HIGH SCHOOL DRAINAGE BASIN

SAPULPA CITYWIDE MASTER DRAINAGE PLAN

JUNE 2010

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CIVIL & WATER RESOURCE ENGINEERING
GEOGRAPHIC INFORMATION SYSTEMS

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SECTION 5. HIGH SCHOOL DRAINAGE BASIN

5.1. EXISTING CONDITIONS HYDROLOGY

The High School Drainage Basin is also included as one of the basins in the Downtown Systems. Its basin and subbasins are shown in **FIGURE 5-1**. The hydrologic soil groups and existing land use for this basin are shown in **FIGURE 5-2 AND FIGURE 5-3** respectively. Additional detailed soil data can also be found in **SECTION 2-1 HYDROLOGIC ANALYSIS**.

The hydrologic coefficients used for input in the HEC-HMS model include the drainage area, the lag time, and the soil complex curve number (CN). A summary of hydrologic coefficients used for HEC-HMS modeling is tabulated in **TABLE 5-1** on a following page. Additional detailed data is listed in **APPENDIX 5-A**.

5.2. EXISTING CONDITIONS HYDRAULICS

Existing conveyance systems, including floodplains and storm sewers, for the High School Drainage Basin were studied. The storm sewer systems studied in the High School Drainage Basin are depicted in **FIGURE 5-4** with storm sewer capacities, obtained using a StormCAD model, shown **FIGURE 5-5**.

The Rock Creek Tributary through this basin was analyzed using HEC-RAS and HEC-GeoRAS. The storage volumes for various flow rates were calculated during the hydraulic analysis of reaches; the data were then used to update the HMS model using Modified Puls routing.

APPENDICES 5-B and 5-C respectively include the schematic of the HEC-RAS model with cross sections, the stream, and a summary of the output table from the HEC-RAS model for the existing conditions for the High School Drainage Basin. **TABLE 5-2** shows the resulting flow rates at major junctions in the basin and available downstream pipe capacities.

Some floodplains still exist in this basin. As a result, the 2-, 10-, 100- and 500-year floodplains for the High School Drainage Basin were mapped with the Downtown Drainage Basin and are presented in **APPENDIX 4-C.** The resulting water surface profiles for each frequency for the High School Drainage Basin are presented in **APPENDIX 5-D**.

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

Feet
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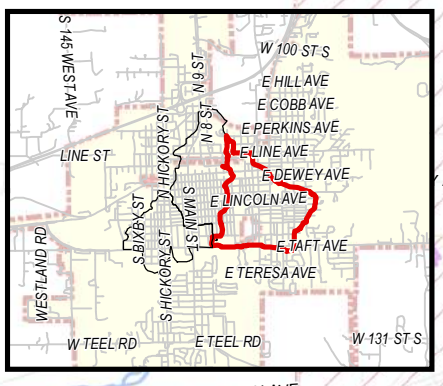

Index Map

Legend

- City Limits
- Storm Sewer
- High School System

STATE HWY 166
S 97 WEST AVE
W 100 ST S
INTERSTATE HWY 44
N LINDEN ST
N 9 ST
N 8 PL
N MAIN ST
E BIRD AVE
E FERN AVE
E SPEER AVE
N 10 ST
N 8 ST
N 13 ST
N 14 ST
N 12 ST
N HICKORY ST
N JOHANNES ST
N BURNETT ST
N LEONARD ST
W OKMULGEE AVE
W LINE AVE
N MANN ST
W JOHNSON AVE
N GRAY ST
N 8 ST
W HOBSON AVE
W LEE AVE
S BURNETT ST
S HICKORY ST
S MOUNDS ST
S CEDAR ST
W SPRINGDALE AVE
W BRYAN AVE
S GROVE ST
S BIXBY ST
S POPLAR ST
S MAIN ST
W TAFT AVE
S DIANE ST
W MILL AVE
W JACKSON AVE S
S WATER ST
S PARK ST
Rock Crk
S BIRCH ST
S DIVISION ST
S MISSION ST
HENSHAW AVE
E TERESA AVE
E MELINDA RD
S LUKER LN
E HASKELL AVE
N DIVISION ST
N ELIZABETH ST
N HODGE ST
N BROWN ST
E DENTON AVE
E ANDERSON AVE
N 5 ST
N 4 ST
N 3 ST
N 2 ST
N 1 ST
N 6 ST
N ELM ST
E JACKSON AVE
N MISSION ST
E JACKSON AVE
E MCLEOD AVE
E MCLEOD AVE
E HOBSON AVE
N WALNUT ST
E DEWEY AVE
E LEE AVE
S BOYD ST
E MCKINLEY AVE
E FAIRVIEW AVE
E BRYAN AVE
E CLEVELAND AVE
S OAK ST
S WALNUT ST
S MAPLE ST
S LINDEN ST
S ADAMS ST
S APPLE ST
S BOYD PL
E TAFT AVE

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Downtown Systems
High School Drainage Basin

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Figure 5-1

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

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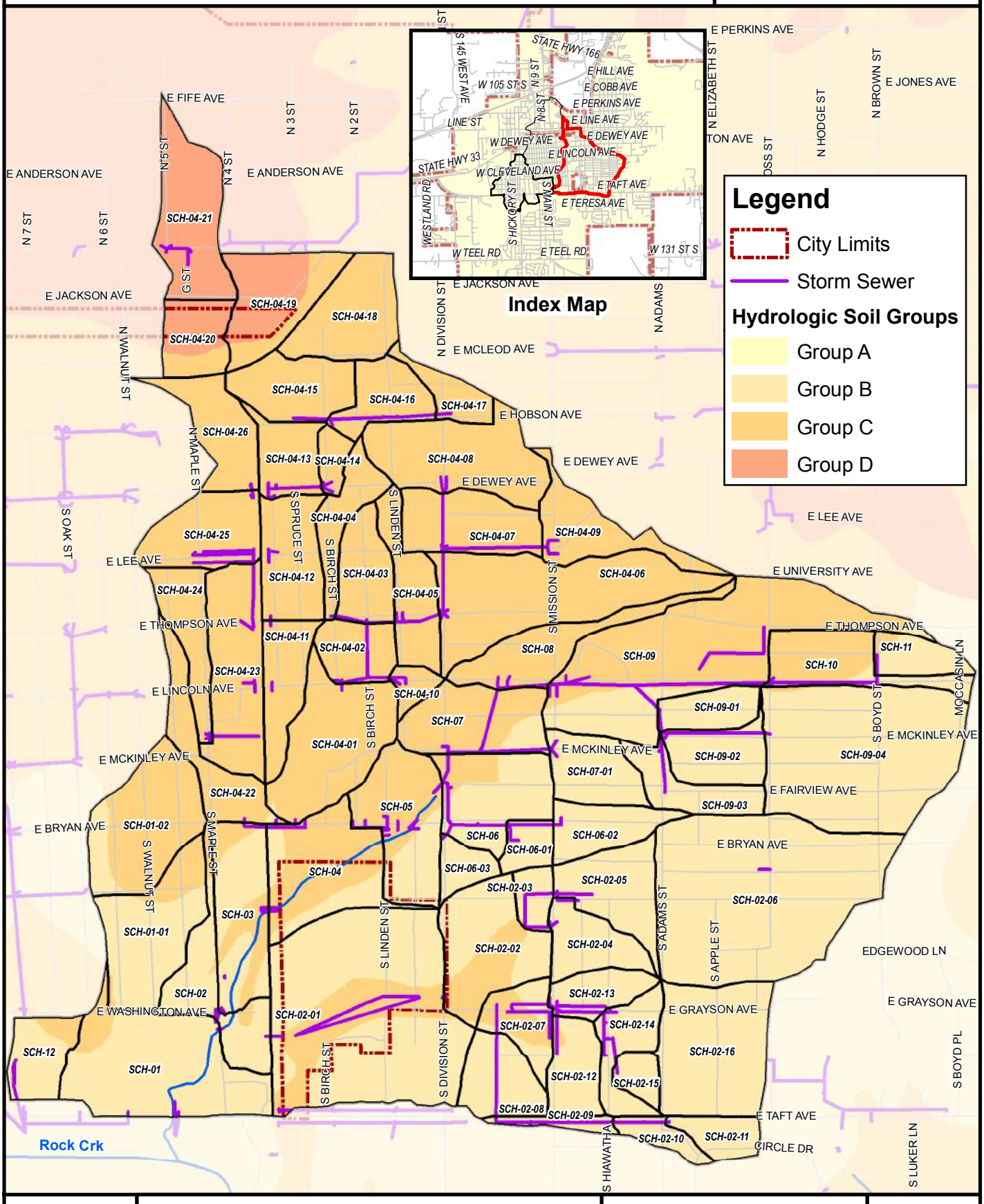

High School Basin Hydrologic Soil Groups

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Figure 5-2

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

Feet
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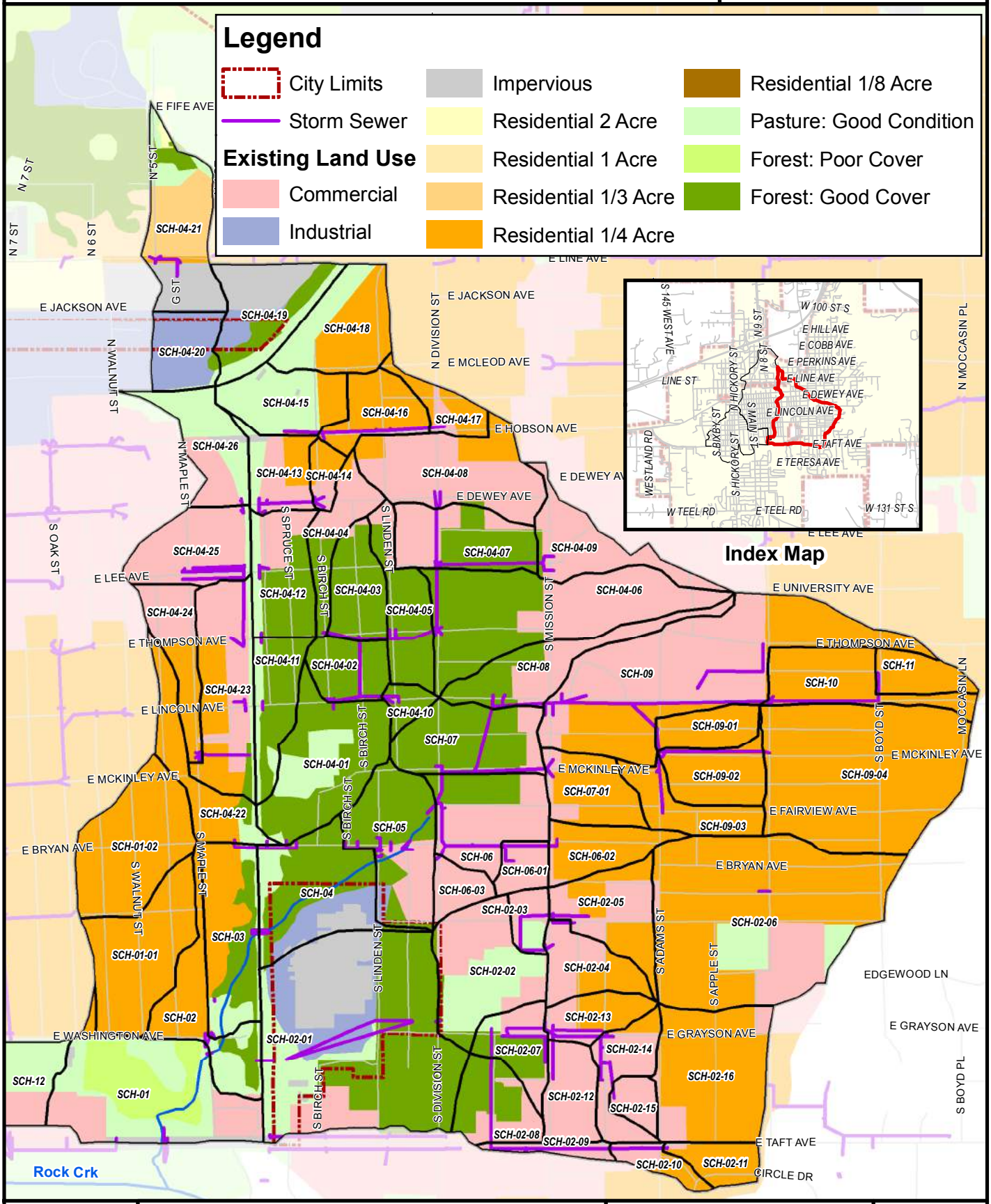

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High School Basin Existing Land Use

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Figure 5-3

FIGURE 5-1. HIGH SCHOOL DRAINAGE BASIN –
SUMMARY OF HYDROLOGIC COEFFICIENTS EXISTING CONDITIONS

Sub-Area	Drainage Area, Acres	Lag Time, Minutes	Composite CN
SCH-01	15.4	2.3	73
SCH-01-01	9.6	4.5	77
SCH-01-02	10.5	4.5	82
SCH-02	6.7	4.0	70
SCH-02-01	29.5	5.6	73
SCH-02-02	9.2	2.8	80
SCH-02-03	1.9	1.5	71
SCH-02-04	4.5	2.9	85
SCH-02-05	6.4	2.3	83
SCH-02-06	27.9	5.0	76
SCH-02-07	3.9	2.5	77
SCH-02-08	4.9	2.1	69
SCH-02-09	1.3	1.9	92
SCH-02-10	1.9	1.8	84
SCH-02-11	2.6	2.0	76
SCH-02-12	4.2	2.3	92
SCH-02-13	3.3	2.4	81
SCH-02-14	4.3	3.3	90
SCH-02-15	1.7	1.1	92
SCH-02-16	12.0	3.3	77
SCH-03	8.4	4.0	70
SCH-04	10.2	3.5	76
SCH-04-01	10.8	5.1	71
SCH-04-02	3.9	2.1	70
SCH-04-03	4.7	2.5	71
SCH-04-04	3.9	4.6	84
SCH-04-05	5.5	2.6	73
SCH-04-06	15.7	9.6	81
SCH-04-07	6.9	2.9	81
SCH-04-08	10.5	3.5	92
SCH-04-09	5.7	5.7	93
SCH-04-10	1.3	1.0	70
SCH-04-11	4.9	5.7	71
SCH-04-12	6.4	4.9	77
SCH-04-13	4.1	3.8	83
SCH-04-14	1.5	2.9	87

