were estimated based on the square footage of office space for commercial developments and based on the number of dwelling units for residential areas.

These sewer flows are summarized in gallons per minute (gpm) and gallons per day (gpd) on **Table 2**. Commercial area flows were estimated by applying a factor of 80 gpd per 1,000 ft^2 to the floor space, while residential area flows were estimated by applying 200 gpd per dwelling unit.

4.0 ANALYSIS CRITERIA

The hydraulic criterion for the sewer system components are documented in the 2005 Sanitary Sewer Master Plan. The City has established limits for the minimum slope and maximum depth over diameter (d/D) ratio for the various pipe diameters **(Table 3)**. The maximum d/D ratio is a primary consideration in flow analysis as the hydraulic grade line inside the pipes must be below the allowable level during peak flows. In accordance with the master plan, a coefficient of 0.013 was assigned to each new proposed pipe to account for head loss due to friction.

5.0 HYDRAULIC MODEL

The City's hydraulic model, developed during the preparation of the 2005 Sanitary Sewer System Master Plan in MWHSoft H2OMAP Sewer was used for this analysis. The hydraulic model, dated March 27, 2007, was obtained by Provost and Pritchard for the purpose of this analysis. The model simulates existing and future peak flows over a period of 24 hours.

The provided model contained a total of eight scenarios that included the following scenarios, numbered for the purpose for this report:

- **Modeling Scenario 1.** Existing flows with existing sewer system
- **Modeling Scenario 2.** Future flows with existing sewer system
- **Modeling Scenario 3.** Future flows with proposed master plan improvements

Modeling Scenario 3 was used by the project team for creating an updated scenario reflecting the revised future flows, and which account for the proposed rezoning of the sub-districts. The new scenario is summarized as follows:

- **Modeling Scenario 4.** Revised future flows with proposed master plan improvements

Modeling Scenario 4 was used to evaluate the impact of this project on the improvements proposed in the 2005 Sanitary Sewer System Master Plan.

6.0 ANALYSIS AND RECOMMENDATION

There are several improvements that were identified in the 2005 Sanitary Sewer Collection System Master Plan, and which are adjacent to the project study area and along Mineral King Avenue. These improvements are listed on **Table 4.**

The hydraulic model analysis, using Model Scenario 4, and including the revised flows from the proposed project, indicates that the improvements listed in **Table 4** need to be extended to include segments not listed in the 2005 Sanitary Sewer System Master Plan. Additionally, the analysis indicates several segments downstream of the project which were previously approaching a deficiency, have become deficient with the increased flows.

Table 5 provides a summary of the pipe segments that require improvements due to deficiencies. Each segment listed in this table is cross referenced to a hydraulic analysis profile attached as **Appendix C (Sheets 1 through 4)**. The segment locations are presented in **Figure 4**.

Proposed amended improvements can be found in **Table 5** and consist primarily of diameter upsizing. However, one proposed change **(Table 5, Segment 5)** consists of a realignment which is also presented graphically in **Appendix D**. This includes a realignment of the existing 24-inch sewer trunk to remove a jog into a parking lot north of East Mineral King Avenue at San Fe Avenue. According to the hydraulic model, the existing 24-inch jog at Willow and an extension of Garden Street includes pipes with adverse slopes **(Appendix D)**. The proposed realignment will eliminate the jog on Santa Fe Avenue, and maintain the pipe along East Mineral King Avenue. If the slope is maintained from Burke through the Garden Street extension, then a 24 inch diameter pipe will be sufficient. This realignment will reduce the overall length of the existing sewer trunk, thus gaining an additional drop that increases the slopes and corresponding capacity of the proposed 24-inch.

An extension of the 24-inch upsize along Burke identified in the 2005 master plan is also recommended. Due to increased flows from this project, the proposed 24-inch improvement needs be extended to Main Street as listed on **Table 5**, Segment 6 **(Appendix D)**.

The profiles in Sheets 5 through 9 in **Appendix C** present the rest of the downstream system from Ranch Street.

Provost and Pritchard

CITY OF VISALIA CIVIC CENTER EXPANSION

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

TABLES

Table 1 - Existing Zoning
Sewer Collection System Capacity Analysis Update
City of Visalia Civic Center Expansion

Zoning	Land Use Designation	Gross Area (AC)
Central Business District (CDT)	Commercial (COM)	30
Commercial/Shopping (CS)	Commercial (COM)	140
Totals		**170**

Table 2 - Proposed Mixed Use Neighborhoods and Associated Sewer Flows
Sewer Collection System Capacity Analysis Update
City of Visalia Civic Center Expansion

No.	Sub-District Land Use	Gross Area (AC)	Opp. Sites (AC)	Land Use Designation	Commercial Floor Space	units (sf or D.U.)	Calculated Flow (gpd)	(gpm)
1	Santa Fe	37.1	10.52	Commercial (COM)	206,000	sf	16,480.00	11.4
			-	High Density Residential (RHD)	250	D.U.	50,000.00	34.7
2	East Main	65.3	19.63	Commercial (COM)	106,000	sf	8,480.00	5.9
			-	High Density Residential (RHD)	350	D.U.	70,000.00	48.6
3	Civic Center	12.6	10	Commercial (COM)	280,000	sf	22,400.00	15.6
4	Central Park	9.7	10	Commercial (COM)	20,000	sf	1,600.00	1.1
			-	High Density Residential (RHD)	400	D.U.	80,000.00	55.6
5	Ben Maddox Business Center	22.7	19	Commercial (COM)	500,000	sf	40,000.00	27.8
6	East Acequia Service Commercial	14.1	3.59	Commercial (COM)	40,000	sf	3,200.00	2.2
	Open Space	8.9	15.66	Open Space (OS)	0		-	-
	Total	**170**	**88**				**292,160.00**	**202.9**

Table 3 - Maximum Depth to Pipe Diameter Ratio
Sewer Collection System Capacity Analysis Update
City of Visalia Civic Center Expansion

Pipe Diameter (in.)	Maximum d/D Ratio during peak flows)
< 10	0.5
12 to 16	0.67
> 16	0.75

Table 4 - 2005 Sewer Master Plan Improvements Near Study Area
Sewer Collection System Capacity Analysis Update
City of Visalia Civic Center Expansion

Pipe Code	Street	Limits	Existing Diameter (in)	Proposed Diameter (in)	Parallel/Replace	Length (ft)
AM-1	W. Mineral King Ave.	N. Ranch St. to S. Mooney Blvd	30	33	replace	2095
AM-2	W. Mineral King Ave.	S. Mooney Blvd to N. Divisidero Ave.	30	33	replace	1304
AM-3	W. Mineral King Ave.	N. Divisidero Ave. to S. West St.	18	30	replace	3842
AM-4	W. Mineral King Ave.	S. West St. to First manhole west of S. Locust St.	24	30	replace	665
AM-5	E. Mineral King Ave.	First manhole east of S. Tipton to S. Burke	21	24	replace	632
AM-6	S. Burke St	E. Mineral King Ave to 1st manhole north	21	24	replace	316
					Total	**8854**

Table 5 - Proposed Amended Improvements to the 2005 SSMP
Sewer Collection System Capacity Analysis Update
City of Visalia Civic Center Expansion

Segment No.	Along Street	Limits	Existing Diameter (in)	Improvements Needed?	Proposed Diameter (in)	Length (ft)	2005 Master Plan Pipe Code in CIP	Parallel/Replace	Comment
1	W. Mineral King	Ranch St to North Divisidero Ave	30	Y	42	3400	AM-1 & AM-2	replace	
2	W. Mineral King	North Divisidero Ave to Stevenson St	18	Y	30	2950	AM-3	replace	
3	W. Mineral King	Stevenson St to Locust St	24	Y	30	1950	AM-3 & AM-4	replace	
4	E. Mineral King	Locust St to extension of Garden St	24	N	-	1000		no upgrades needed	
5	E. Mineral King Ave.	extension of Garden St. to Burke St.	21	Y	24	2000	AM-5[1]	replace, realign, and adjust slope along Segment 5	abandon existing alignment through parking lot (See Exhibit 1)
6	S. Burke St	E. Mineral King Ave to Main St	21	Y	24	900	AM-6[1]	replace and adjust with uniform slope	Extend 24" upsize to second manhole on Burke to Main St
					Total	12,200			