Sub-Area	Drainage Area, Acres	Lag Time, Minutes	Composite CN
SCH-04-15	5.9	3.3	76
SCH-04-16	4.4	1.0	84
SCH-04-17	2.6	2.5	87
SCH-04-18	7.4	8.5	80
SCH-04-19	7.7	4.2	86
SCH-04-20	4.3	2.6	91
SCH-04-21	8.9	4.0	93
SCH-04-22	5.5	9.4	81
SCH-04-23	9.7	6.6	87
SCH-04-24	4.7	5.5	89
SCH-04-25	6.6	1.3	93
SCH-04-26	5.7	4.6	82
SCH-05	9.0	2.4	74
SCH-06	7.8	2.5	84
SCH-06-01	2.0	1.2	87
SCH-06-02	4.4	2.6	76
SCH-06-03	2.1	3.9	92
SCH-07	7.9	2.5	72
SCH-07-01	5.0	2.8	78
SCH-08	6.2	2.4	84
SCH-09	23.1	7.2	88
SCH-09-01	3.2	2.3	75
SCH-09-02	4.8	3.1	75
SCH-09-03	4.2	2.5	75
SCH-09-04	22.2	4.1	75
SCH-10	6.2	1.8	81
SCH-11	2.9	2.0	76
SCH-12	4.2	1.1	77

STORMWATER
UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
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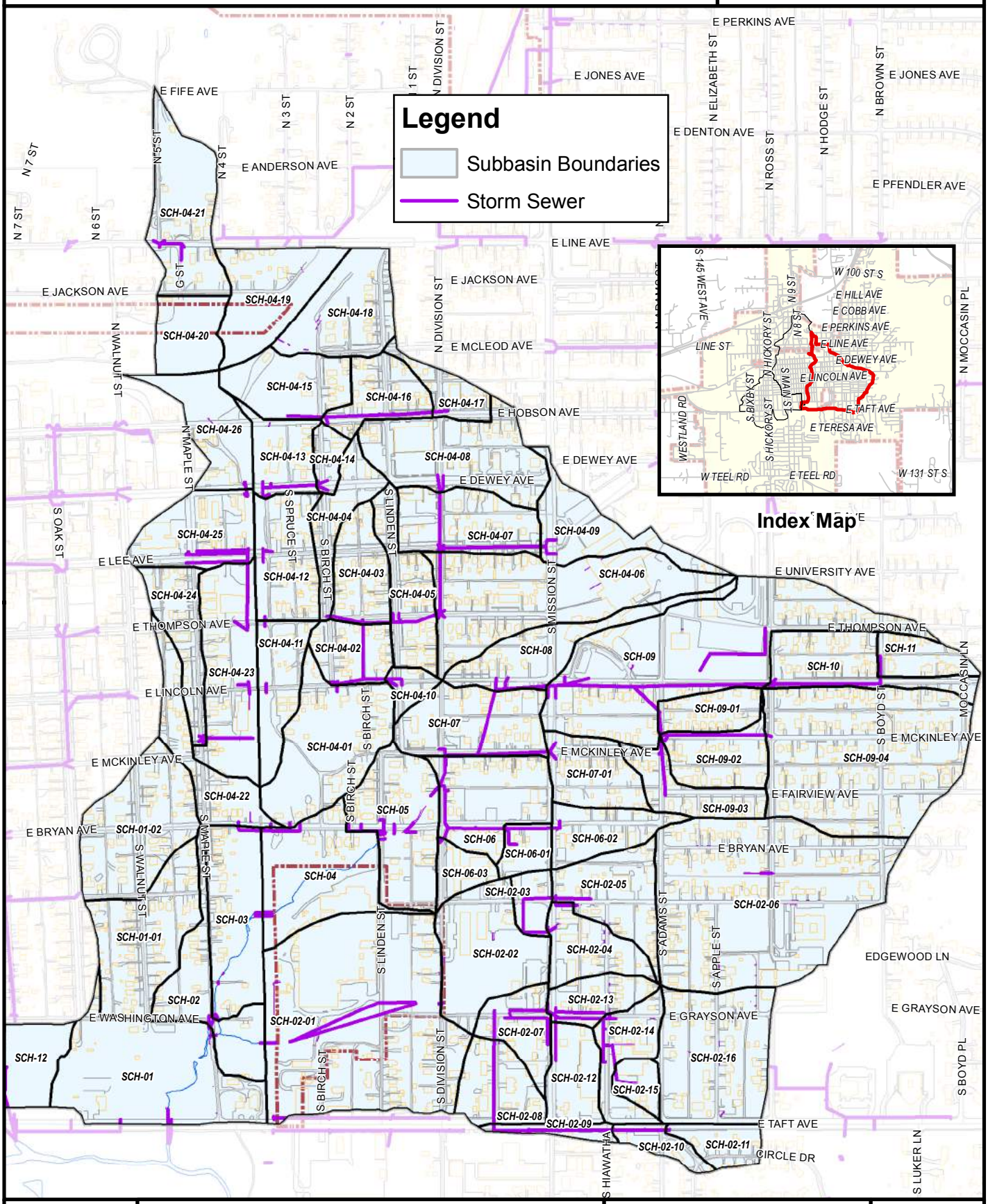

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Figure 5-4

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

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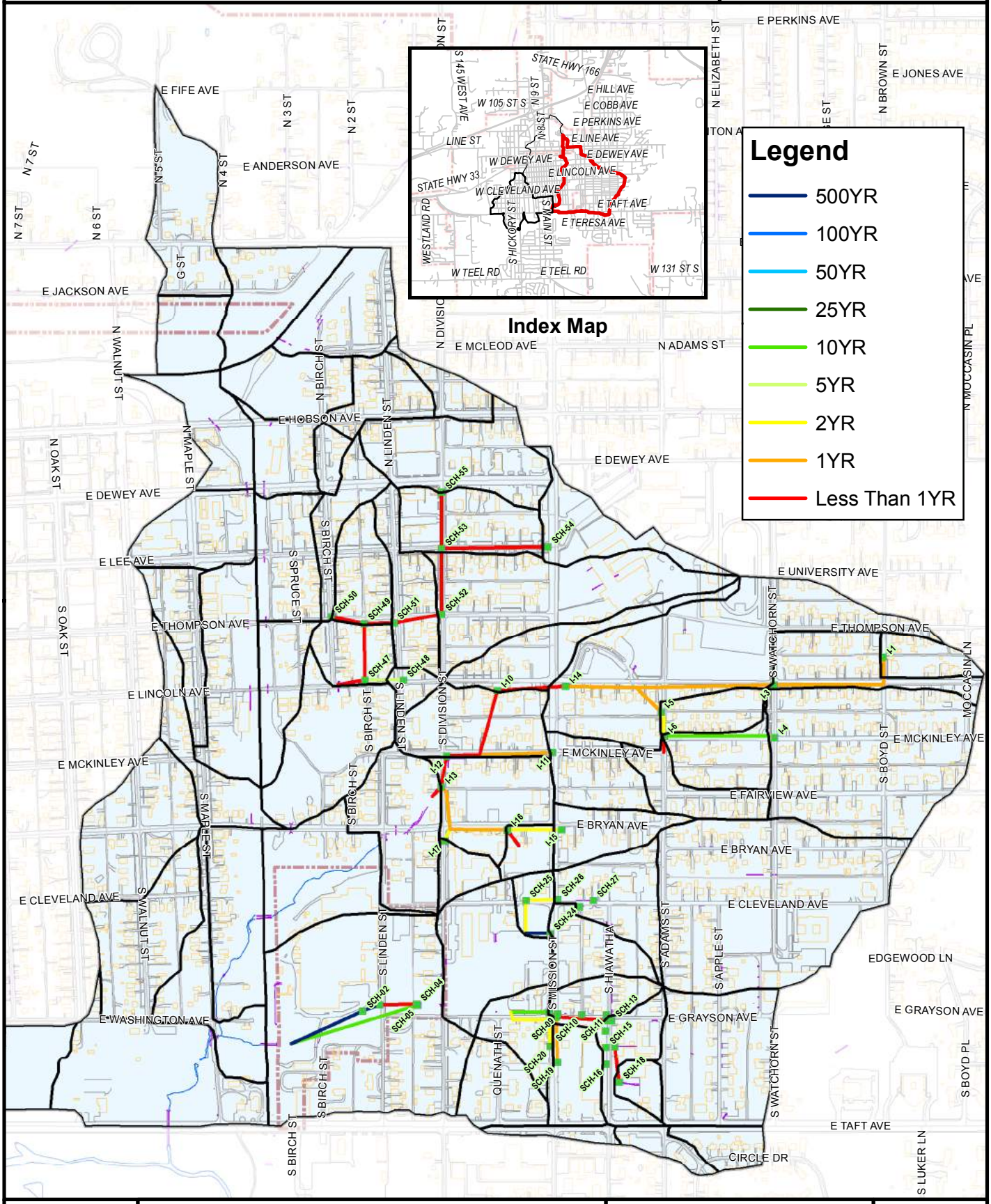

High School Drainage Storm Sewer Capacity

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Figure 5-5

FIGURE 5-2. HIGH SCHOOL DRAINAGE BASIN – EXISTING FLOW RATES AT MAJOR JUNCTIONS (CFS)

HMS Junction	Street Intersection	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Downstream Pipe Capacity (cfs)
J-SCH-01	Taft Ave	599	825	1079	1189	1279	1343	1399	1730	
J-SCH-02	Washington & U.S. of Maple	423	631	913	1098	1269	1352	1399	1885	
J-SCH-02-01	RR to the South of Grayson	102	154	339	415	493	546	577	801	
J-SCH-02-02	Grayson & Division	108	175	291	365	460	532	603	744	
J-SCH-02-03	SS Outlet SW of Cleveland & Mission	43	70	123	156	198	231	264	328	
J-SCH-02-04	South of Cleveland on Mission	8	14	21	25	31	35	39	47	**100.00**
J-SCH-02-05	Cleveland & Mission	35	60	105	134	171	199	227	283	**65.00**
J-SCH-02-06	Cleveland & Adams	28	48	86	111	142	167	191	238	
J-SCH-02-07	Grayson & Quenath	56	93	149	185	231	266	299	364	
J-SCH-02-12	South of Grayson & Mission	11	17	24	28	33	37	40	47	**2.00**
J-SCH-02-13	Grayson & Mission	40	65	101	124	154	175	196	237	**130.00**
J-SCH-02-14	Grayson & Hiawatha	26	43	68	85	106	121	136	165	**12.00**
J-SCH-03	U.S. of Washington & Maple	326	482	762	826	926	1020	1299	2226	
J-SCH-04	Cleveland & RR	329	487	759	913	1075	1186	1569	2117	
J-SCH-04-01	Bryan & East of RR	172	264	415	512	635	728	819	1007	
J-SCH-04-02	Lincoln & Birch	81	124	193	238	295	339	381	468	
J-SCH-04-03	Thompson b/w Linden & Birch	79	120	185	227	281	321	361	441	
J-SCH-04-04	Thompson & Birch	7	11	16	20	25	28	31	38	
J-SCH-04-05	Thompson & Linden	69	105	161	196	240	274	307	374	
J-SCH-04-06	Thompson & Division	66	98	148	179	220	249	279	338	
J-SCH-04-07	Lee & Division	49	75	107	128	154	173	192	229	
J-SCH-04-08	Dewey & Division	26	41	56	66	79	87	96	113	
J-SCH-04-09	Lee & Mission	14	20	28	33	39	43	48	56	
J-SCH-04-13	Dewey & RR	79	119	181	220	269	306	342	414	

HMS Junction	Street Intersection	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	**Downstream Pipe Capacity (cfs)**
J-SCH-04-15	Hobson & RR	71	107	161	195	238	271	302	367	
J-SCH-04-16	Hobson & Birch	12	17	27	33	40	46	52	62	
J-SCH-04-17	Hobson & Division	5	9	13	15	19	21	23	28	
J-SCH-04-22	Bryan & RR	59	90	133	161	196	221	246	297	
J-SCH-04-24	McKinley & Maple	10	15	21	25	30	34	38	45	
J-SCH-04-25	Lee & Maple	25	39	57	67	82	92	102	122	
J-SCH-05	Bryan & Linden	131	202	320	417	539	627	714	895	
J-SCH-06	B/w McKinley & Bryan at Division	126	200	331	414	519	600	680	841	**45**
J-SCH-07	McKinley & Division	93	152	249	310	389	449	509	626	**93**
J-SCH-08	Lincoln & b/w Division & Mission	86	141	232	289	363	419	474	582	
J-SCH-09	Lincoln & Mission	32	57	103	133	172	202	232	290	**70**
J-SCH-09-01	B/w Mckinley & Lincoln at Adams	29	52	94	122	157	184	211	264	**50**
J-SCH-09-02	McKinley & Adams (North)	4	8	14	18	24	28	32	39	**55**
J-SCH-09-03	McKinley & Adams (South)	21	38	70	90	116	136	156	195	**4**
J-SCH-09-04	McKinley & Watchorn	21	38	70	90	116	136	156	195	**115**
J-SCH-09-UP	Lincoln & West of Adams	44	78	139	177	227	265	304	378	
J-SCH-10	Lincoln & Watchorn	12	22	36	45	56	65	73	89	**15**
J-SCH-11	Lincoln & Boyd	3	6	11	13	17	20	23	28	**4**
J-SCH-12	Pond outlet to North of Taft	190	239	294	314	395	458	519	692	

5.3. PROBLEM AREAS

Problem Areas have been identified for the High School Drainage Basin and a summary is presented below in addition to a map of Problem Areas shown in **FIGURE 5-6**. Modeling revealed that all storm sewer systems located in this drainage basin are currently surcharged by a storm event having a 50% annual chance storm frequency.

A. Problem Area 1: Adams and Lincoln Area, Including 1125, 1136 and 1140 E. Lincoln Avenue

Houses and yards in this area receive water from the alley and street, which results in property damage. Residents have stated that problems have worsened since the parking lot for the school gym was paved and the building constructed due to runoff being channeled into the alley. Although the City has cleaned out the box and replaced the top slabs, the flooding from the alley remains a problem.

Some residents have stated that they cannot use their toilets when it floods. The City has installed check valves to correct this problem. The drainage subbasin southeast from Adams Street and Lincoln Avenue contains 58 acres and drains to a 42-inch RCP which can handle a storm event with a 20% annual chance frequency. The street flow is directed to the inlet shown to the right above. However, this inlet is limited and results in overland flow to the northwest that impacts the house and yard (shown in the photo above) and results in standing water.