Note:
1) This analysis revised the length of this 2005 Master Plan improvement

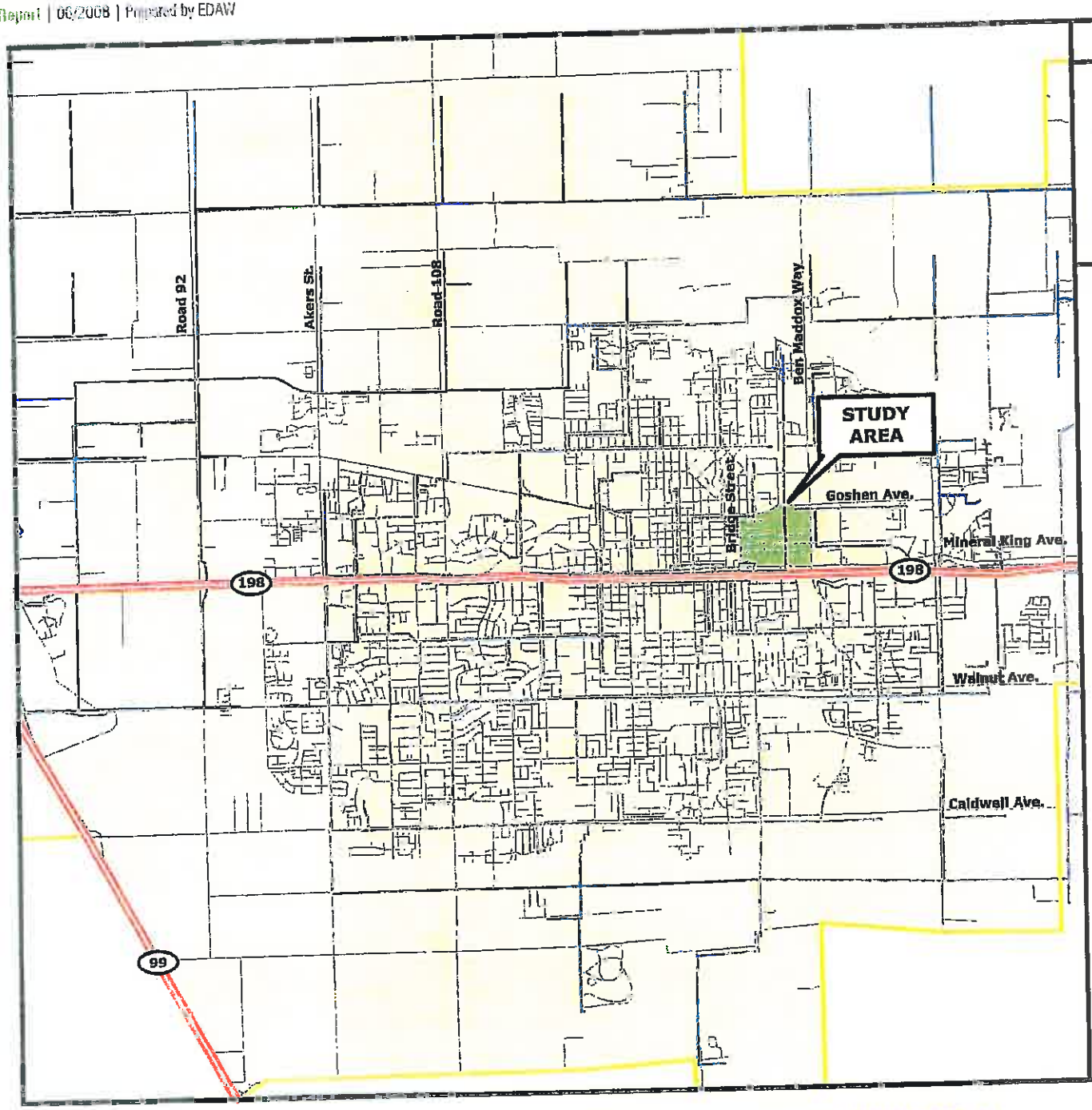
Provost and Pritchard

CITY OF VISALIA CIVIC CENTER EXPANSION

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

FIGURES

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE



LEGEND

- Existing Sewer Line
- Road Centerline
- Study Area

N

W E

S

NTS

FIGURE 1
CIVIC CENTER EXPANSION
CITY OF VISALIA
LOCATION MAP

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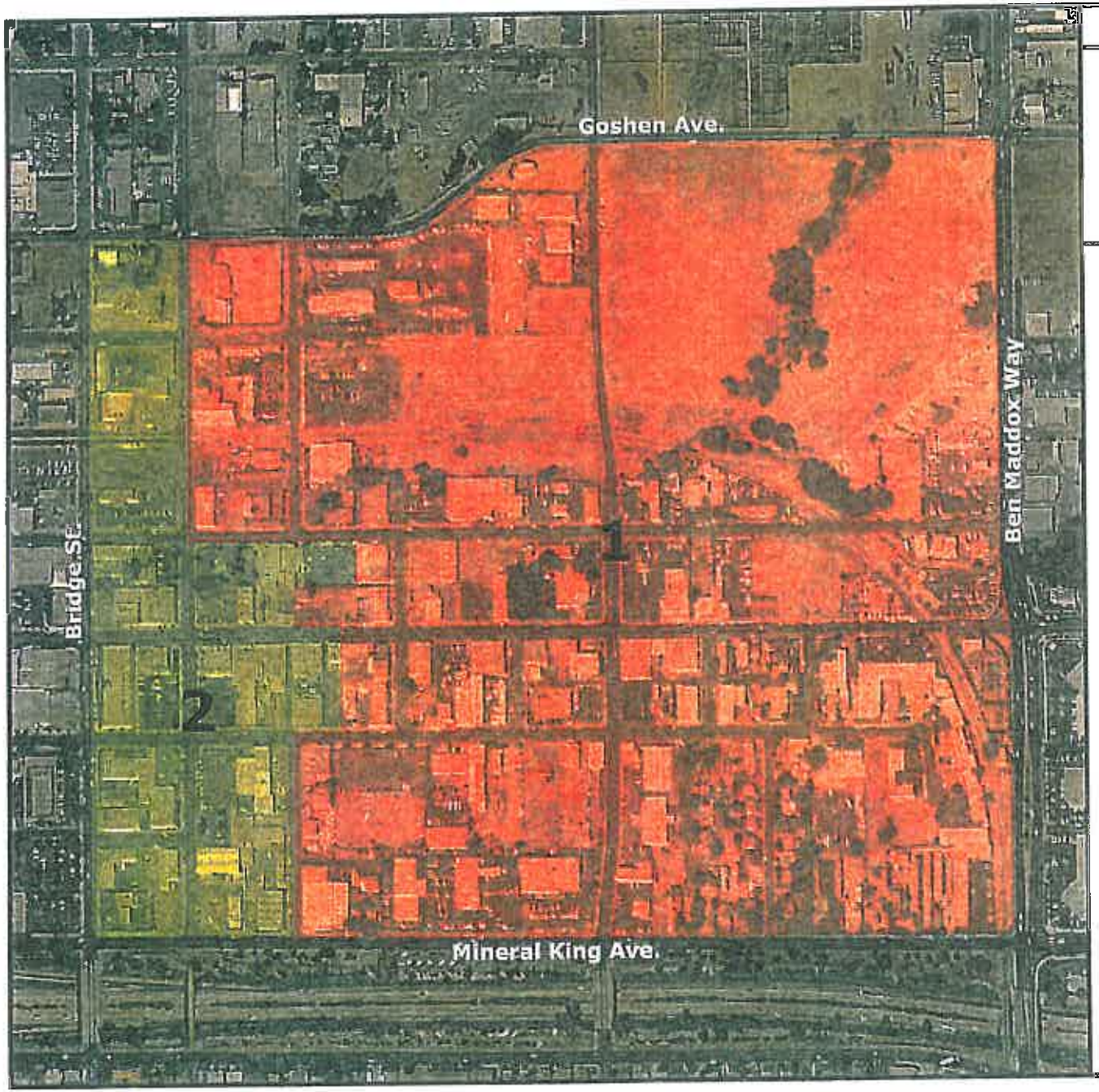
AKEL ENGINEERING GROUP, INC.



LEGEND

1. CS - Commercial Shopping

2. CDT - Central Business District

N

W E

S

NTS

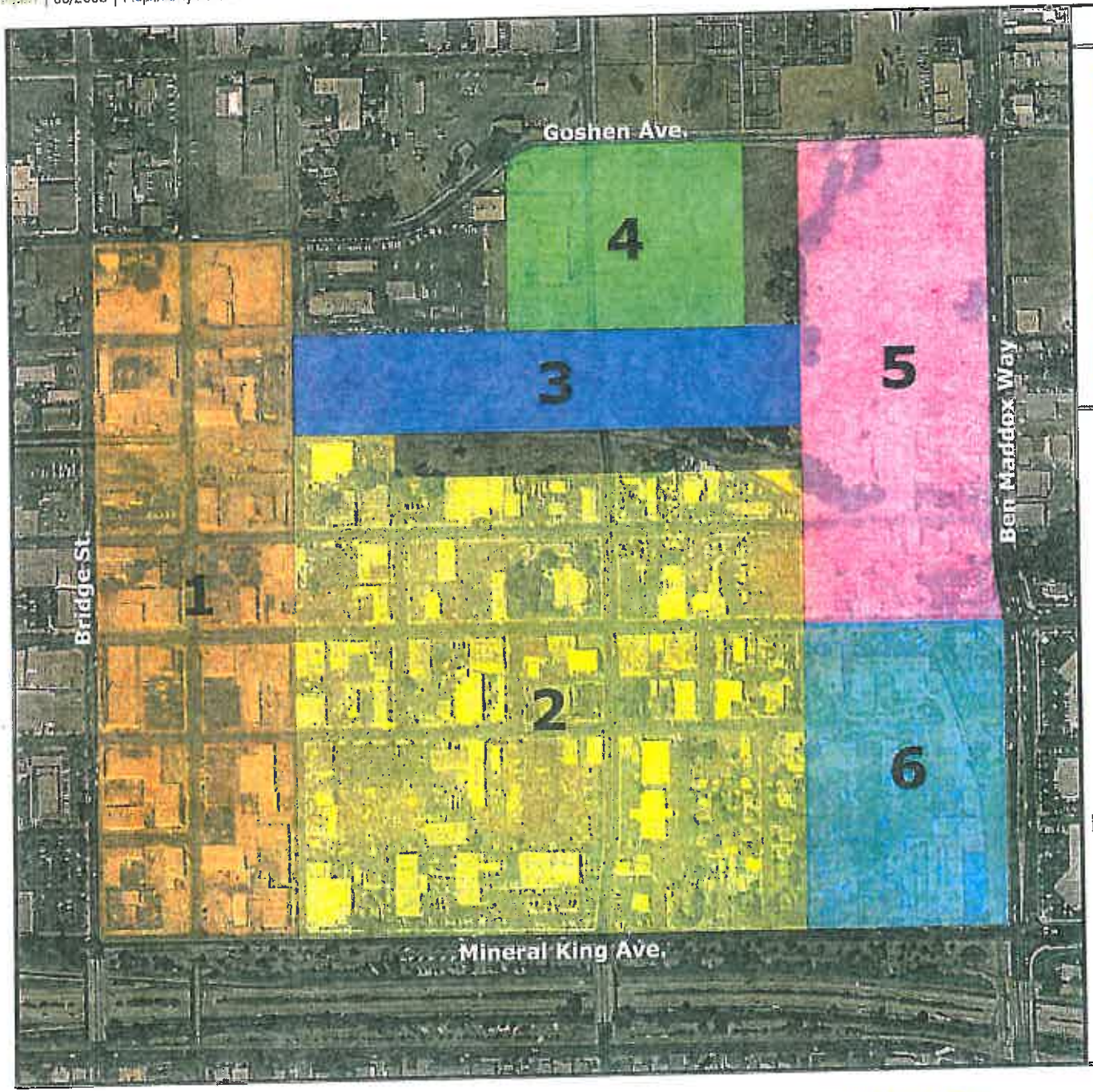
FIGURE 2
CIVIC CENTER EXPANSION
CITY OF VISALIA
EXISTING
EAST DOWNTOWN
ZONING MAP

PROVOST & PRITCHARD ENGINEERING GROUP

AKEL ENGINEERING GROUP, INC.

REVISED: 10/15/07

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS
UPDATE



LEGEND

1. Sante Fe
2. East Main
3. Civic Center
4. Central Park
5. Ben Maddox Business Center
6. East Acequia Service Commercial

N
W E
S
NTS

FIGURE 3
CIVIC CENTER EXPANSION
CITY OF VISALIA
PROPOSED EAST DOWNTOWN MIXED USE NEIGHBORHOOD MAP

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10/15/07

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

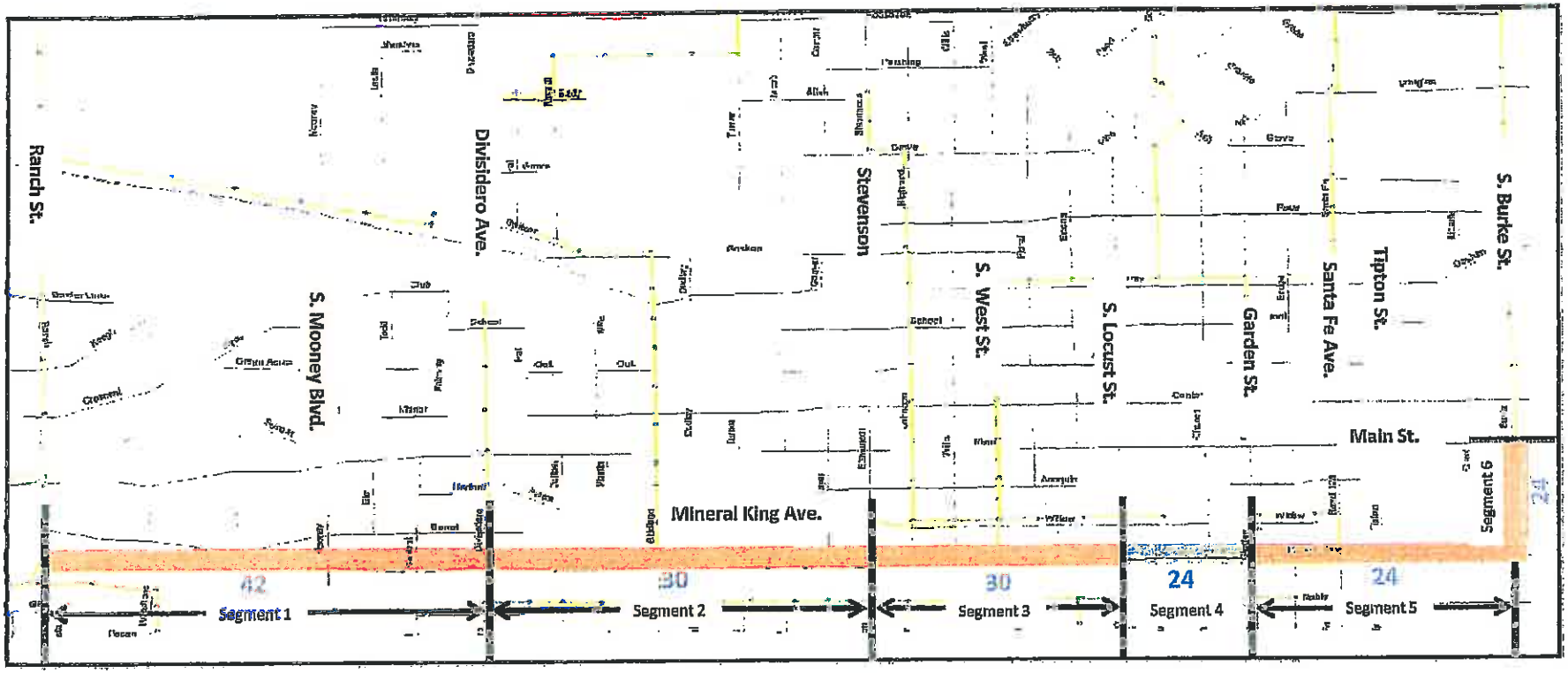


Figure 4
City of Visalia
Civic Center Expansion
Improvement Updates to 2005 Master Plan

AKEL ENGINEERING GROUP, INC.

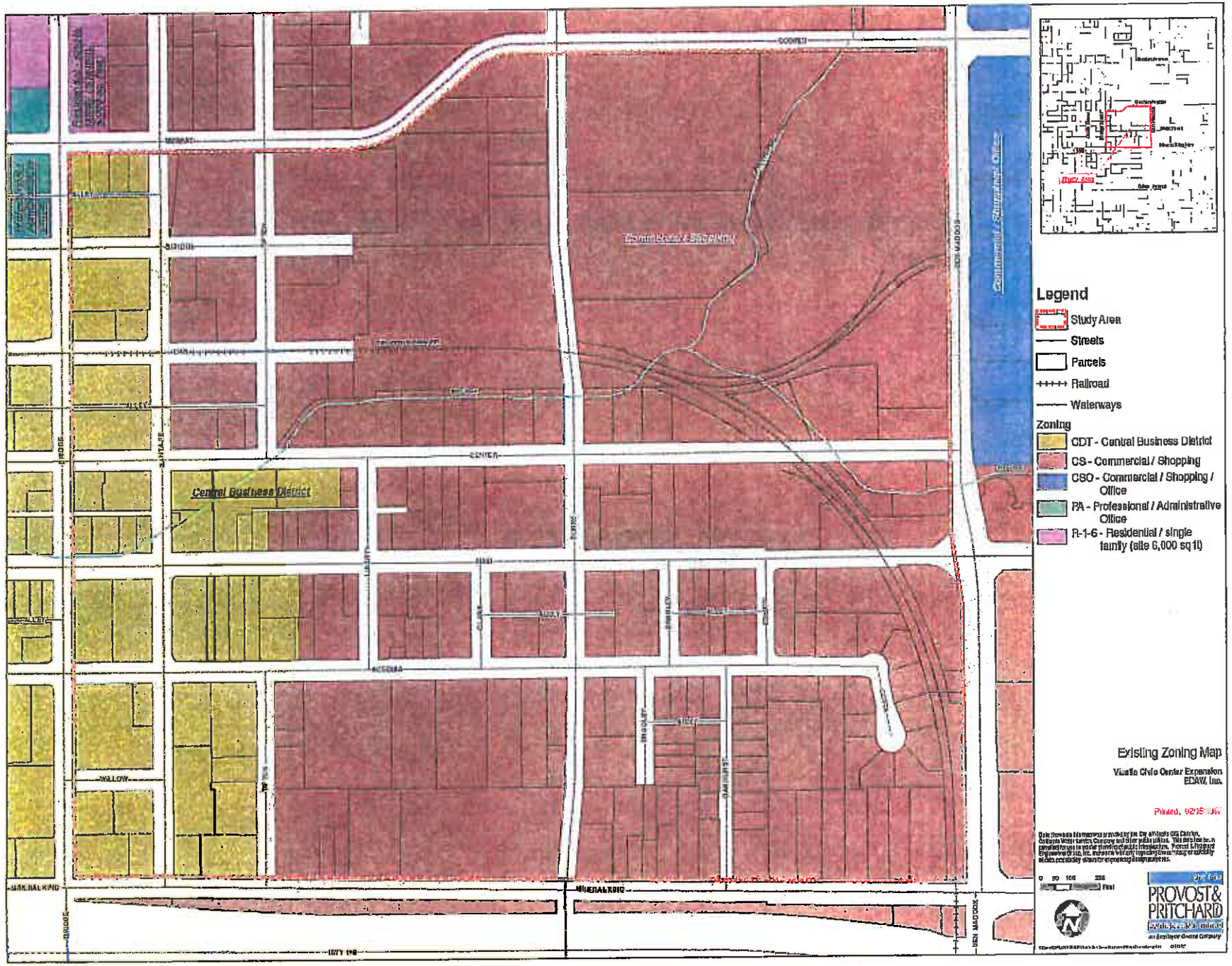
Provost and Pritchard

CITY OF VISALIA CIVIC CENTER EXPANSION

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

APPENDICES

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE


Central Business District
Commercial / Shopping / Office
Legend
Study Area
Streets
Parcels
Railroad
Waterways
Zoning
CDT - Central Business District
CS - Commercial / Shopping
CSO - Commercial / Shopping / Office
PA - Professional / Administrative Office
R-1-6 - Residential / single family (site 6,000 sq ft)
Existing Zoning Map
Visalia Civic Center Expansion
EDAW, Inc.
PROVOST & PRITCHARD

Mixed-Use Neighborhoods

The planning for East Downtown reinforces the community's sustained efforts to keep downtown as the physical and economic center of the city by complementing its retail and commercial function with residential, office and civic uses. Recommended planning strategies and supporting action plan provide a road map to accomplish the community's aspirations. By adopting this plan, the City has put in motion reinvestment activities that implement popular planning principles for East Downtown.