The drainage subbasin northeast from Adams Street and Lincoln Avenue contains 45 acres and is drained by a 21-inch masonry pipe on the south side of Lincoln Avenue and a concrete ditch from the high school on the north side of Lincoln Avenue (as shown in the photo to the left). The 21-inch MAS pipe is so inadequate that it cannot handle even a 100% annual chance storm event. Downstream from the junction of these two systems, the flow is carried in a 36 X 32-inch RCB with has less cross-section area than that of the 42-inch pipe. This RCB is undersized and quite shallow. Once it becomes surcharged, it causes the ground to shift above it. Due to this surcharge, downstream driveways have been damaged.

B. Problem Area 2: 1119 E. Cleveland Avenue

STORMWATER
UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
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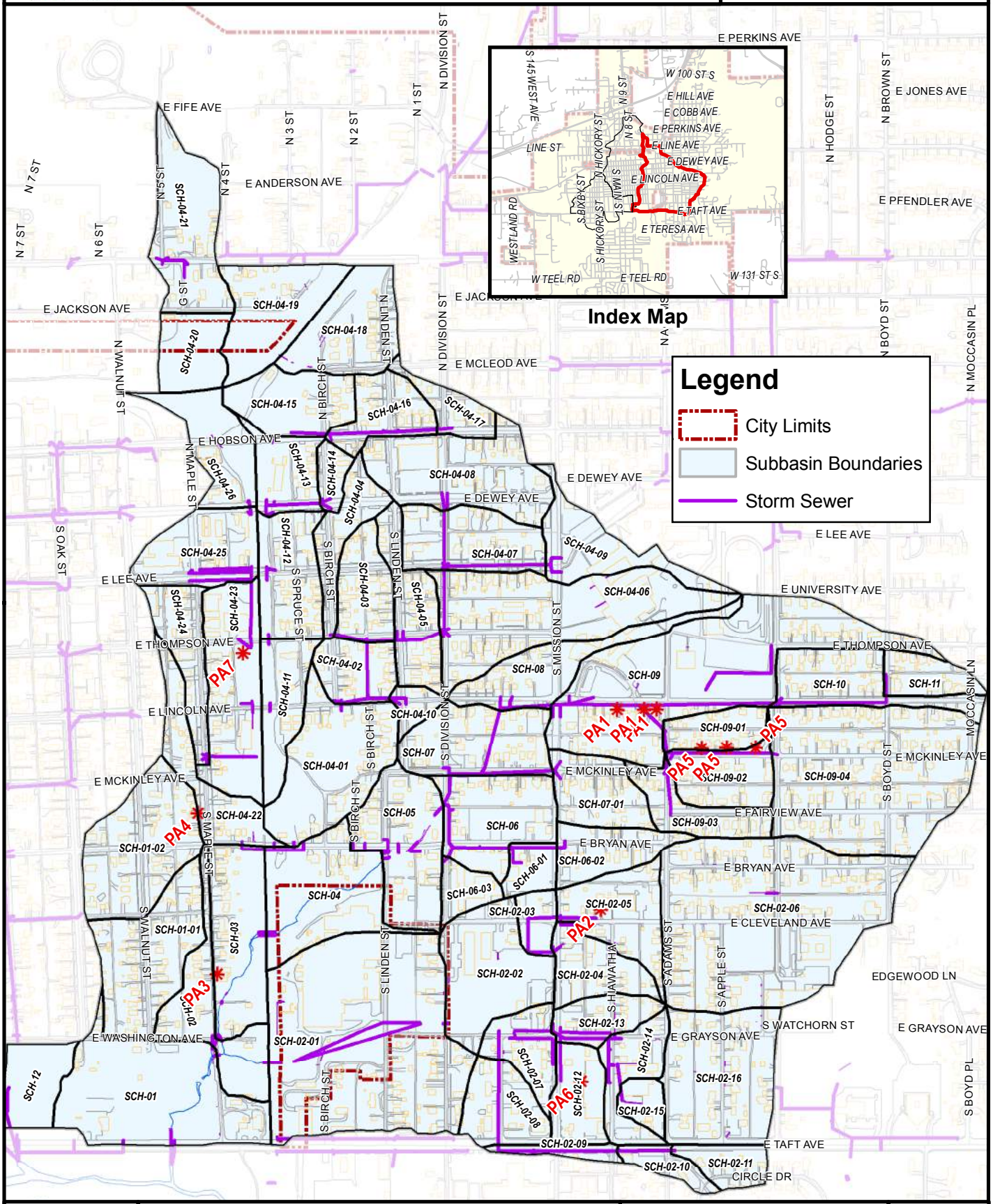

High School Basin Problem Areas

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Figure 5-6

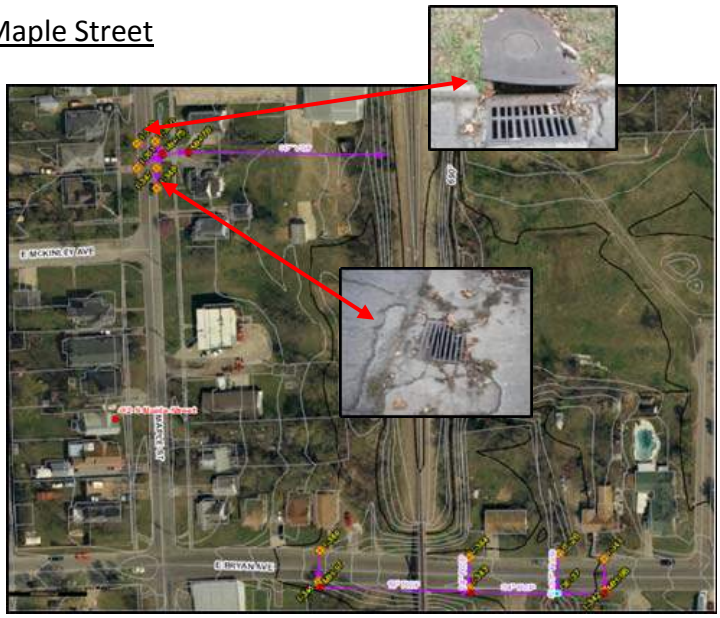
Stormwater fills the ditches so that the area around 1119 S. Cleveland Avenue does not drain well. The culverts are also in disrepair. The drainage subbasin to this location is approximately 34 acres. The ditches south of the middle school, shown on a preceding page, are a hazard for school buses and other traffic. The flow rates produced are much too large to be confined to roadway ditches.

A. Problem Area 3: 600 and 700 Block of S. Maple Street

Drainage is poor along the roadway from Bryan Avenue south to Washington Avenue. The water drains for approximately four blocks on both sides of the roadway, flooding culverts and driveways, as well as one house and garage.

Bar ditches must to be re-established in this area and adequate driveway culverts installed on slopes to convey the stormwater.

B. Problem Area 4: 412 S. Maple Street



The ground contours in the area show a single elevation of 696 feet for the southerly part of the 300 block west of Maple Street as well as the northwest corner and the east half of the 400 block west of Maple Street. Stormwater from the alleys, which have been built up over time, causes property and backyard flooding due to poor drainage.

The area three blocks to the north of the inlet location is a relatively steep slope so that the runoff ends at the inlet location shown to the right above. The inlets at this location are part of a storm sewer system intended to drain the area and consisting of five undersized inlets connected by 10-inch VCP pipes to a manhole on the east side of Maple Street north of McKinley Avenue. On the east side of Maple Street, a short segment of 18-inch pipe connects the first manhole to a second manhole that discharges through a 30-inch VCP.

The area to the south has an extremely flat slope so that the water from the south, intended for these inlets, has difficulty flowing at all. Additionally, street overlays have added to the limited storage capacity of the street sections.

E. Problem Area 5: 1207, 1213 and 1243 E. McKinley Avenue

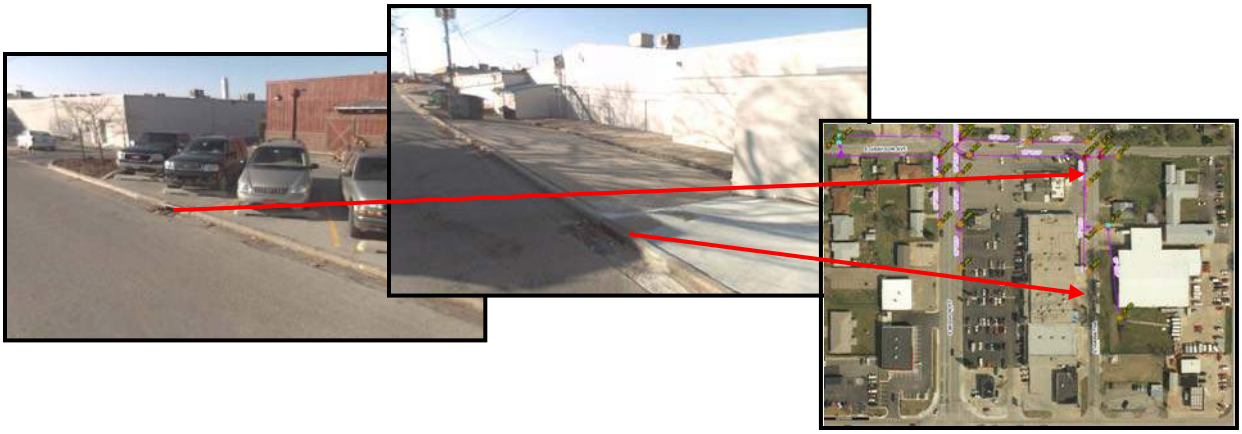
In this area, homes, garages and yards are being flooded. The foundation at 1213 E. McKinley is being impacted by stormwater, and during storm events, water backs up in the bathtub at 1207 E. McKinley Avenue.

Residents have stated that the City recently installed a new water line which has changed the grade and the surface drainage in this area. However, the storm sewer system downstream from McKinley Avenue is surcharged during frequent storms, making it at least contributory to the problem. The City has provided some grading changes to facilitate surface drainage.

F. Problem Area 6: 705 S. Mission Street

Tenants at Village Square shopping center have stated that stormwater floods some of the commercial buildings. The two pictures on the left reflect the drainage patterns west of Hiawatha. These are two locations where the buildings and storm drains are lower than the street.

Drainage Area SCH-02-16 and the northern portion of SCH-02-14, approximately 14 acres, are drained by an 18-inch RCP on the south side of Grayson. There is an 18-inch CMP on the north



side of Grayson as well, but it does not impact the flow on the south side.

The two inlets shown in the pictures above drain through a 15-inch RCP storm sewer that also collects water from the southerly parts of SC-02-15 and SC-04-15. The pipe system is clearly undersized.

G. Problem Area 7: 614 E. Thompson Avenue

Although water travels from the railroad easement to this property, the erosion path indicates that the majority of it is from Lee Street which is one block north. The result is localized erosion problems which are visible in the photo to the right.

5.4. EVALUATION OF ALTERNATIVES

Several Problem Areas were identified in the High School Drainage Basin, much of which was related to localized flooding problems. Several alternatives were considered and are described below. Costs are provided for each alternative and are presented in detail in **APPENDIX 5-E**.

A. Problem Areas 1 and 5: Adams & Lincoln Area, 1125 E. Lincoln Avenue, 1140 E. Lincoln Avenue and 1207, 1213 and 1243 E. McKinley Avenue

Alternative 1 – Upgrade existing trunk line system and construct a diversion system from McKinley Avenue and Adams Street west to the existing system east of Division Street. In general, all pipes in the trunk line from Boyd Street to the outfall west of Division Street, i.e. except a small section between Adams and Mission Streets, would be replaced in this alternative to accommodate a 20% annual chance storm event. In many cases, the 20% and 10% annual chance flow rates are carried in the same size pipe.

This alternative would also divert drainage subbasins SCH-09-04, 09-03, and 09-02 west from McKinley Avenue and Adams Street into the existing system west of Mission Street. From the "T" intersection at McKinley Avenue and Adams Street, 100 feet of 36-inch RCP would be installed south on Adams Street. At the point that Adams Street intersects McKinley Avenue to the west side, 750 feet of 42-inch RCP would be constructed along McKinley Avenue to where it discharges into the existing system just west of Mission Street. This diversion would carry a 10% to 20% annual storm event.

At its intersection with the existing system west of Mission Street, the existing pipe would be upgraded to a 42-inch RCP and continue west to its intersection with the upgraded trunk line midway between Division and Mission Streets. The trunk line would continue west in a 60-inch RCP to Division Street and then south on Division Street to the current outfall.

In order to utilize fully the storm sewer system, new 4-foot recessed curb inlets with steel inserts would be installed at all appropriate locations along the upgraded trunk line and diversion system.

The cost for this alternative is $2,155,000 and is shown in **Figure 5-7**.

Alternative 2 – Replace existing storm sewer system. All pipes in the main system, other than the pipe along McKinley Avenue between Watchorn and Adams Streets, are inadequate to carry even frequent storm events. As a result, all of the trunk line system downstream of Adams Street and McKinley Avenue would be replaced to handle a 10% to 20% annual chance storm.