Development Program Summary

1. Santa Fe	
Opp. Sites	10.52 acres
Residential	250 units
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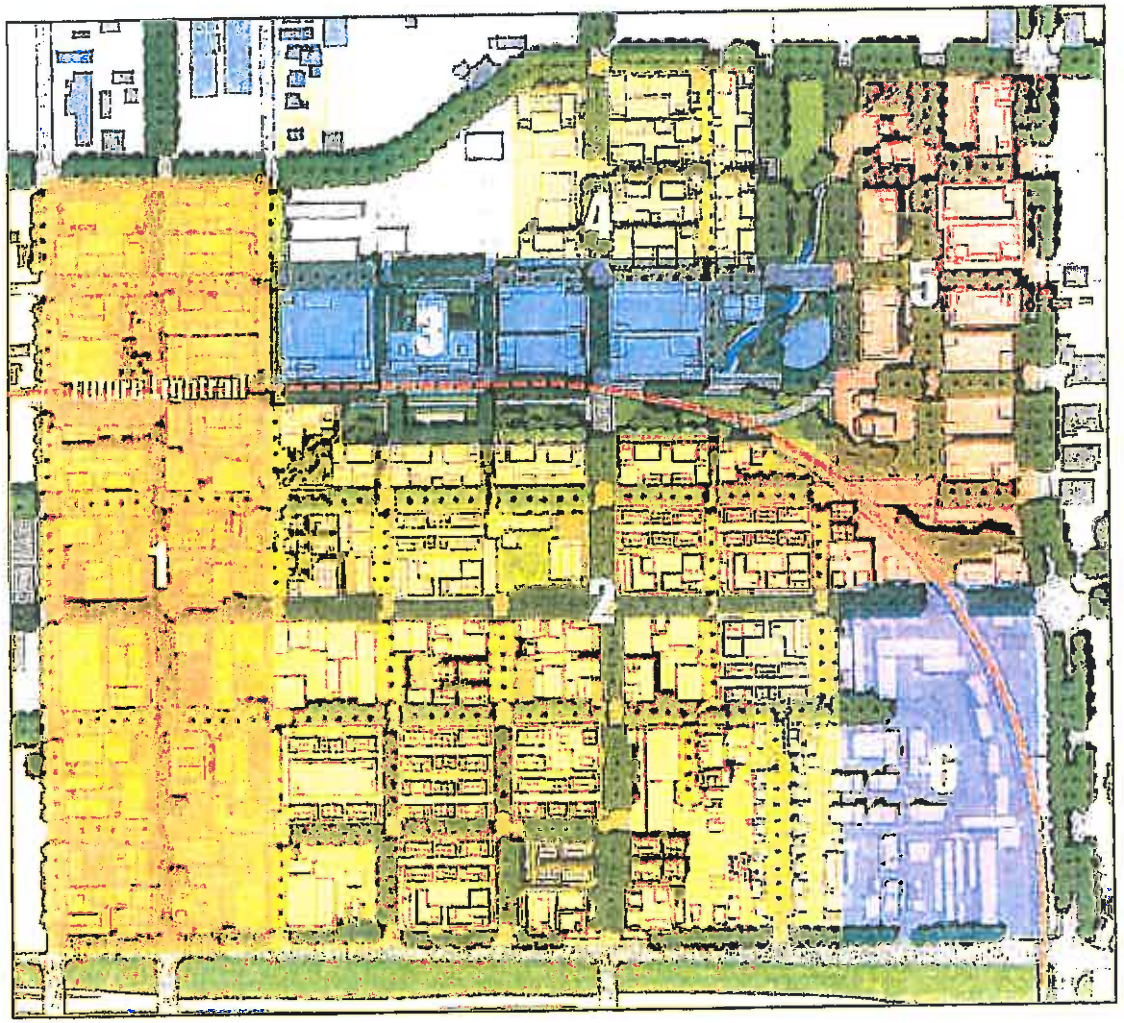
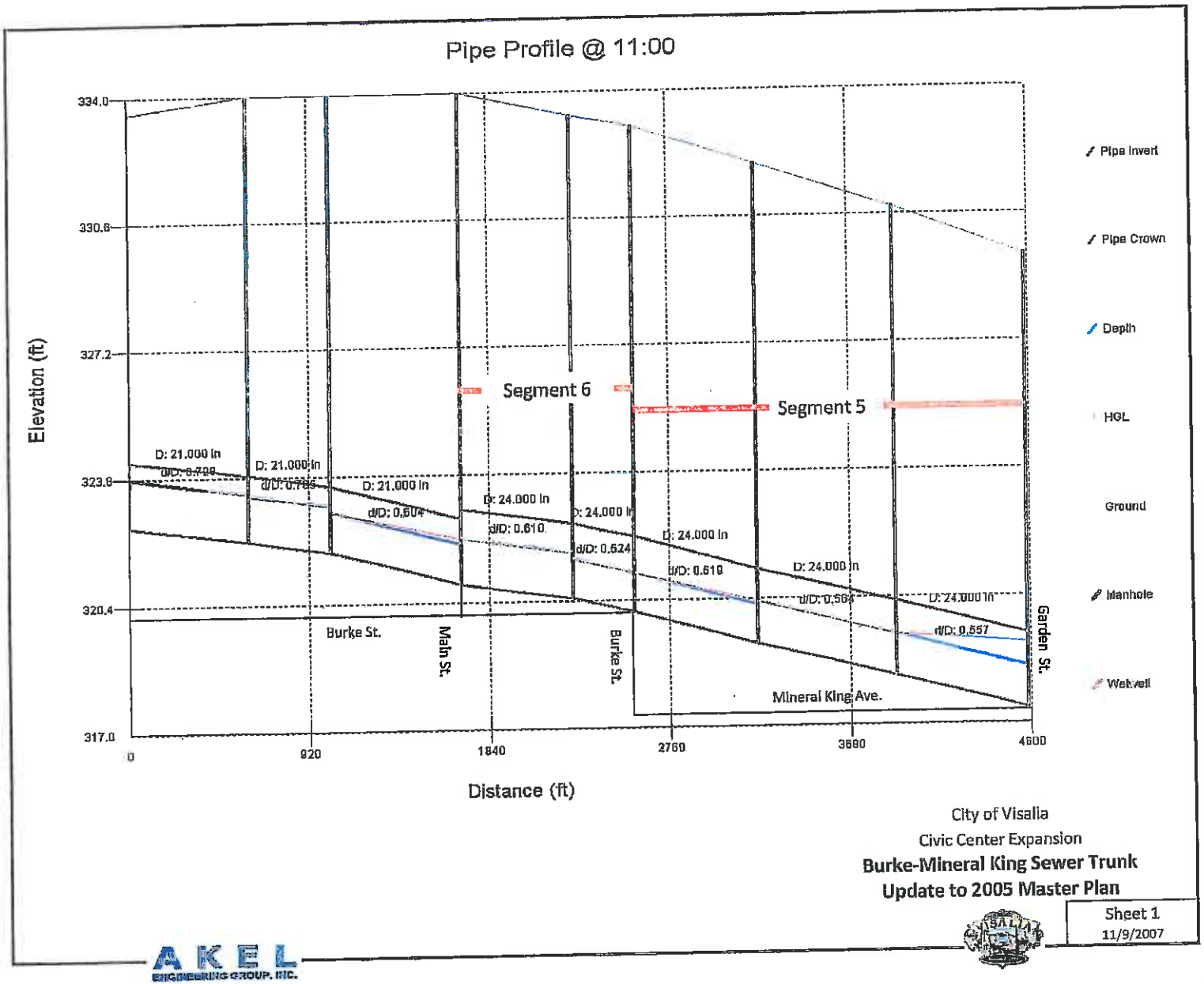
Opp. Sites	19.63 acres
Residential	350 units
Commercial	106,000 SF
3. Civic Center	
Opp. Sites	10.00 acres
Office	280,000 sf
4. Central Park	
Opp. Sites	10.00 acres
Residential	400 units
Commercial	20,000 SF
5. Ben Maddox Business Center	
Opp. Sites	19.00 acres
Office	500,000 SF
6. East Acequia Service Commercial	
Opp. Sites	3.59 acres
Serv. Commercial	40,000 SF
Open Space	15.66 acres
TOTAL	
Opp. Sites	88.4 acres
Residential	1,000 units
Employment	1,152,000 SF




Pipe Profile @ 11:00
Elevation (ft)
334.0
330.8
327.2
323.8
320.4
317.0
0
920
1840
2760
3680
4600
Distance (ft)
Segment 6
Segment 5
D: 21.000 in
d/D: 0.708
D: 21.000 in
d/D: 0.705
D: 21.000 in
d/D: 0.604
D: 24.000 in
d/D: 0.610
D: 24.000 in
d/D: 0.624
D: 24.000 in
d/D: 0.619
D: 24.000 in
d/D: 0.563
D: 24.000 in
d/D: 0.557
Burke St.
Main St.
Burke St.
Mineral King Ave.
Garden St.
Pipe Invert
Pipe Crown
Depth
HGL
Ground
Manhole
Wetwell
City of Visalia
Civic Center Expansion
Burke-Mineral King Sewer Trunk
Update to 2005 Master Plan
Sheet 1
11/9/2007
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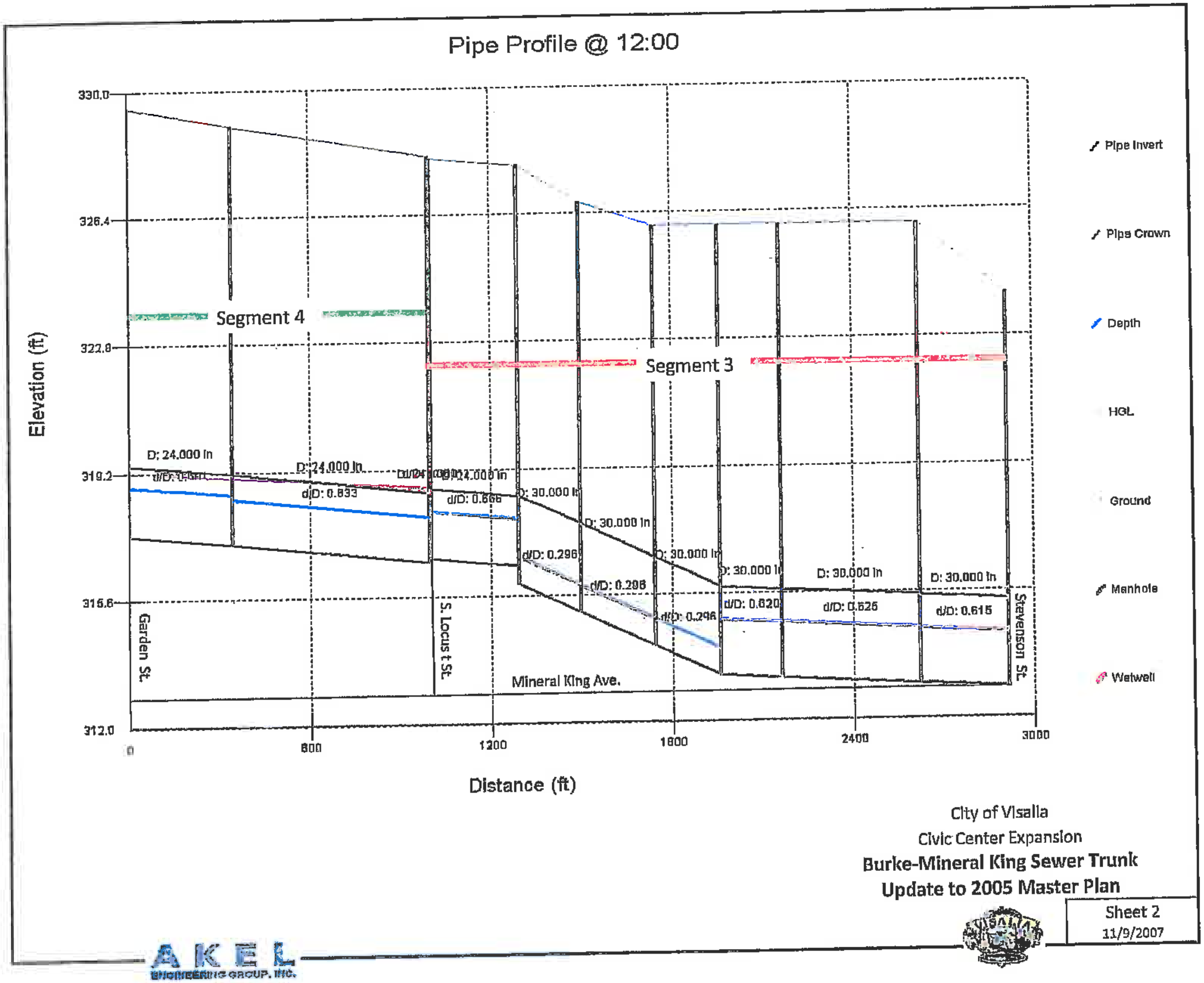
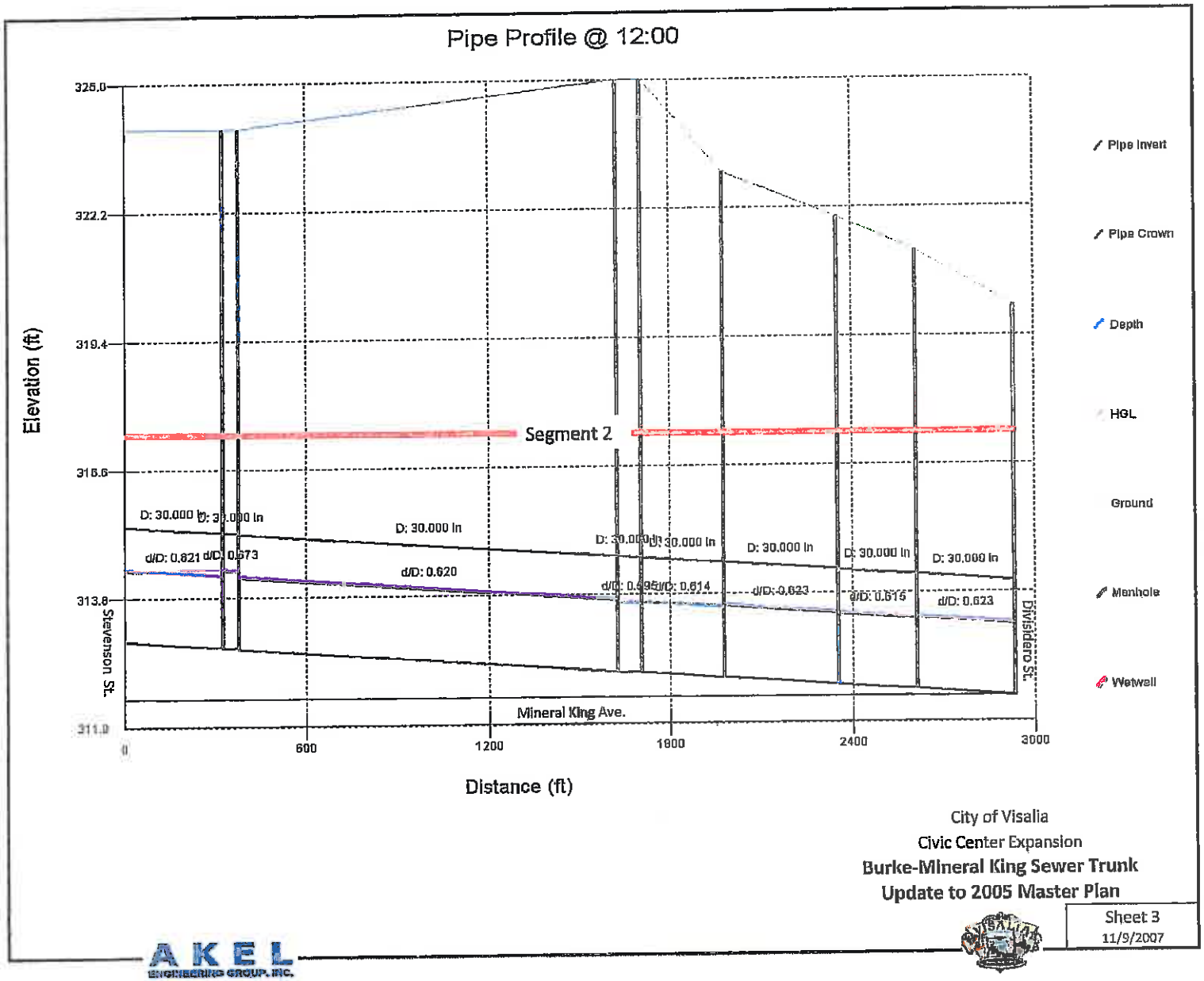
ENGINEERING GROUP, INC.

APPENDIX C

SEWER COLLECTION SYSTEM CAPACITY ANALYSIS UPDATE

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Elevation (ft)
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322.2
319.4
316.6
313.8
311.0
0
600
1200
1800
2400
3000
Distance (ft)
Segment 2
Stevenson St.
Mineral King Ave.
Divisidero St.
D: 30.000 In
d/D: 0.621
d/D: 0.620
d/D: 0.623
d/D: 0.615
Pipe Invert
Pipe Crown
Depth
HGL
Ground
Manhole
Wetwell
City of Visalia
Civic Center Expansion
Burke-Mineral King Sewer Trunk
Update to 2005 Master Plan
Sheet 3
11/9/2007
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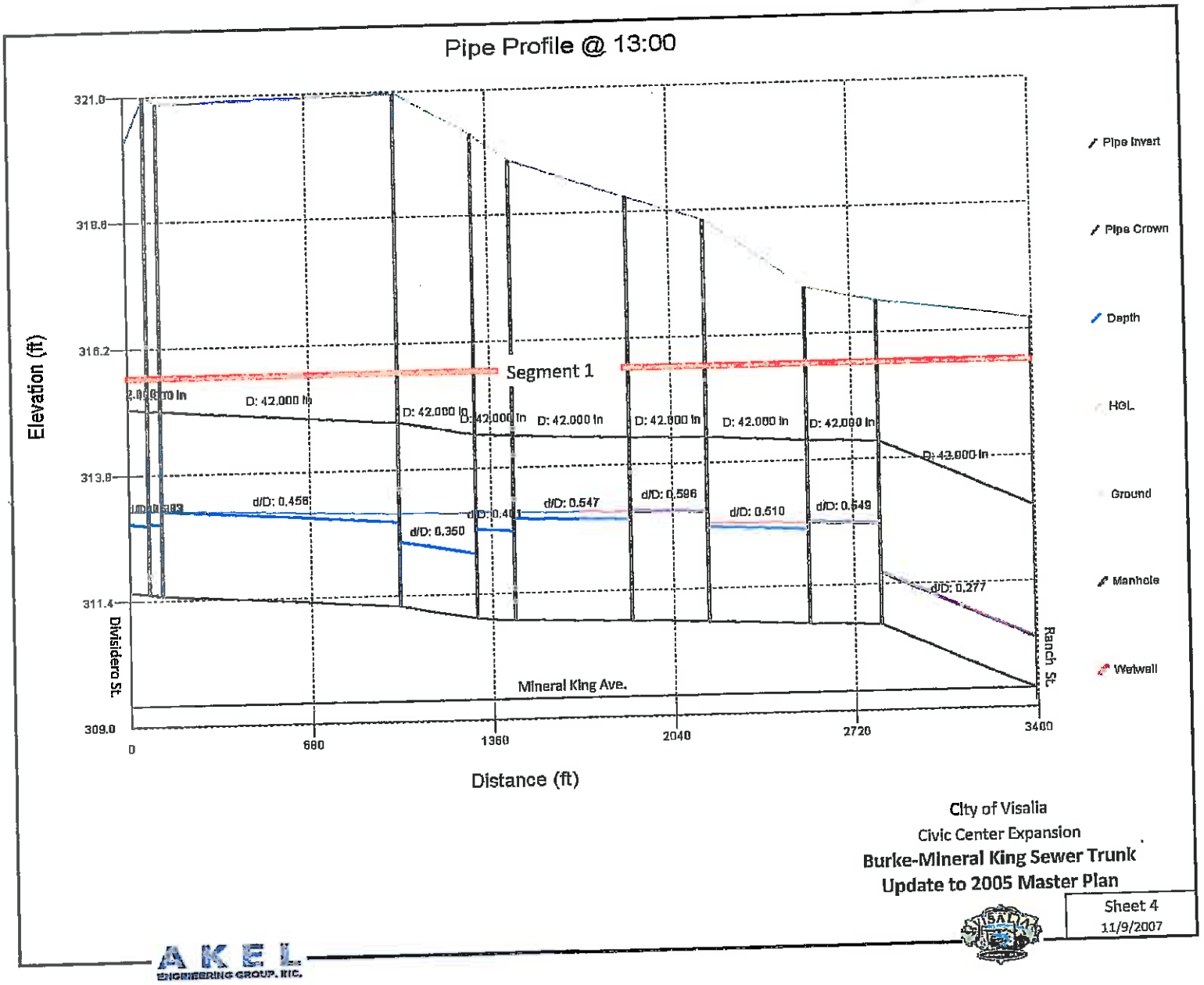
Pipe Profile @ 13:00
Elevation (ft)
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318.8
316.2
313.8
311.4
309.0
Segment 1
D: 42.000 In
d/D: 0.456
d/D: 0.350
d/D: 0.547
d/D: 0.586
d/D: 0.510
d/D: 0.549
d/D: 0.277
Divisidero St.
Mineral King Ave.
Ranch St.
0
680
1360
2040
2720
3400
Distance (ft)
Pipe Invert
Pipe Crown
Depth
HGL
Ground
Manhole
Wetwall
City of Visalia
Civic Center Expansion
Burke-Mineral King Sewer Trunk
Update to 2005 Master Plan
Sheet 4
11/9/2007
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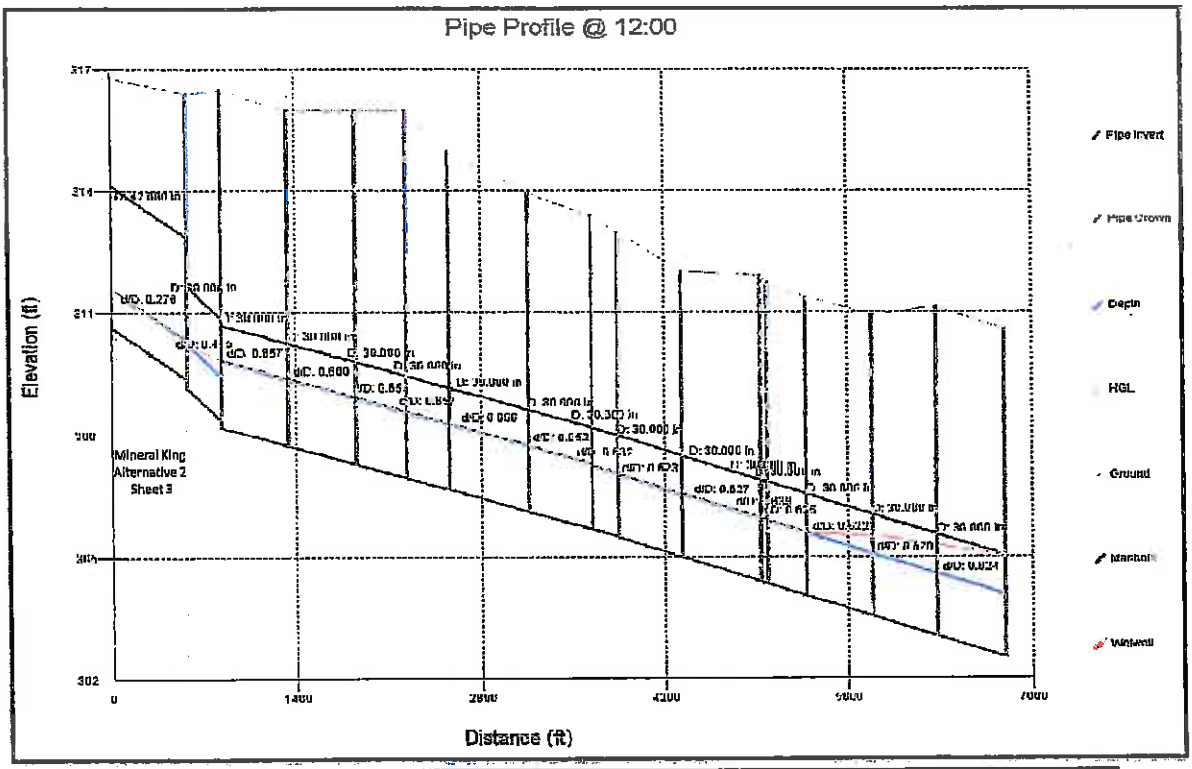