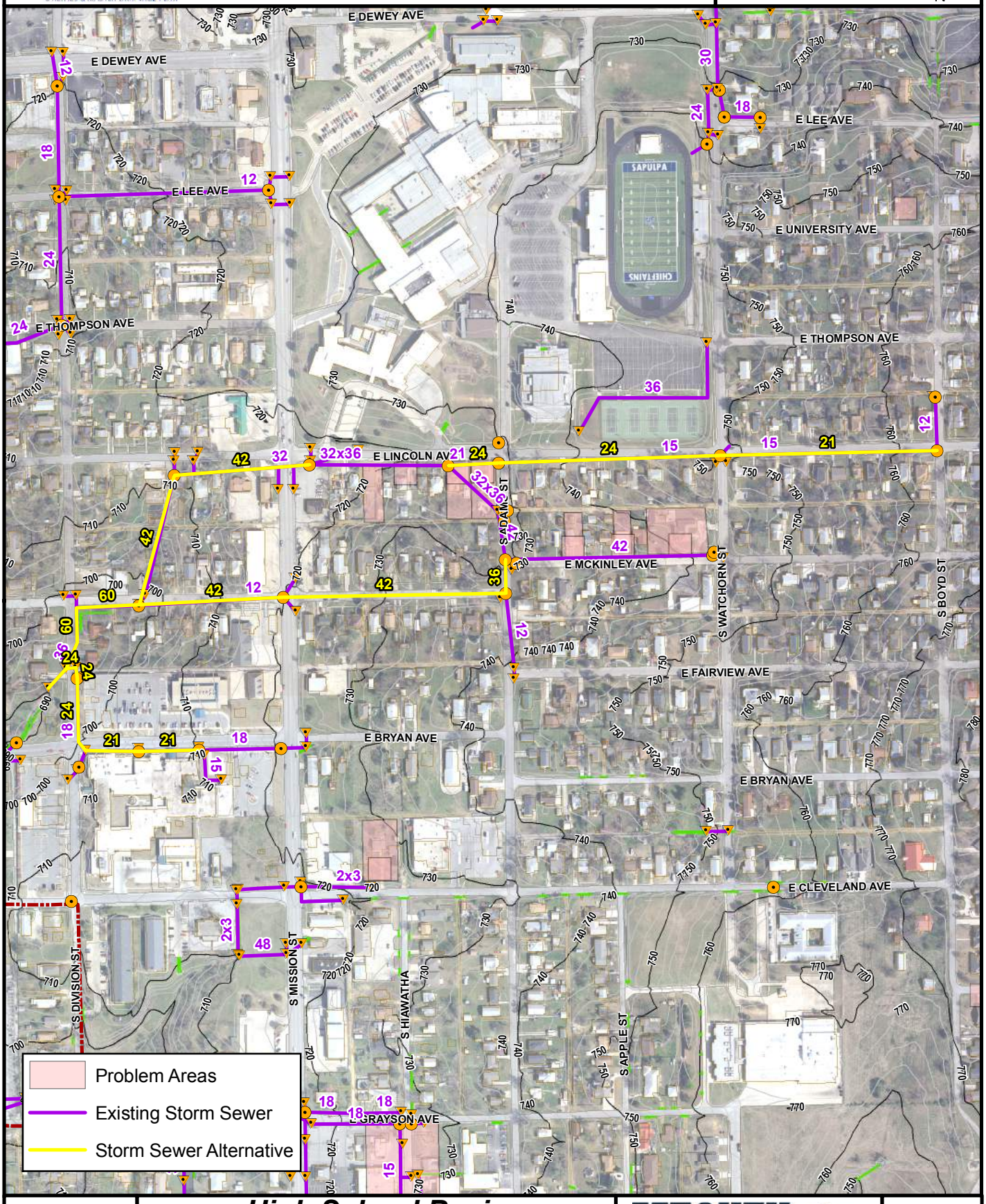
The system immediately upstream from Adams Street (to Watchorn Street) would be enlarged to 675 feet of 24-inch RCP. Upstream of Watchorn Street (to Boyd Street) would be sized for 675 feet of 24-inch RCP.

The cost for this alternative is $2,120,000 and is presented in **Figure 5-8**.

STORMWATER
UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
0 200 400
N



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High School Basin Problem Area 1 & 5 Alternative 1

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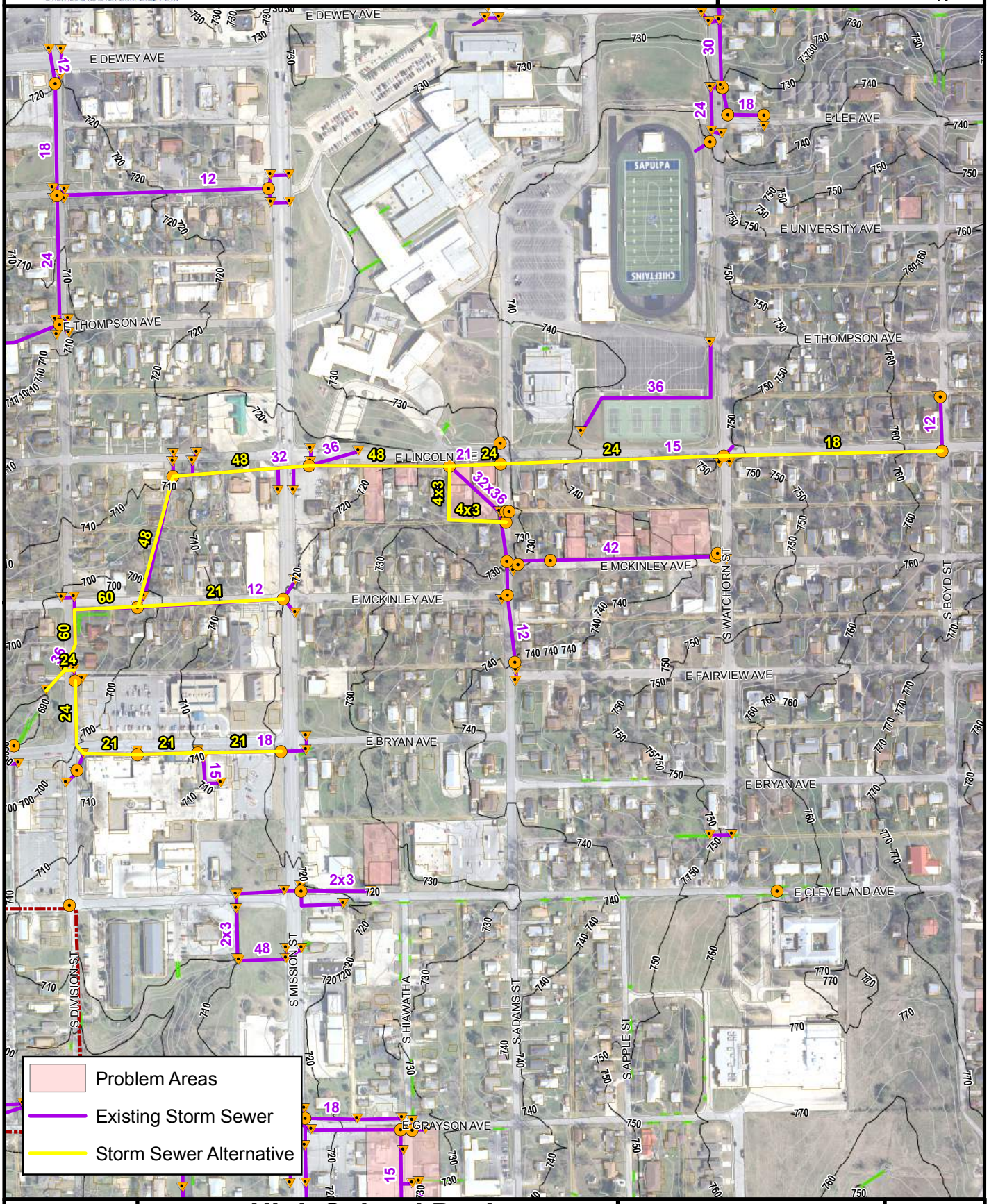
Figure 5-7

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
0 200 400
N



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High School Basin
Problem Area 1 & 5
Alternative 2

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Figure 5-8

A. Problem Area 2: 1119 E. Cleveland Avenue

Two alternatives were considered to address the drainage issues for this area. The first was a system to convey a 10% annual chance storm. The second alternative was a system to provide protection for a 1% annual chance frequency storm. Either of these alternatives would solve the drainage problem at this location although the cost for the second alternative would cost more.

In addition, the City has planned a street project for Cleveland Avenue from Mission Street to east of Watchorn Street. The coordination of either of these alternatives with the street project would provide cost-savings overall for the combined project and reducing disruption and inconvenience to local traffic and residents.

Alternative 1 – Construct a storm sewer system with a 10% annual chance capacity along Cleveland Avenue from east of Watchorn Street to Mission Street. This alternative would include the construction of a storm sewer system along Cleveland Avenue from Watchorn Street west to Mission Street, most of which would be construction in an unsewered area. From 165 feet east of Watchorn Street, a 15-inch RCP would be installed. From Watchorn Street to Apple Street, the pipe system would change to an 18-inch and then to a 24-inch RCP from Apple Street to Adams Street. From Adams Street, a 42-inch RCP would be installed west to Mission Street and then continue south 200 feet along Mission Street. The final section to the outfall would be 180 feet of 48-inch RCP.

The cost for this alternative is $784,000 and is depicted in **Figure 5-9**.

Alternative 2 – Construct a storm sewer system with a 1% annual chance along Cleveland Avenue from Mission Street to east of Watchorn. The cost for this alternative would be considerably higher than Alternative 1. Because there are no flooded buildings in this area and due to the greater project cost, this alternative was not pursued further.

B. Problem Area 3: 600 and 700 Block of S. Maple Street

Alternative 1 – Construct driveway culverts and ditch improvements south on Maple Street from Cleveland Avenue to Washington Avenue. This alternative calls for the installation of fifteen 18-inch driveway culverts as well as grading the ditches to drain. The ditch would have a bottom width of 30 inches and have a concrete liner to reduce future maintenance costs and sedimentation problems.

The cost for this alternative is $145,200 and is shown in **Figure 5-10**.

C. Problem Area 4: 412 S. Maple Street

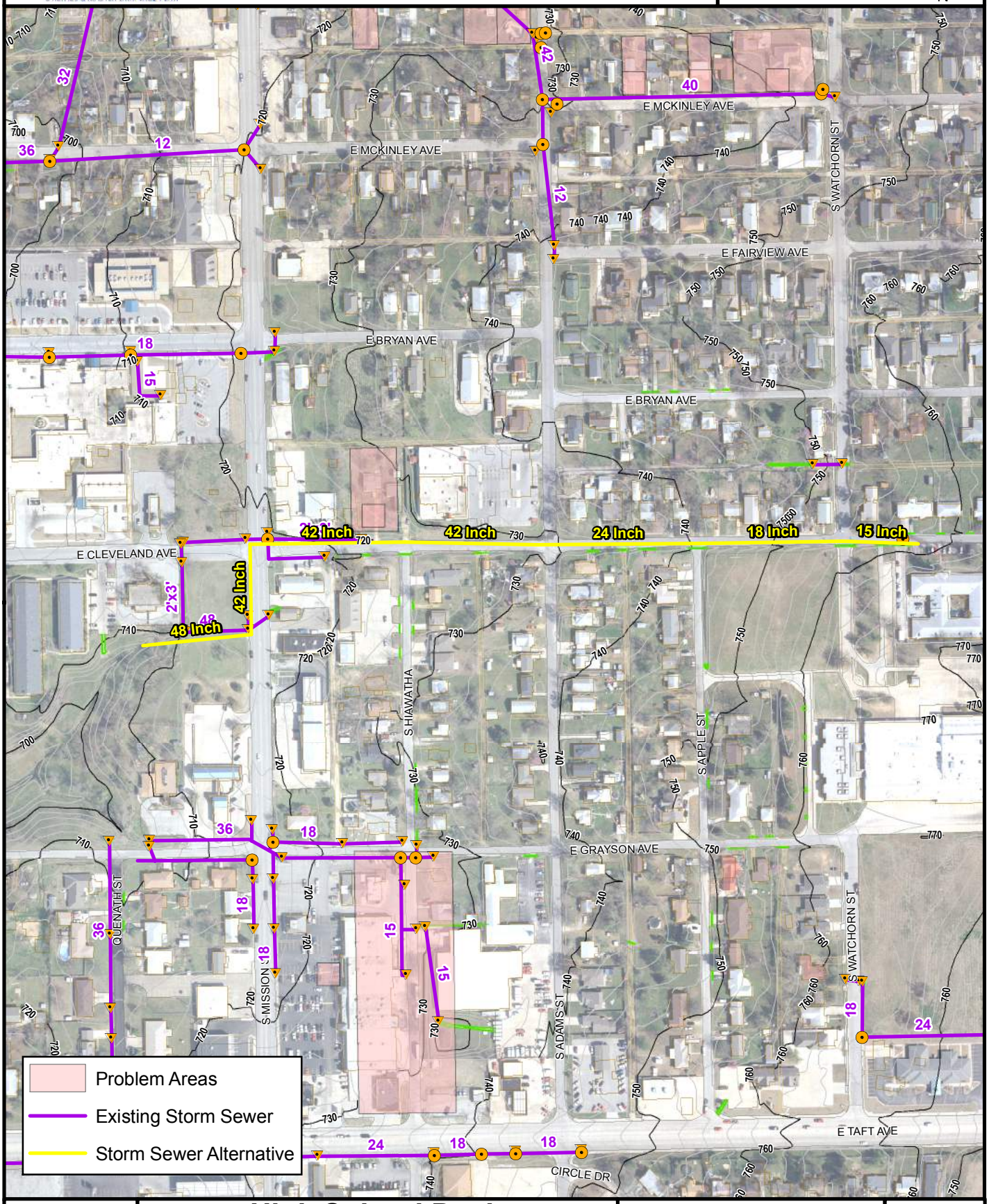
Significant public comments were received concerning this poorly drained area. The storm sewer system intended to drain this area is one block north of the identified Problem Area located at 412 S. Maple Street.