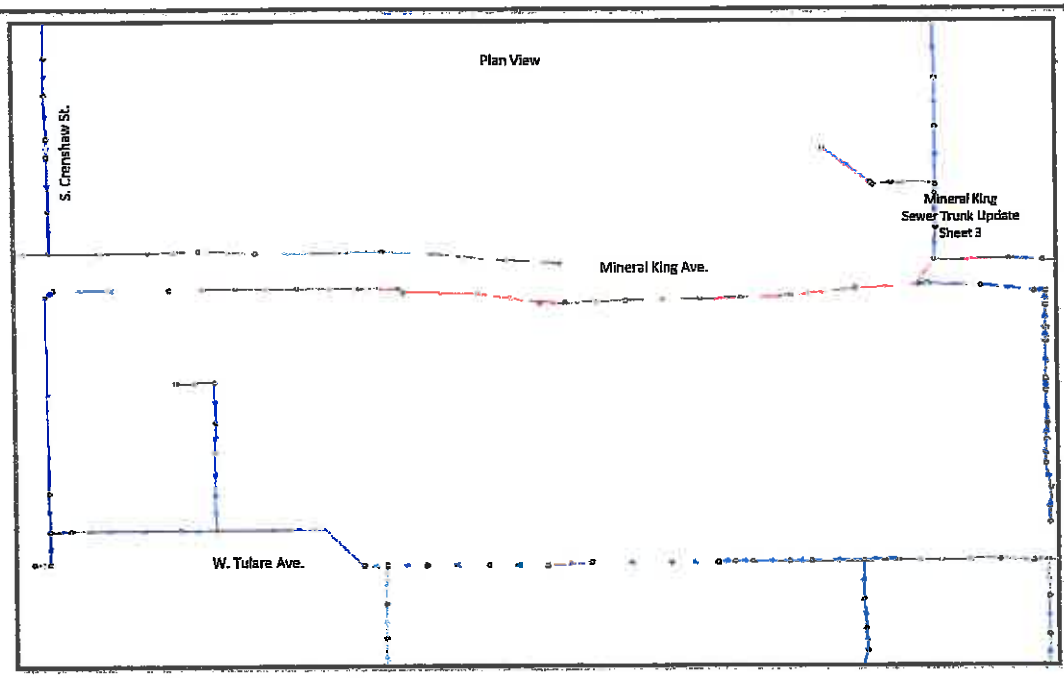

City of Visalia
Civic Center Expansion
Mineral King - Walnut Sewer Trunk
Update to 2005 Master Plan

Sheet 5
11/9/2007

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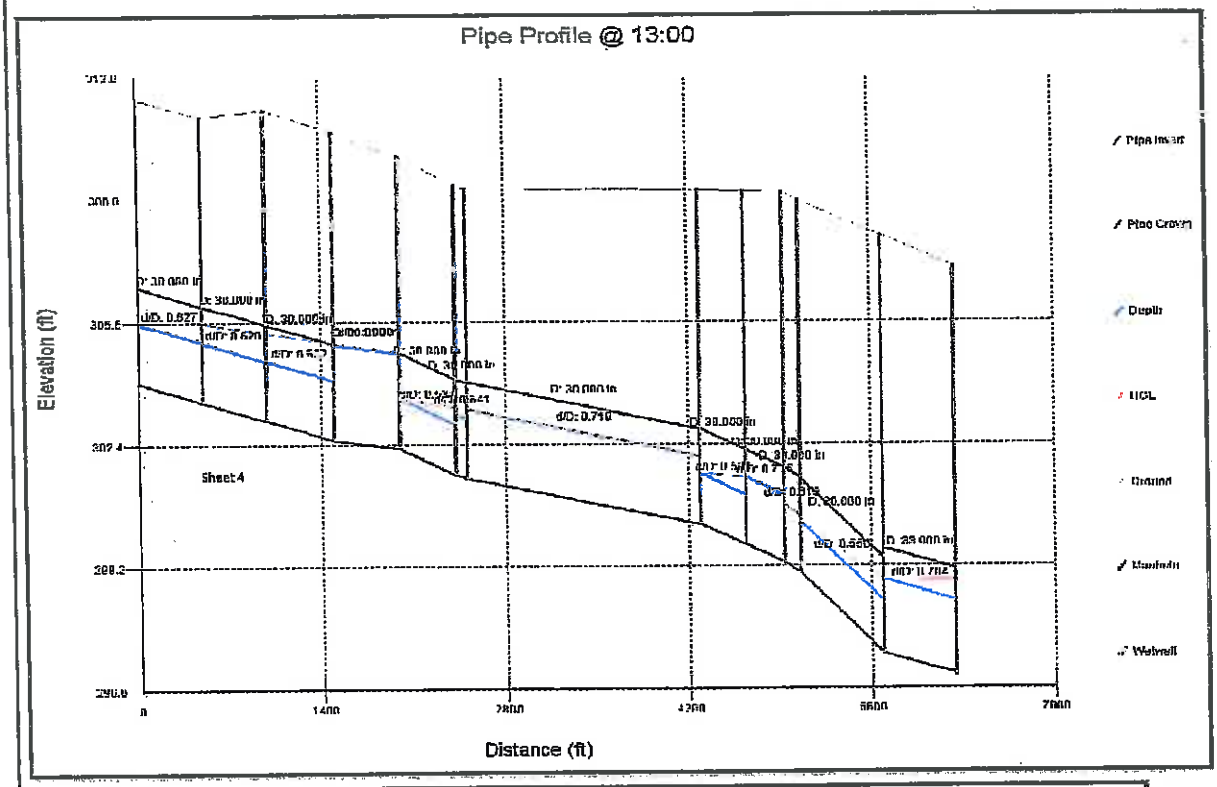
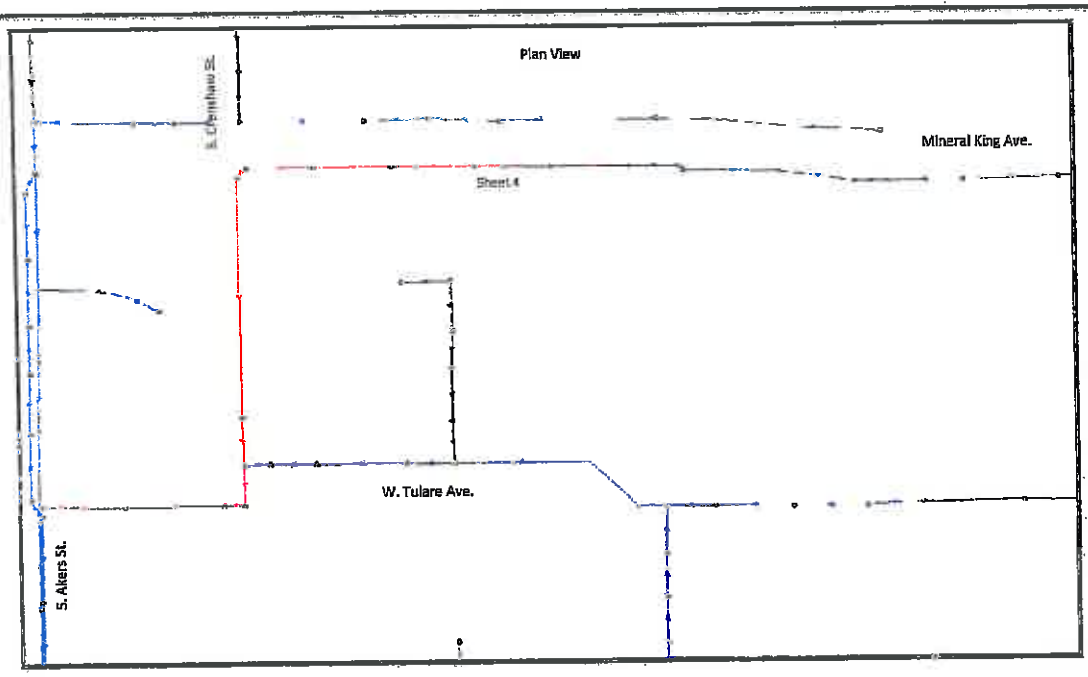
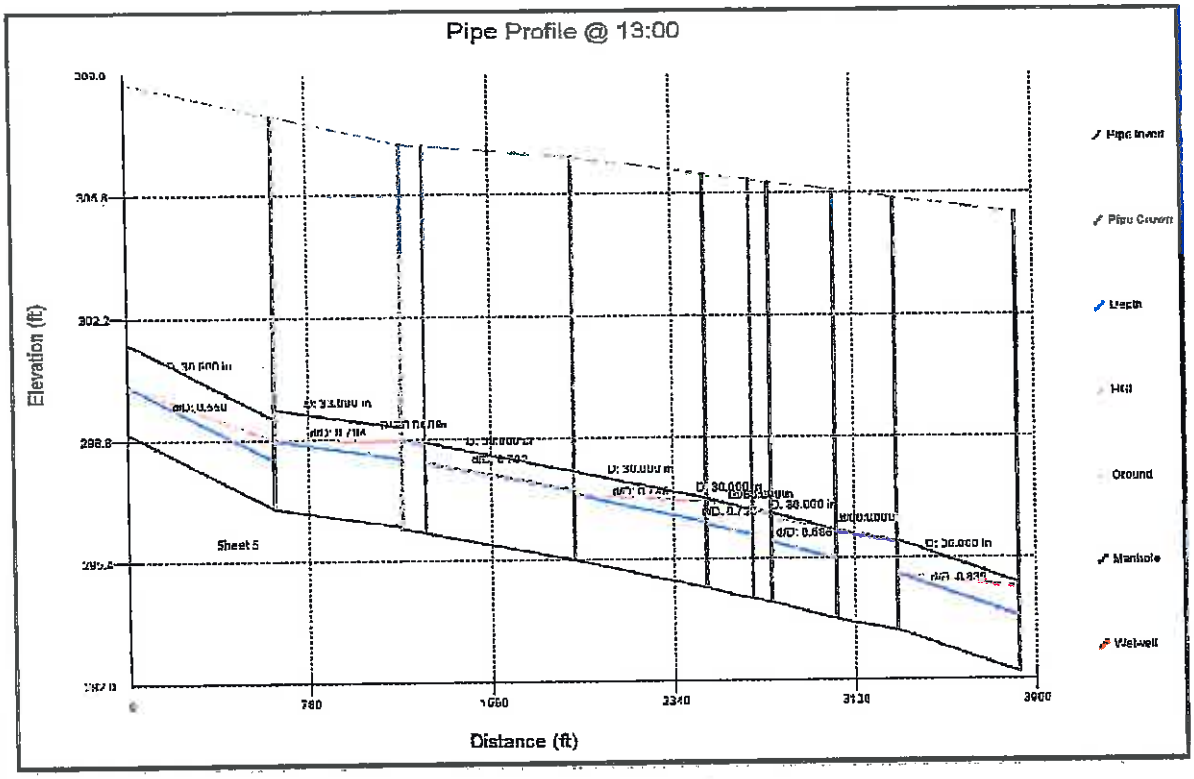