Alternative 1 – Construct a storm sewer system from approximately 412 S. Maple to the existing inlets and pipe north of McKinley Avenue on Maple Street. Under this alternative, a

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
0 150 300
N



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High School Basin
Problem Area 2
Alternative 1

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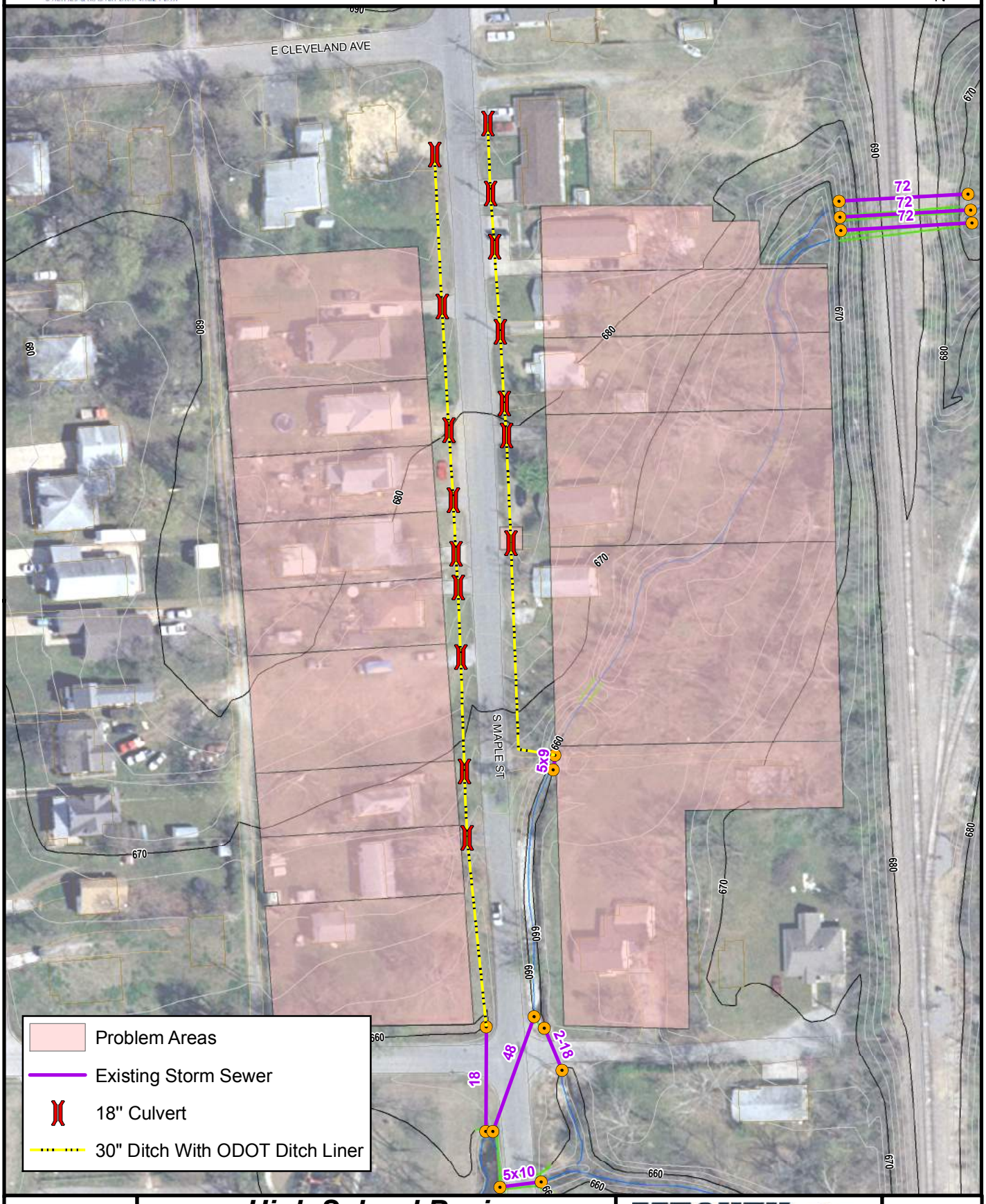
Figure 5-9

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

Feet
0 50 100
N



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High School Basin
Problem Area 3
Alternative 1

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Figure 5-10

new 18-inch RCP with a 20% annual chance capacity would be constructed to provide the area an additional "low point" for conveying the local drainage. Two new 4-foot recessed curb inlets with steel inserts would be installed at both 412 S. Maple and the intersection of McKinley Avenue and Maple Street to convey the water north through the new 18-inch pipe system. Four of the existing inlets north of the intersection would also be upgraded to 4-foot recessed curb inlets with steel inserts. These inlets would then convey water to the existing manhole, and from there, through a new 30-inch RCP east to the existing 30-inch VCP.

The cost for this alternative is $146,000 and is shown in **Figure 5-11**.

Alternative 2 – Construct a new 18-inch RCP from the intersection at McKinley Avenue and Maple Street south along Maple Street to its intersection with Bryan Avenue and then east to the existing 18-inch RCP west of the railroad. This alternative would provide a new storm sewer System with a capacity of a 50% annual chance storm event and include an additional "low point" to convey the localized drainage south and east to connect to the existing system. Like Alternative 1, this alternative would include two new 4-foot recessed curb inlets with steel inserts at the intersection of Maple Street and McKinley Avenue and at 412 S. Maple to convey stormwater south through a new 18-inch RCP to Bryan Avenue and then east to connect with the existing VCP. From the intersection at Maple Street and Bryan Avenue, the water would be conveyed through a new 18-inch RCP along the north side of Bryan Avenue to a point where it would connect to the existing 18-inch RCP crossing Bryan Avenue and continuing east along the south side of the street.

The cost for this alternative is $126,000 and is shown in **Figure 5-12**.

Alternative 3 – Construct a new storm sewer system south along Maple Street and east at Bryan Avenue to the open channel east of the railroad with inlet improvements. Like Alternative 1, this alternative would also provide protection for a 20% annual chance frequency storm and an additional "low point" for the local drainage. It would also replace all inlets north of McKinley Avenue and add two new 4-foot recessed curb inlets with steel inserts at the intersection of Maple Street and McKinley Avenue and 412 S. Maple Street. These inlets would drain through new 15-inch pipes to a new 48-inch RCP on the east side of Maple Street starting about McKinley Avenue to Bryan Avenue.

At the northeast corner of Maple Street and Bryan Avenue, this system would be diverted through a 48-inch RCP east along the north side of Bryan Avenue to the concrete flume west and adjacent to the railroad tracks. At that point, a 4-foot recessed curb inlets with steel inserts would be installed to pick up the flow and a 60-inch RCP would carry this flow south across Bryan Avenue and east along Bryan Avenue to the creek east of the railroad. The existing storm sewer would be replaced as necessary. The flow would finally discharge through a 60-inch headwall into the creek on the south side of Bryan Avenue.

The cost for this alternative is estimated at $743,700 and is shown in **Figure 5-13**.

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
0 25 50
N

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High School Basin Problem Area 4 Alternative 1

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Figure 5-11

STORMWATER
UTILITIES & MASTER DRAINAGE PLAN

City of Sapulpa Master Drainage Plan

Feet
0 25 50
N

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High School Basin Problem Area 4 Alternative 2

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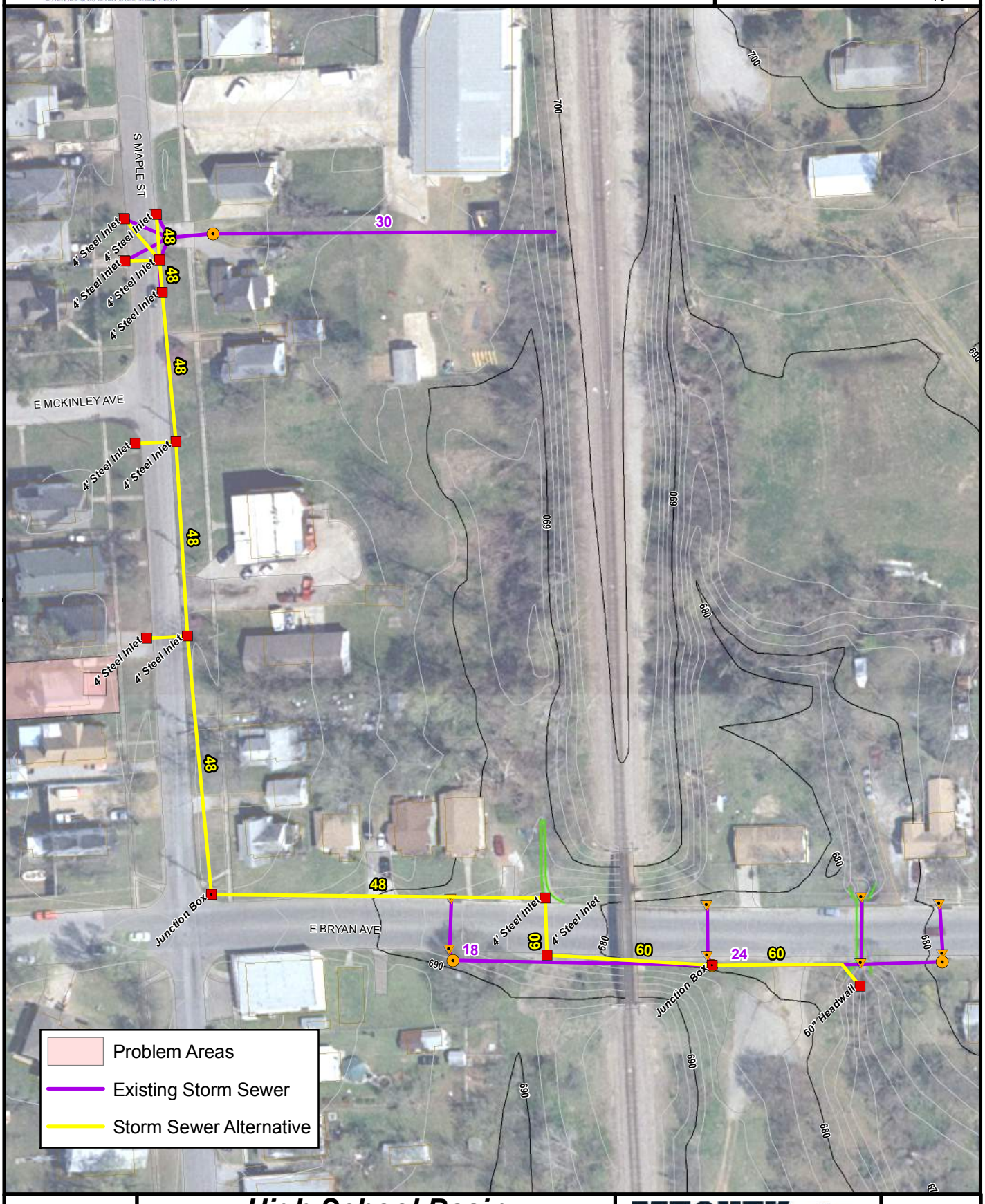
Figure 5-12

City of Sapulpa Master Drainage Plan



High School Basin
Problem Area 4
Alternative 3

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Figure 5-13

G. Problem Area 6: 705 S. Mission Street

Alternative 1 – Construct a storm sewer system with a 10% annual chance frequency to facilitate drainage behind Village Square Shopping Center. This alternative would replace the 15-inch pipe with a 24-inch RCP from the backside of the shopping center to the intersection at Hiawatha and Grayson Avenue. At this location, a significant amount of drainage from the east is captured by the inlet on the southeast corner. The ground is quite low at this location and, therefore, a very low hydraulic grade is required for any pipe. Because of that, a 36-inch RCP with a very flat slope would be constructed from Hiawatha west along the south side of Grayson Avenue to the inlet on the southeast corner of Mission Street and Grayson Avenue to keep the water surface elevation low.

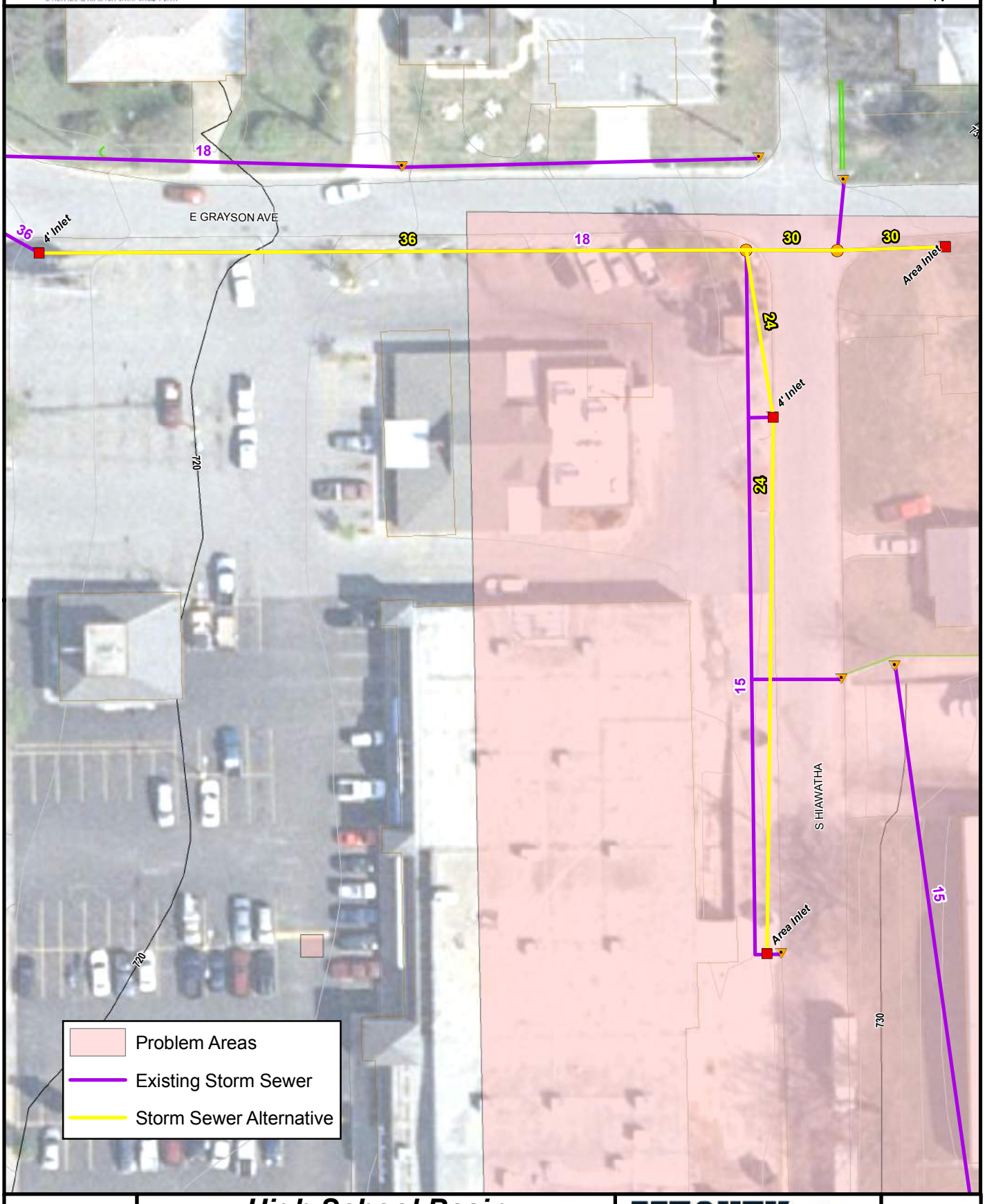
The cost for this alternative is $208,500 and is shown in **Figure 5-14**.

G. Problem Area 7: 614 E. Thompson Avenue

Alternative 1 – Construct erosion control measures downstream from Thompson Avenue. This problem area is somewhat difficult to mitigate because of the low building elevation. The 30-inch CMP crossing Thompson Avenue from the north could handle a 50% annual chance storm with a flow rate of approximately 40 cfs and a 20% annual chance storm with a flow rate of approximately 60 cfs. The culvert overtops somewhere between those two storm events and produces downstream velocities of approximately 10 feet per second. South of the property the water runs onto a parking lot approximately 1 to 2 feet lower than the culvert outlet at Thompson Avenue. The result is erosion problems in the area.

This alternative calls for erosion control measures, such as riprap, south of Thompson Avenue to counteract the erosive velocities. The channel between the outlet and the parking lot could be flattened somewhat and a concrete bottom installed to maintain flows; however, this would just relocate the problem downstream. As a result, this option was not considered a viable alternative.

City of Sapulpa Master Drainage Plan



High School Basin
Problem Area 6
Alternative 1

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Figure 5-14

5.5. RECOMMENDED PLAN

Based on the prioritization criteria presented in the **INTRODUCTION SECTION 1** and discussions with City staff, the following alternatives were selected as the Recommended Plan for the High School Drainage Basin. In some cases, "No Action" was the selected course. Detailed information and exhibits for each of these alternatives can be found in **SECTION 5-4 EVALUATION OF ALTERNATIVES**. Cost estimates can be found in **APPENDIX 5-E**.

The Recommended Plan for the High School Drainage Basin is:

PROBLEM AREA	RECOMMENDED ALTERNATIVE	RATIONALE FOR SELECTION	ESTIMATED COST
Problem Areas 1 and 5	Alternative 2	This project provides protection for storm events ranging from a 10% to 20% annual chance event at the least cost. It has a positive effect on health and safety, reduces hazards from overtopped bridges and structures, improves access, replaces an aging system in poor condition, addresses a City liability issue and has an existing funding source from which it can be funded.	$2,120,000
Problem Area 2	Alternative 1	This project provides a high level of protection at an acceptable public cost. The other alternative considered was eliminated because no structures flood in the area and due to its excessive cost.	$784,000
Problem Area 3	Alternative 1	This is a localized drainage problem which can be resolved relatively inexpensively and easily by re-establishing the existing bar ditches with a concrete liner and adding driveway culverts.	$145,200
Problem Area 4	Alternative 3	Although Alternative 3 is the most expensive of the three alternatives reviewed, this Problem Area is the only alternative that would provide protection from a 20% annual chance storm event along Maple Street to east of the railroad. This area is a serious problem which has been the location of documented injuries/deaths and a long-term identified problem with City liability. This alternative	$743,000

		would also have access to other funding sources.	
Problem Area 6	Alternative 1	This solution would address an area that is the site of documented injuries and deaths and would provide protection from a 10% annual chance storm event at a reasonable cost to the public. It has been a long-term problem area.	$208,500
Problem Area 7	No Action	No solution was recommended due to adverse downstream impacts resulting from the proposed solution. It has no flooded buildings, no documented injuries or deaths nor access problems.	-0-
		TOTAL COST	**$4,000,700**