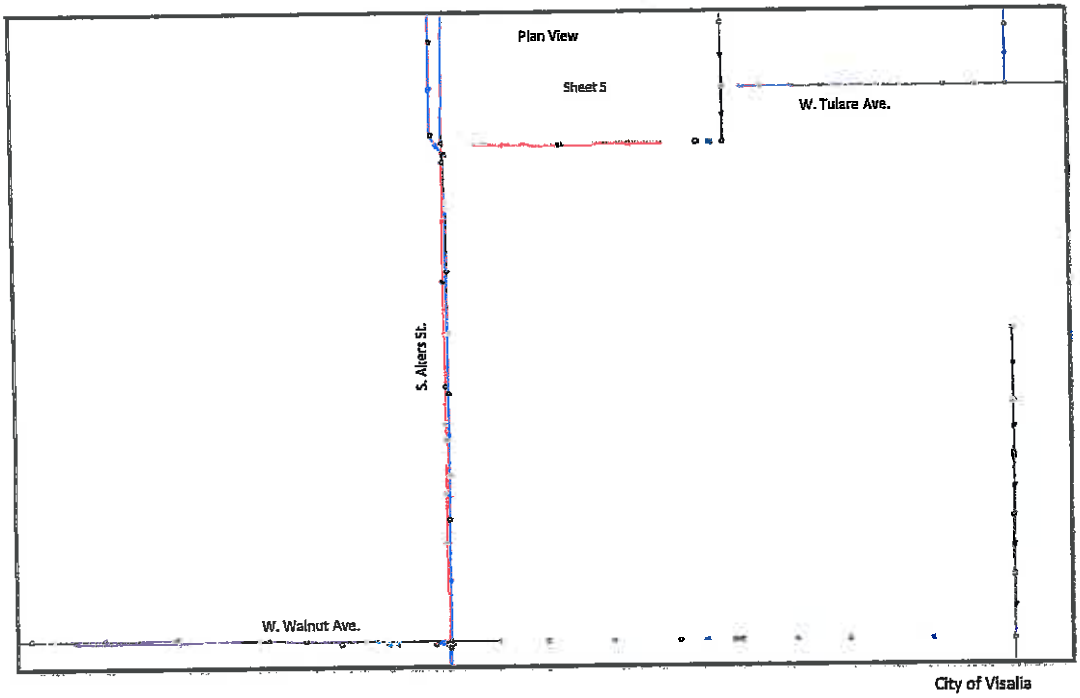


City of Visalia
Civic Center Expansion
Mineral King - Walnut Sewer Trunk
Update to 2005 Master Plan

Sheet 6
11/9/2007

AKEL ENGINEERING GROUP, INC.





City of Visalia
Civic Center Expansion
Mineral King - Walnut Sewer Trunk
Update to 2005 Master Plan

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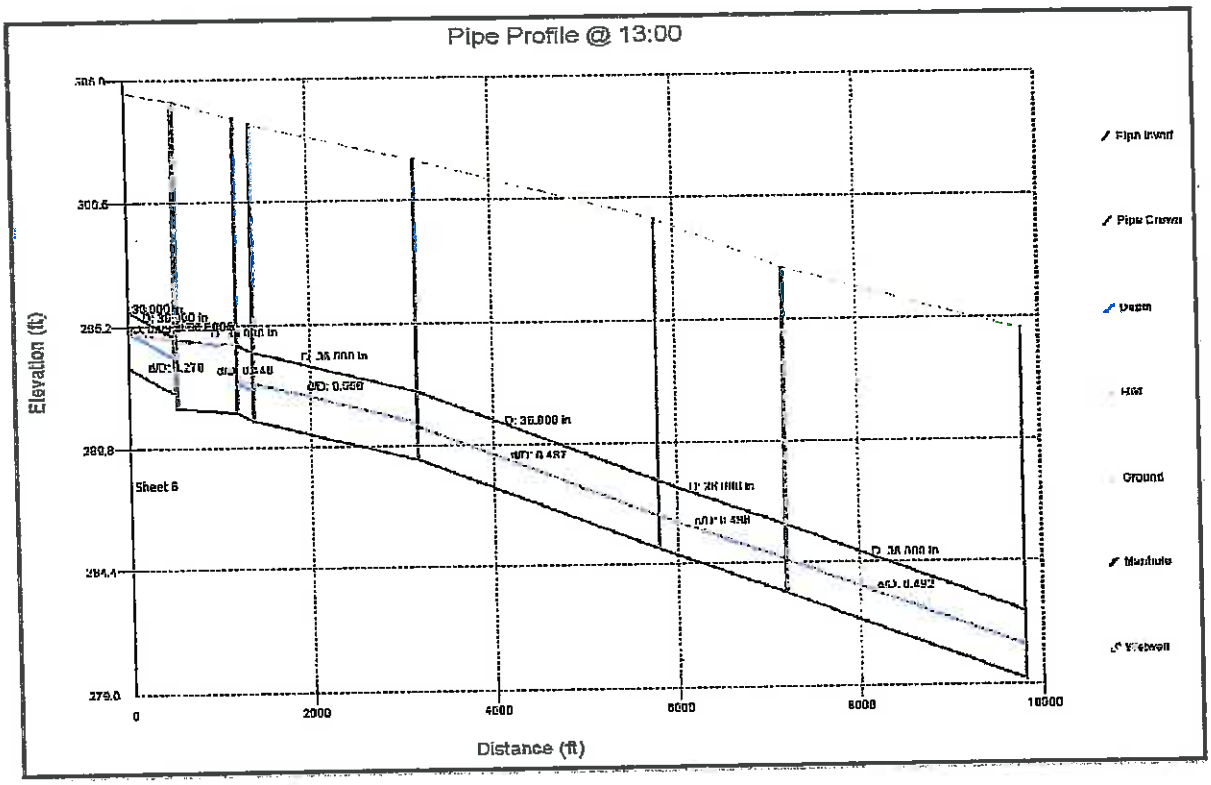

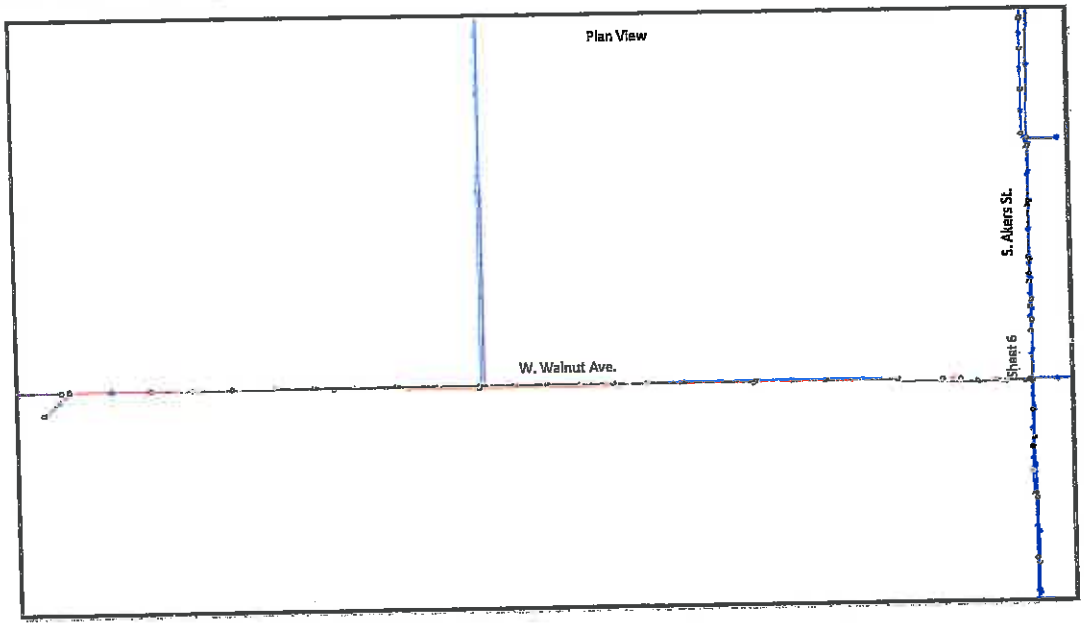

City of Visalia
Civic Center Expansion
Mineral King - Walnut Sewer Trunk
Update to 2005 Master Plan