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		858																		
SCH-01	Overland			0.00	0.00			Commercial	24	89	92	94	95	0.0	23.7	0.0	0.0	73.4	15.4	0.02402
	Channel (ditch)			0.00	0.00			Forest (poor cover)	34	45	66	77	83	0.0	32.3	1.9	0.0			
	Paved	208	2.35	3.06	1.14			Impervious	5	98	98	98	98	0.0	4.8	0.6	0.0			
	Pipe			0.00	0.00			Pasture: Good Condition	34	39	61	74	80	0.0	30.1	3.6	0.0			
	Stream	650	1.66	4.00	2.71	2.3	0.04	Residential 1/4 acre	3	61	75	83	87	0.0	0.5	2.3	0.0			
		1222																		
SCH-01-01	Overland			0.00	0.00			Residential 1/4 acre	100	61	75	83	87	0.0	78.3	21.7	0.0	76.7	9.6	0.01497
	Channel (ditch)	763	3.09	2.63	4.84															
	Paved	458	2.18	2.95	2.59															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.5	0.07													
		1018																		
SCH-01-02	Overland			0.00	0.00			Residential 1/4 acre	100	61	75	83	87	0.0	16.4	83.6	0.0	81.7	10.5	0.01642
	Channel (ditch)			0.00	0.00															
	Paved	1018	1.28	2.25	7.54															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.5	0.08													
		1219																		
SCH-02	Overland			0.00	0.00			Commercial	1	89	92	94	95	0.0	1.3	0.0	0.0	69.6	6.7	0.01045
	Channel (ditch)	1142	3.62	2.85	6.68			Forest (good cover)	13	25	55	70	77	0.0	11.8	1.3	0.0			
	Paved			0.00	0.00			Forest (poor cover)	0	45	66	77	83	0.0	0.4	0.0	0.0			
	Pipe	77	1.30	0.00	0.00			Pasture: Good Condition	28	39	61	74	80	0.0	26.0	2.4	0.0			
	Stream			0.00	0.00	4.0	0.07	Residential 1/4 acre	57	61	75	83	87	0.0	50.6	6.3	0.0			
		1468																		
SCH-02-01	Overland			0.00	0.00			Commercial	8	89	92	94	95	0.0	6.8	0.8	0.0	73.4	29.5	0.04610
	Channel (ditch)	704	1.70	1.94	6.05			Forest (good cover)	45	25	55	70	77	0.0	38.6	6.2	0.0			
	Paved	671	3.92	3.96	2.82			Impervious	19	98	98	98	98	0.0	17.0	2.3	0.0			
	Pipe			0.00	0.00			Industrial	13	81	88	91	93	0.0	6.5	6.8	0.0			
	Stream	93	0.00	4.00	0.39	5.6	0.09	Pasture: Good Condition	15	39	61	74	80	0.0	8.4	6.7	0.0			
		946																		
SCH-02-02	Overland			0.00	0.00			Commercial	46	89	92	94	95	0.0	45.0	1.3	0.0	79.8	9.2	0.01434
	Channel (ditch)	395	3.34	2.74	2.41			Forest (good cover)	7	25	55	70	77	0.0	3.1	4.2	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	46	39	61	74	80	0.0	13.7	32.6	0.0			
	Pipe			0.00	0.00															
	Stream	551	0.00	4.00	2.30	2.8	0.05													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		497																		
SCH-02-03	Overland			0.00	0.00			Commercial	31	89	92	94	95	0.0	30.0	1.3	0.0	70.9	1.9	0.00292
	Channel (ditch)			0.00	0.00			Pasture: Good Condition	69	39	61	74	80	0.0	67.5	1.2	0.0			
	Paved	497	2.62	3.23	2.56															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	1.5	0.03													
		780																		
SCH-02-04	Overland			0.00	0.00			Commercial	57	89	92	94	95	0.0	57.3	0.0	0.0	84.7	4.5	0.00701
	Channel (ditch)	780	3.25	2.70	4.82			Pasture: Good Condition	0	39	61	74	80	0.0	0.2	0.0	0.0			
	Paved			0.00	0.00			Residential 1/4 acre	42	61	75	83	87	0.0	42.5	0.0	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.9	0.05													
		900																		
SCH-02-05	Overland			0.00	0.00			Commercial	45	89	92	94	95	0.0	45.1	0.0	0.0	82.7	6.4	0.01002
	Channel (ditch)	404	3.73	2.89	2.33			Residential 1/4 acre	55	61	75	83	87	0.0	54.9	0.0	0.0			
	Paved	260	2.23	2.98	1.45															
	Pipe	236	1.44	0.00	0.00															
	Stream			0.00	0.00	2.3	0.04													
		1723																		
SCH-02-06	Overland			0.00	0.00			Commercial	14	89	92	94	95	0.0	14.4	0.0	0.0	76.1	27.9	0.04356
	Channel (ditch)			0.00	0.00			Pasture: Good Condition	10	39	61	74	80	0.0	9.6	0.0	0.0			
	Paved	1723	2.94	3.43	8.38			Residential 1/4 acre	76	61	75	83	87	0.0	76.0	0.0	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	5.0	0.08													
		724																		
SCH-02-07	Overland			0.00	0.00			Commercial	42	89	92	94	95	0.0	33.0	8.8	0.0	77.3	3.9	0.00611
	Channel (ditch)	551	3.17	2.66	3.45			Forest (good cover)	52	25	55	70	77	0.0	15.5	36.1	0.0			
	Paved	173	4.05	4.02	0.72			Pasture: Good Condition	7	39	61	74	80	0.0	0.0	6.6	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													
		520																		
SCH-02-08	Overland			0.00	0.00			Commercial	39	89	92	94	95	0.0	38.9	0.0	0.0	69.4	4.9	0.00765
	Channel (ditch)	520	2.67	2.44	3.55			Forest (good cover)	61	25	55	70	77	0.0	61.1	0.0	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.1	0.04													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		776																		
SCH-02-09	Overland			0.00	0.00			Commercial	100	89	92	94	95	0.0	100.0	0.0	0.0	92.0	1.3	0.00209
	Channel (ditch)			0.00	0.00															
	Paved			0.00	0.00															
	Pipe	776	1.70	4.00	3.23															
	Stream			0.00	0.00	1.9	0.03													
		648																		
SCH-02-10	Overland			0.00	0.00			Commercial	52	89	92	94	95	0.0	51.6	0.0	0.0	83.8	1.9	0.00290
	Channel (ditch)			0.00	0.00			Residential 1/4 acre	48	61	75	83	87	0.0	48.4	0.0	0.0			
	Paved	453	3.14	3.54	2.13															
	Pipe	195	2.56	4.00	0.81															
	Stream			0.00	0.00	1.8	0.03													
		622																		
SCH-02-11	Overland			0.00	0.00			Commercial	5	89	92	94	95	0.0	5.1	0.0	0.0	75.9	2.6	0.00404
	Channel (ditch)	356	3.82	2.93	2.02			Residential 1/4 acre	95	61	75	83	87	0.0	94.9	0.0	0.0			
	Paved	266	2.67	3.26	1.36															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.0	0.03													
		742																		
SCH-02-12	Overland			0.00	0.00			Commercial	100	89	92	94	95	0.0	95.5	4.5	0.0	92.1	4.2	0.00651
	Channel (ditch)	508	3.75	2.90	2.92															
	Paved			0.00	0.00															
	Pipe	234	0.81	4.00	0.97															
	Stream			0.00	0.00	2.3	0.04													
		760																		
SCH-02-13	Overland			0.00	0.00			Commercial	37	89	92	94	95	0.0	36.7	0.0	0.0	81.2	3.3	0.00513
	Channel (ditch)	393	3.29	2.72	2.41			Residential 1/4 acre	63	61	75	83	87	0.0	63.3	0.0	0.0			
	Paved			0.00	0.00															
	Pipe	367	3.32	4.00	1.53															
	Stream			0.00	0.00	2.4	0.04													
		925																		
SCH-02-14	Overland			0.00	0.00			Commercial	87	89	92	94	95	0.0	87.4	0.0	0.0	89.9	4.3	0.00664
	Channel (ditch)	659	2.87	2.53	4.34			Residential 1/4 acre	13	61	75	83	87	0.0	12.6	0.0	0.0			
	Paved			0.00	0.00															
	Pipe	266	0.19	4.00	1.11															
	Stream			0.00	0.00	3.3	0.05													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		385																		
SCH-02-15	Overland			0.00	0.00			Commercial	100	89	92	94	95	0.0	100.0	0.0	0.0	92.0	1.7	0.00264
	Channel (ditch)	385	5.33	3.48	1.85															
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	1.1	0.02													
		892																		
SCH-02-16	Overland			0.00	0.00			Commercial	12	89	92	94	95	0.0	11.5	0.0	0.0	77.0	12.0	0.01881
	Channel (ditch)	892	3.30	2.72	5.46			Residential 1/4 acre	88	61	75	83	87	0.0	88.5	0.0	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	3.3	0.05													
		1272																		
SCH-03	Overland			0.00	0.00			Forest (good cover)	32	25	55	70	77	0.0	17.4	14.1	0.0	69.9	8.4	0.01306
	Channel (ditch)	551	2.78	2.49	3.68			Pasture: Good Condition	21	39	61	74	80	0.0	15.6	5.4	0.0			
	Paved			0.00	0.00			Residential 1/4 acre	48	61	75	83	87	0.0	31.3	16.2	0.0			
	Pipe			0.00	0.00															
	Stream	721	0.00	4.00	3.00	4.0	0.07													
		1281																		
SCH-04	Overland			0.00	0.00			Forest (good cover)	58	25	55	70	77	0.0	2.8	55.4	0.0	75.7	10.2	0.01597
	Channel (ditch)	614	5.19	3.43	2.99			Impervious	10	98	98	98	98	0.0	8.9	0.6	0.0			
	Paved			0.00	0.00			Industrial	20	81	88	91	93	0.0	8.7	11.3	0.0			
	Pipe			0.00	0.00			Pasture: Good Condition	12	39	61	74	80	0.0	7.9	4.3	0.0			
	Stream	667	0.00	4.00	2.78	3.5	0.06													
		1188																		
SCH-04-01	Overland			0.00	0.00			Forest (good cover)	73	25	55	70	77	0.0	0.4	73.1	0.0	71.0	10.8	0.01688
	Channel (ditch)	1188	2.41	2.32	8.54			Pasture: Good Condition	27	39	61	74	80	0.0	0.0	26.5	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	5.1	0.09													
		565																		
SCH-04-02	Overland			0.00	0.00			Forest (good cover)	100	25	55	70	77	0.0	0.0	100.0	0.0	70.0	3.9	0.00602
	Channel (ditch)	380	1.51	1.82	3.47															
	Paved			0.00	0.00															
	Pipe	185	0.41	0.00	0.00															
	Stream			0.00	0.00	2.1	0.03													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		721																		
SCH-04-03	Overland			0.00	0.00			Commercial	4	89	92	94	95	0.0	0.0	3.6	0.0	70.9	4.7	0.00732
	Channel (ditch)	721	3.61	2.85	4.22			Forest (good cover)	96	25	55	70	77	0.0	0.0	96.4	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													
		1173																		
SCH-04-04	Overland			0.00	0.00			Commercial	57	89	92	94	95	0.0	0.0	56.7	0.0	84.3	3.9	0.00609
	Channel (ditch)	468	1.94	2.07	3.77			Forest (good cover)	38	25	55	70	77	0.0	0.0	38.0	0.0			
	Paved	705	2.34	3.05	3.85			Residential 1/4 acre	5	61	75	83	87	0.0	0.0	5.3	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.6	0.08													
		851																		
SCH-04-05	Overland			0.00	0.00			Commercial	13	89	92	94	95	0.0	0.0	13.2	0.0	73.2	5.5	0.00853
	Channel (ditch)			0.00	0.00			Forest (good cover)	87	25	55	70	77	0.0	0.0	86.8	0.0			
	Paved	851	2.60	3.22	4.41															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.6	0.04													
		2054																		
SCH-04-06	Overland			0.00	0.00			Commercial	47	89	92	94	95	0.0	0.0	47.4	0.0	81.4	15.7	0.02460
	Channel (ditch)	1834	2.16	2.19	13.96			Forest (good cover)	53	25	55	70	77	0.0	0.0	52.6	0.0			
	Paved	220	0.77	1.75	2.10															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	9.6	0.16													
		711																		
SCH-04-07	Overland			0.00	0.00			Commercial	46	89	92	94	95	0.0	0.0	45.9	0.0	81.0	6.9	0.01081
	Channel (ditch)	500	2.59	2.40	3.47			Forest (good cover)	54	25	55	70	77	0.0	0.0	54.1	0.0			
	Paved	211	1.90	2.75	1.28															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.9	0.05													
		782																		
SCH-04-08	Overland			0.00	0.00			Commercial	80	89	92	94	95	0.0	0.0	80.0	0.0	91.7	10.5	0.01648
	Channel (ditch)	782	2.25	2.24	5.83			Forest (good cover)	1	25	55	70	77	0.0	0.0	0.7	0.0			
	Paved			0.00	0.00			Residential 1/4 acre	19	61	75	83	87	0.0	0.0	19.3	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	3.5	0.06													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
SCH-04-09		1214																93.1	5.7	0.00894
	Overland			0.00	0.00			Commercial	96	89	92	94	95	0.0	0.0	96.4	0.0			
	Channel (ditch)	1214	2.04	2.13	9.51			Forest (good cover)	4	25	55	70	77	0.0	0.0	3.6	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	5.7	0.10													
SCH-04-10		343																70.0	1.3	0.00209
	Overland			0.00	0.00			Forest (good cover)	100	25	55	70	77	0.0	0.0	100.0	0.0			
	Channel (ditch)			0.00	0.00															
	Paved	343	2.74	3.31	1.73															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	1.0	0.02													
SCH-04-11		1254																71.0	4.9	0.00768
	Overland			0.00	0.00			Forest (good cover)	75	25	55	70	77	0.0	0.0	75.2	0.0			
	Channel (ditch)	1254	2.19	2.21	9.48			Pasture: Good Condition	25	39	61	74	80	0.0	0.0	24.8	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	5.7	0.09													
SCH-04-12		1005																77.5	6.4	0.00995
	Overland			0.00	0.00			Commercial	29	89	92	94	95	0.0	0.0	28.6	0.0			
	Channel (ditch)	1005	1.92	2.06	8.12			Forest (good cover)	56	25	55	70	77	0.0	0.0	55.7	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	16	39	61	74	80	0.0	0.0	15.7	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.9	0.08													
SCH-04-13		723																83.3	4.1	0.00639
	Overland			0.00	0.00			Commercial	47	89	92	94	95	0.0	0.0	47.3	0.0			
	Channel (ditch)	723	1.60	1.88	6.41			Impervious	3	98	98	98	98	0.0	0.0	3.1	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	18	39	61	74	80	0.0	0.0	18.4	0.0			
	Pipe			0.00	0.00			Residential 1/4 acre	27	61	75	83	87	0.0	0.0	26.8	0.0			
	Stream			0.00	0.00	3.8	0.06													
SCH-04-14		423																87.2	1.5	0.00231
	Overland			0.00	0.00			Commercial	38	89	92	94	95	0.0	0.0	38.1	0.0			
	Channel (ditch)			0.00	0.00			Residential 1/4 acre	62	61	75	83	87	0.0	0.0	61.9	0.0			
	Paved	423	0.54	1.46	4.82															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.9	0.05													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		711																		
SCH-04-15	Overland			0.00	0.00			Commercial	0	89	92	94	95	0.0	0.0	0.2	0.0	76.3	5.9	0.00920
	Channel (ditch)	711	2.12	2.17	5.46			Impervious	1	98	98	98	98	0.0	0.0	1.2	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	76	39	61	74	80	0.0	0.0	76.3	0.0			
	Pipe			0.00	0.00			Residential 1/4 acre	22	61	75	83	87	0.0	0.0	22.3	0.0			
	Stream			0.00	0.00	3.3	0.05													
		798																		
SCH-04-16	Overland			0.00	0.00			Commercial	5	89	92	94	95	0.0	0.0	5.2	0.0	83.6	4.4	0.00681
	Channel (ditch)			0.00	0.00			Pasture: Good Condition	0	39	61	74	80	0.0	0.0	0.0	0.0			
	Paved	371	3.48	3.73	1.66			Residential 1/4 acre	95	61	75	83	87	0.0	0.0	94.8	0.0			
	Pipe	427	0.77	0.00	0.00															
	Stream			0.00	0.00	1.0	0.02													
		616																		
SCH-04-17	Overland			0.00	0.00			Commercial	22	89	92	94	95	0.0	0.0	21.8	0.0	86.8	2.6	0.00401
	Channel (ditch)	400	2.60	2.41	2.77			Impervious	9	98	98	98	98	0.0	0.0	9.2	0.0			
	Paved	216	1.57	2.50	1.44			Residential 1/4 acre	69	61	75	83	87	0.0	0.0	68.9	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													
		850																		
SCH-04-18	Overland			0.00	0.00			Pasture: Good Condition	38	39	61	74	80	0.0	0.0	38.0	0.0	79.6	7.4	0.01156
	Channel (ditch)	850	0.47	1.01	14.09			Residential 1/4 acre	62	61	75	83	87	0.0	0.0	62.0	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	8.5	0.14													
		1118																		
SCH-04-19	Overland			0.00	0.00			Forest (good cover)	25	25	55	70	77	0.0	0.0	12.3	12.7	86.2	7.7	0.01203
	Channel (ditch)	1118	3.17	2.66	6.99			Impervious	39	98	98	98	98	0.0	0.0	2.4	36.1			
	Paved			0.00	0.00			Industrial	16	81	88	91	93	0.0	0.0	0.0	15.9			
	Pipe			0.00	0.00			Pasture: Good Condition	21	39	61	74	80	0.0	0.0	20.6	0.0			
	Stream			0.00	0.00	4.2	0.07													
		725																		
SCH-04-20	Overland			0.00	0.00			Forest (good cover)	3	25	55	70	77	0.0	0.0	2.5	0.7	91.0	4.3	0.00671
	Channel (ditch)	725	3.59	2.84	4.26			Industrial	92	81	88	91	93	0.0	0.0	24.3	67.9			
	Paved			0.00	0.00			Pasture: Good Condition	4	39	61	74	80	0.0	0.0	4.5	0.0			
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.6	0.04													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		1515																		
SCH-04-21	Overland			0.00	0.00			Forest (good cover)	12	25	55	70	77	0.0	0.0	0.0	11.5	93.0	8.9	0.01385
	Channel (ditch)	590	2.42	2.32	4.24			Impervious	73	98	98	98	98	0.0	0.0	0.0	73.1			
	Paved	925	9.82	6.29	2.45			Industrial	2	81	88	91	93	0.0	0.0	0.0	1.6			
	Pipe			0.00	0.00			Pasture: Good Condition	14	39	61	74	80	0.0	0.0	0.0	13.8			
	Stream			0.00	0.00	4.0	0.07													
		1521																		
SCH-04-22	Overland			0.00	0.00			Commercial	1	89	92	94	95	0.0	0.0	1.1	0.0	81.1	5.5	0.00862
	Channel (ditch)	1386	1.06	1.52	15.19			Forest (good cover)	7	25	55	70	77	0.0	0.2	6.6	0.0			
	Paved	135	5.19	4.56	0.49			Pasture: Good Condition	10	39	61	74	80	0.0	1.8	8.2	0.0			
	Pipe			0.00	0.00			Residential 1/4 acre	82	61	75	83	87	0.0	0.0	82.0	0.0			
	Stream			0.00	0.00	9.4	0.16													
		1353																		
SCH-04-23	Overland			0.00	0.00			Commercial	51	89	92	94	95	0.0	0.0	51.2	0.0	87.5	9.7	0.01510
	Channel (ditch)	1353	1.87	2.04	11.08			Forest (good cover)	3	25	55	70	77	0.0	0.0	3.1	0.0			
	Paved			0.00	0.00			Pasture: Good Condition	9	39	61	74	80	0.0	0.0	8.6	0.0			
	Pipe			0.00	0.00			Residential 1/4 acre	37	61	75	83	87	0.0	0.0	37.1	0.0			
	Stream			0.00	0.00	6.6	0.11													
		1239																		
SCH-04-24	Overland			0.00	0.00			Commercial	52	89	92	94	95	0.0	0.0	52.1	0.0	88.7	4.7	0.00732
	Channel (ditch)	1239	2.28	2.25	9.17			Residential 1/4 acre	48	61	75	83	87	0.0	0.0	47.9	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	5.5	0.09													
		805																		
SCH-04-25	Overland			0.00	0.00			Commercial	95	89	92	94	95	0.0	0.0	95.1	0.0	93.0	6.6	0.01036
	Channel (ditch)			0.00	0.00			Pasture: Good Condition	5	39	61	74	80	0.0	0.0	4.9	0.0			
	Paved	349	1.89	2.74	2.12															
	Pipe	456	1.40	0.00	0.00															
	Stream			0.00	0.00	1.3	0.02													
		909																		
SCH-04-26	Overland			0.00	0.00			Commercial	35	89	92	94	95	0.0	0.0	34.7	0.0	81.9	5.7	0.00892
	Channel (ditch)	909	1.76	1.97	7.68			Industrial	0	81	88	91	93	0.0	0.0	0.2	0.0			
	Paved			0.00	0.00			Impervious	4	98	98	98	98	0.0	0.0	4.1	0.0			
	Pipe			0.00	0.00			Pasture: Good Condition	61	39	61	74	80	0.0	0.0	61.1	0.0			
	Stream			0.00	0.00	4.6	0.08													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		863																		
SCH-05	Overland			0.00	0.00			Commercial	23	89	92	94	95	0.0	22.8	0.6	0.0	74.4	9.0	0.01403
	Channel (ditch)	480	4.64	3.24	2.47			Forest (good cover)	72	25	55	70	77	0.0	10.3	62.1	0.0			
	Paved			0.00	0.00			Industrial	4	81	88	91	93	0.0	4.1	0.0	0.0			
	Pipe			0.00	0.00															
	Stream	383	0.00	4.00	1.60	2.4	0.04													
		880																		
SCH-06	Overland			0.00	0.00			Commercial	72	89	92	94	95	0.0	69.4	2.4	0.0	84.5	7.8	0.01221
	Channel (ditch)			0.00	0.00			Forest (good cover)	28	25	55	70	77	0.0	8.9	19.3	0.0			
	Paved	880	3.18	3.56	4.11															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													
		452																		
SCH-06-01	Overland			0.00	0.00			Commercial	85	89	92	94	95	0.0	85.0	0.0	0.0	87.4	2.0	0.00319
	Channel (ditch)	297	2.78	2.49	1.99			Pasture: Good Condition	15	39	61	74	80	0.0	15.0	0.0	0.0			
	Paved			0.00	0.00															
	Pipe	155	2.71	0.00	0.00															
	Stream			0.00	0.00	1.2	0.02													
		879																		
SCH-06-02	Overland			0.00	0.00			Commercial	7	89	92	94	95	0.0	7.1	0.0	0.0	76.2	4.4	0.00681
	Channel (ditch)			0.00	0.00			Residential 1/4 acre	93	61	75	83	87	0.0	92.9	0.0	0.0			
	Paved	879	2.88	3.39	4.32															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.6	0.04													
		687																		
SCH-06-03	Overland			0.00	0.00			Commercial	99	89	92	94	95	0.0	99.3	0.0	0.0	91.7	2.1	0.00328
	Channel (ditch)	350	0.65	1.18	4.93			Forest (good cover)	1	25	55	70	77	0.0	0.7	0.0	0.0			
	Paved	337	3.56	3.77	1.49															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	3.9	0.06													
		586																		
SCH-07	Overland			0.00	0.00			Commercial	13	89	92	94	95	0.0	6.8	6.3	0.0	71.7	7.9	0.01231
	Channel (ditch)	391	3.75	2.90	2.24			Forest (good cover)	87	25	55	70	77	0.0	8.6	78.3	0.0			
	Paved	195	0.72	1.68	1.93															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													

Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
		732																		
SCH-07-01	Overland			0.00	0.00			Commercial	18	89	92	94	95	0.0	17.9	0.0	0.0	78.0	5.0	0.00779
	Channel (ditch)	732	3.06	2.62	4.66			Residential 1/4 acre	82	61	75	83	87	0.0	82.1	0.0	0.0			
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.8	0.05													
		767																		
SCH-08	Overland			0.00	0.00			Commercial	59	89	92	94	95	0.0	0.0	59.0	0.0	84.2	6.2	0.00973
	Channel (ditch)			0.00	0.00			Forest (good cover)	41	25	55	70	77	0.0	0.0	41.0	0.0			
	Paved	767	2.48	3.14	4.07															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.4	0.04													
		2438																		
SCH-09	Overland			0.00	0.00			Commercial	58	89	92	94	95	0.0	2.3	56.2	0.0	87.9	23.1	0.03606
	Channel (ditch)			0.00	0.00			Residential 1/4 acre	42	61	75	83	87	0.0	18.4	23.1	0.0			
	Paved	1771	2.60	3.22	9.17															
	Pipe	667	1.80	4.00	2.78															
	Stream			0.00	0.00	7.2	0.12													
		638																		
SCH-09-01	Overland			0.00	0.00			Residential 1/4 acre	100	61	75	83	87	0.0	98.8	1.2	0.0	75.1	3.2	0.00496
	Channel (ditch)	638	3.45	2.78	3.82															
	Paved			0.00	0.00															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	2.3	0.04													
		857																		
SCH-09-02	Overland			0.00	0.00			Residential 1/4 acre	100	61	75	83	87	0.0	100.0	0.0	0.0	75.0	4.8	0.00749
	Channel (ditch)	333	5.13	3.41	1.63															
	Paved	524	1.53	2.46	3.55															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	3.1	0.05													
		1014																		
SCH-09-03	Overland			0.00	0.00			Residential 1/4 acre	100	61	75	83	87	0.0	100.0	0.0	0.0	75.0	4.2	0.00649
	Channel (ditch)	219	2.98	2.58	1.41															
	Paved	461	1.95	2.79	2.76															
	Pipe	334	3.23	0.00	0.00															
	Stream			0.00	0.00	2.5	0.04													