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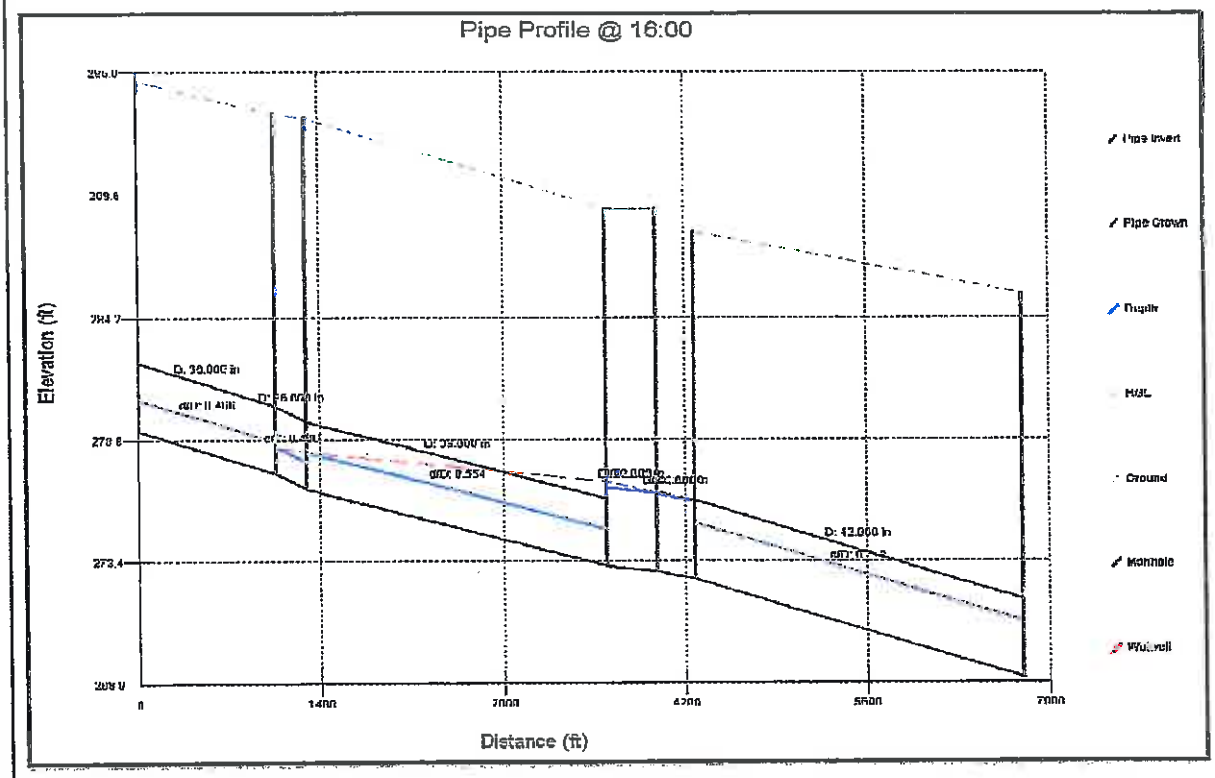
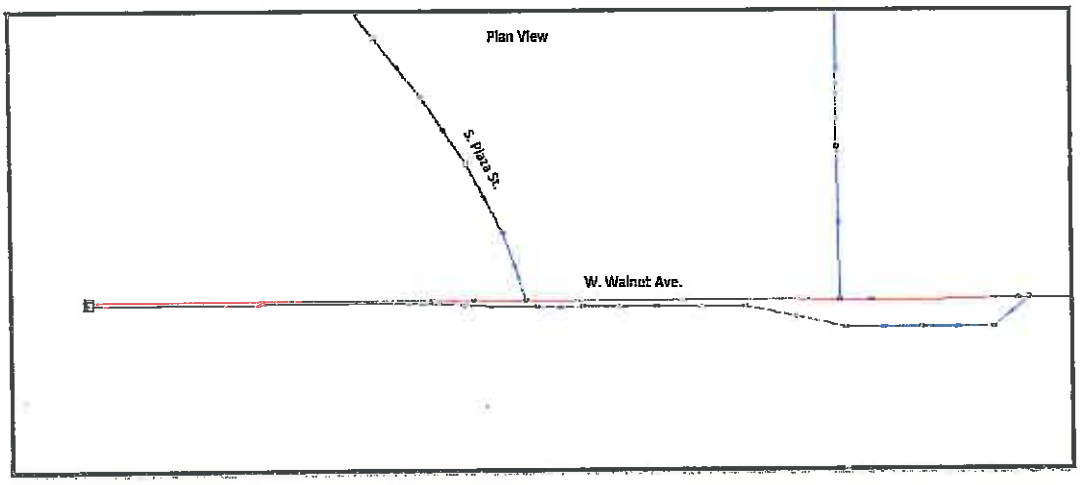
APPENDIX C





City of Visalia
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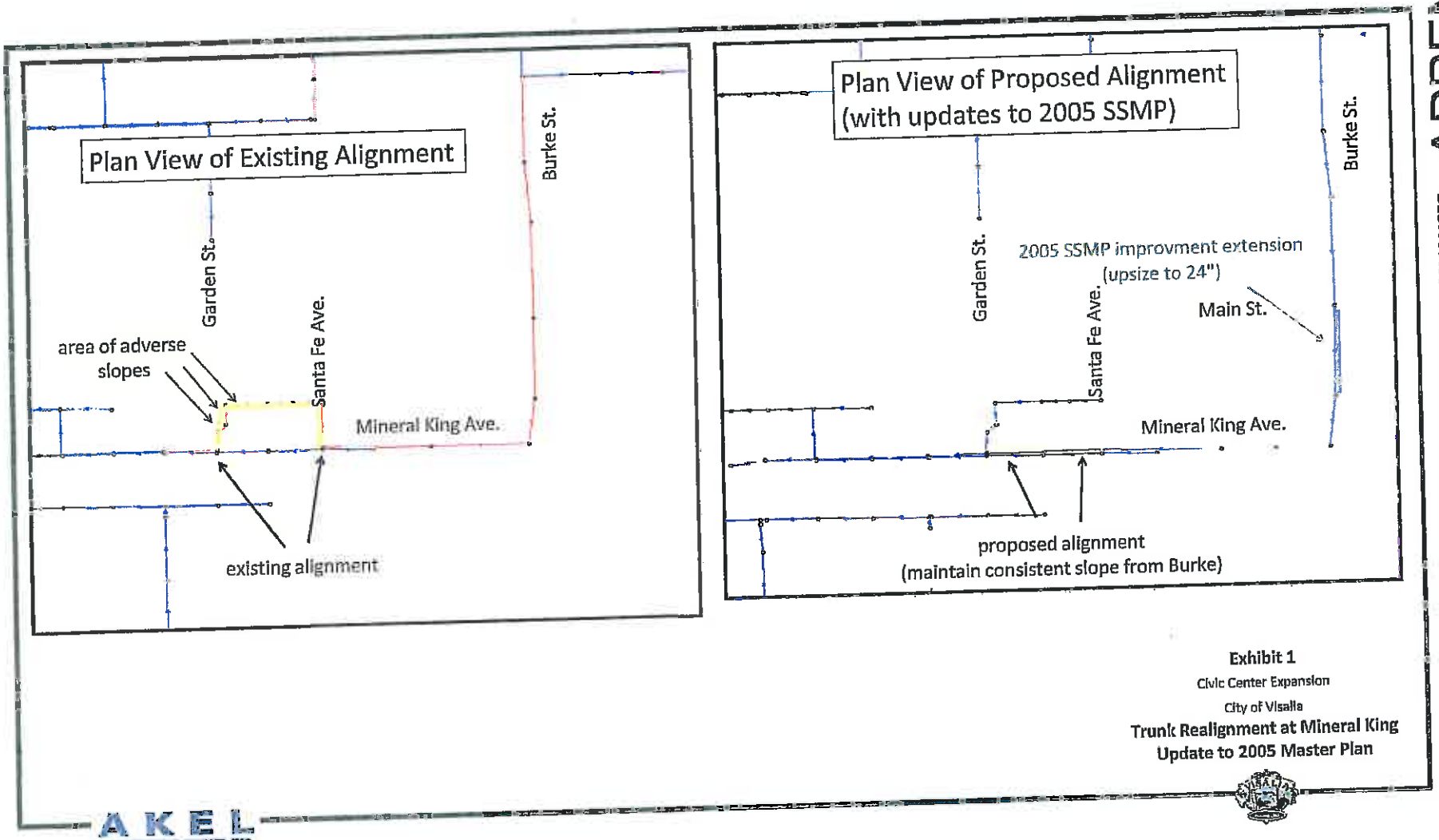

Exhibit 1

Civic Center Expansion

City of Visalia

Trunk Realignment at Mineral King
Update to 2005 Master Plan

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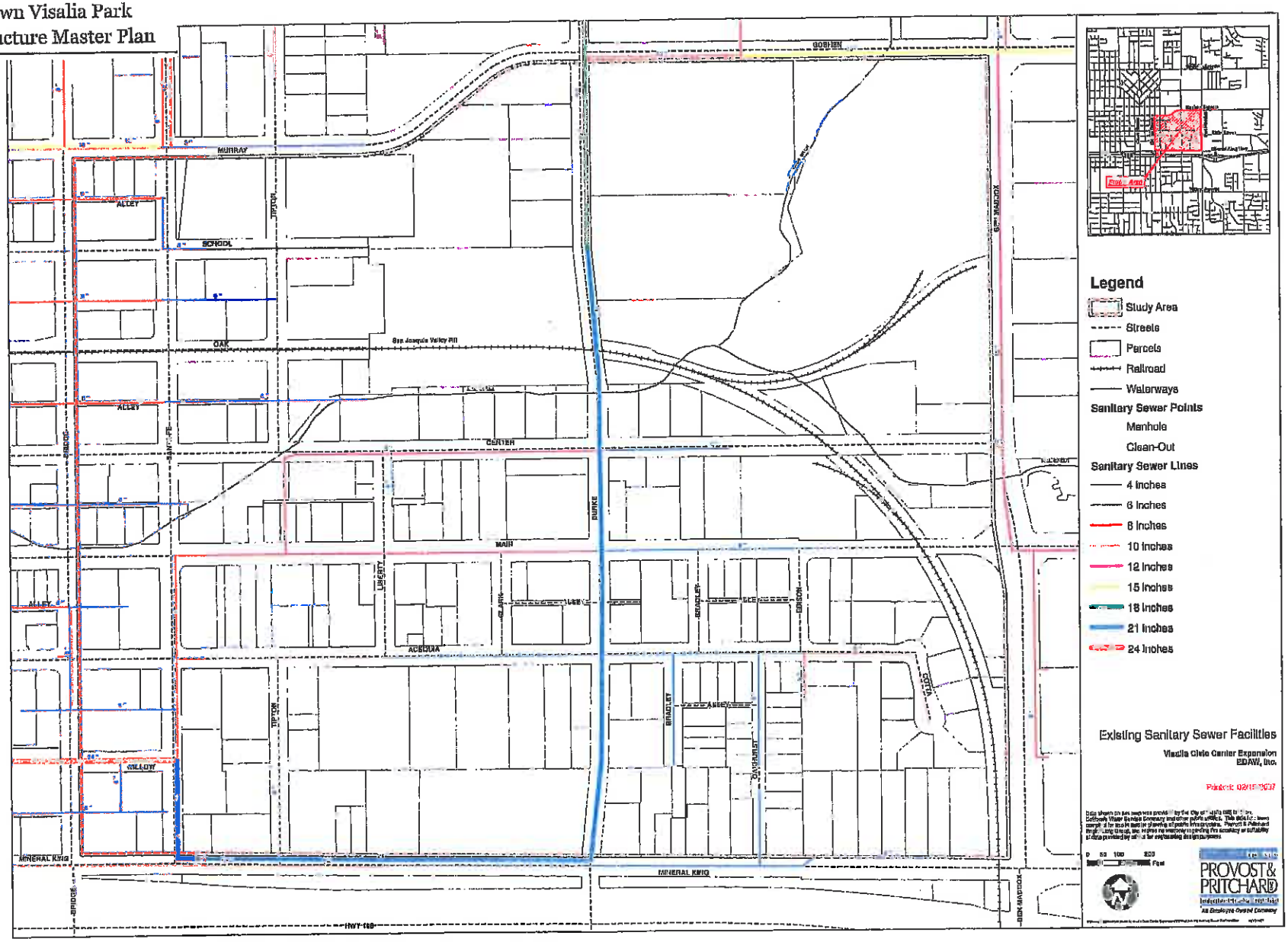
Appendix G

East Downtown Visalia Park and Infrastructure Master Plan



Appendix H

East Downtown Visalia Park and Infrastructure Master Plan