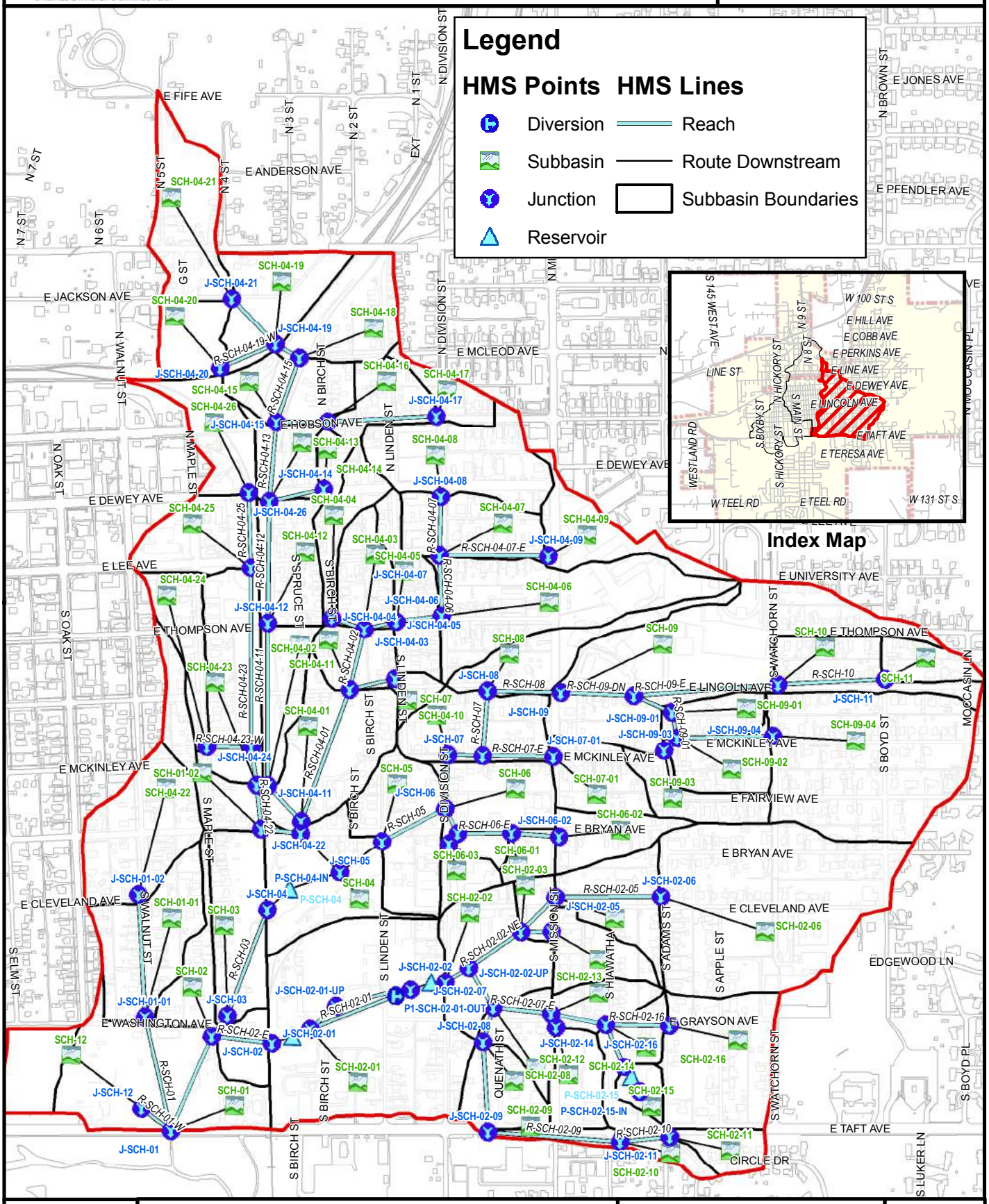
Appendix 5-A. High School Drainage Basin - Hydrologic Coefficients for Existing Conditions

Tributary Subarea	Flow Type	Length (ft)	Weighted Slope (%)	Velocity (ft./sec.)	Tc (min.)	Lag (min.)	Lag (hr.)	Land Use:	% of Use	CN value for each Hydrologic Soil Group				Hydrologic Soil Groups and %				Composite CN	Drainage Area (acres)	Drainage Area (sq. mi.)
										A	B	C	D	A	B	C	D		454.2	
SCH-09-04		1337						Residential 1/4 acre	100	61	75	83	87	0.0	99.0	1.0	0.0	75.1	22.2	0.03476
	Overland			0.00	0.00															
	Channel (ditch)	208	3.46	2.79	1.24															
	Paved	1129	2.91	3.40	5.53															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	4.1	0.07													
SCH-10		1277						Residential 1/4 acre	100	61	75	83	87	0.0	24.7	75.3	0.0	81.0	6.2	0.00966
	Overland			0.00	0.00															
	Channel (ditch)			0.00	0.00															
	Paved	604	2.98	3.45	2.92															
	Pipe	673	2.20	0.00	0.00															
	Stream			0.00	0.00	1.8	0.03													
SCH-11		635						Residential 1/4 acre	100	61	75	83	87	0.0	87.3	12.7	0.0	76.0	2.9	0.00449
	Overland			0.00	0.00															
	Channel (ditch)	499	2.78	2.49	3.34															
	Paved			0.00	0.00															
	Pipe	136	0.15	0.00	0.00															
	Stream			0.00	0.00	2.0	0.03													
SCH-12		375						Commercial	50	89	92	94	95	0.0	50.3	0.0	0.0	76.6	4.2	0.00653
	Overland			0.00	0.00			Pasture: Good Condition	50	39	61	74	80	0.0	49.7	0.0	0.0			
	Channel (ditch)			0.00	0.00															
	Paved	375	2.88	3.39	1.84															
	Pipe			0.00	0.00															
	Stream			0.00	0.00	1.1	0.02													

City of Sapulpa Master Drainage Plan

STORMWATER UTILITIES & MASTER DRAINAGE PLAN

Feet
0 200 400 800
N



High School System HMS Schematic

The City of Sapulpa — Oklahoma's Most Connected City

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Appendix 5-B

Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
001yr_J-DTN-01	601								0.580
002yr_J-DTN-01		872							0.580
005yr_J-DTN-01			1298						0.580
010yr_J-DTN-01				1569					0.580
025yr_J-DTN-01					1910				0.580
050yr_J-DTN-01						2166			0.580
100yr_J-DTN-01							2418		0.580
500yr_J-DTN-01								2936	0.580
Div-02-01	57	89	236	301	364	413	464	561	0.140
Div-SCH-12	190	239	294	314	395	458	519	692	0.587
J-P-SCH-01-IN	434	648	965	1139	1325	1425	1485	1940	0.679
J-P-SCH-12	307	515	935	1197	1495	1693	1886	2237	0.000
J-SCH-01	599	825	1079	1189	1279	1343	1399	1730	0.703
J-SCH-01-01	25	42	69	87	110	127	143	177	0.031
J-SCH-01-02	15	25	41	51	63	72	81	99	0.016
J-SCH-02	423	631	913	1098	1269	1352	1399	1885	0.648
J-SCH-02-01	102	154	339	415	493	546	577	801	0.186
J-SCH-02-01-UP	29	39	65	76	98	119	140	184	0.000
J-SCH-02-02	108	175	291	365	460	532	603	744	0.140
J-SCH-02-02-UP	96	156	261	328	413	478	542	669	0.126
J-SCH-02-03	43	70	123	156	198	231	264	328	0.064
J-SCH-02-04	8	14	21	25	31	35	39	47	0.007
J-SCH-02-05	35	60	105	134	171	199	227	283	0.054
J-SCH-02-06	28	48	86	111	142	167	191	238	0.044
J-SCH-02-07	56	93	149	185	231	266	299	364	0.063
J-SCH-02-08	12	20	35	45	57	66	76	94	0.017
J-SCH-02-09	9	15	24	29	36	41	47	57	0.009
J-SCH-02-10	6	11	18	23	28	33	37	45	0.007
J-SCH-02-11	3	5	9	12	15	18	20	25	0.004
J-SCH-02-12	11	17	24	28	33	37	40	47	0.007
J-SCH-02-13	40	65	101	124	154	175	196	237	0.040
J-SCH-02-14	26	43	68	85	106	121	136	165	0.028
J-SCH-02-15	3	4	5	6	7	7	8	8	0.003
J-SCH-02-16	14	24	43	54	69	80	91	112	0.019
J-SCH-03	326	482	762	826	926	1020	1299	2226	0.451
J-SCH-04	329	487	759	913	1075	1186	1569	2117	0.438
J-SCH-04-01	172	264	415	512	635	728	819	1007	0.198
J-SCH-04-01-DN	221	334	524	645	799	915	1030	1263	0.249
J-SCH-04-02	81	124	193	238	295	339	381	468	0.091
J-SCH-04-03	79	120	185	227	281	321	361	441	0.083
J-SCH-04-04	7	11	16	20	25	28	31	38	0.006

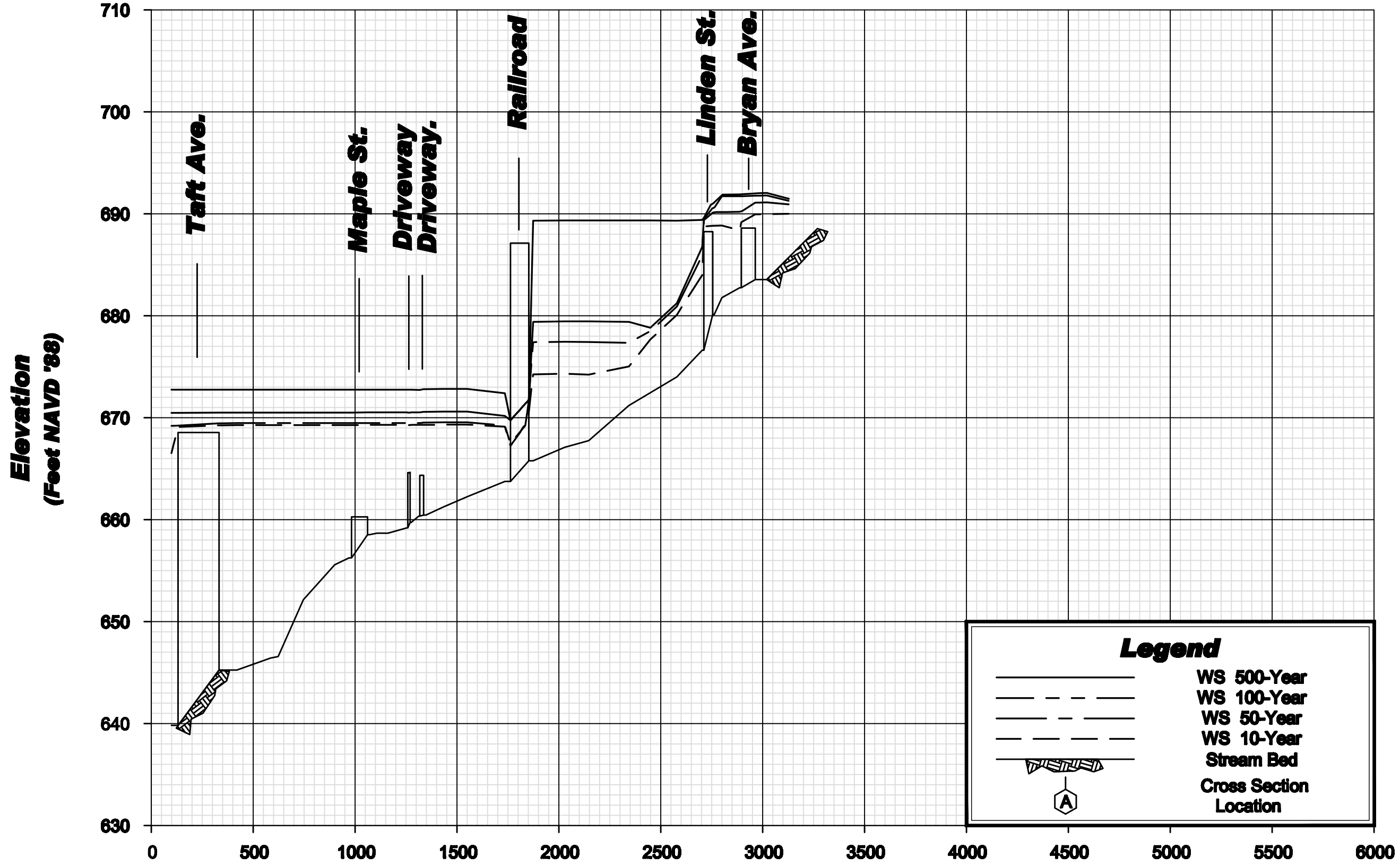
Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
J-SCH-04-05	69	105	161	196	240	274	307	374	0.069
J-SCH-04-06	66	98	148	179	220	249	279	338	0.061
J-SCH-04-07	49	75	107	128	154	173	192	229	0.036
J-SCH-04-08	26	41	56	66	79	87	96	113	0.016
J-SCH-04-09	14	20	28	33	39	43	48	56	0.009
J-SCH-04-10	1	2	4	5	7	8	10	12	0.002
J-SCH-04-11	87	133	205	251	310	354	398	486	0.091
J-SCH-04-12	85	129	197	240	295	336	377	458	0.083
J-SCH-04-13	79	119	181	220	269	306	342	414	0.073
J-SCH-04-14	3	5	7	9	11	12	13	16	0.002
J-SCH-04-15	71	107	161	195	238	271	302	367	0.064
J-SCH-04-16	12	17	27	33	40	46	52	62	0.011
J-SCH-04-17	5	9	13	15	19	21	23	28	0.004
J-SCH-04-18	54	83	122	146	177	199	222	266	0.044
J-SCH-04-19	47	73	103	122	146	164	181	215	0.033
J-SCH-04-20	11	17	24	28	33	37	41	48	0.007
J-SCH-04-21	22	35	47	55	66	73	80	94	0.014
J-SCH-04-22	59	90	133	161	196	221	246	297	0.050
J-SCH-04-23	52	81	117	140	170	192	213	255	0.042
J-SCH-04-23-UP	35	54	78	92	112	126	140	167	0.027
J-SCH-04-24	10	15	21	25	30	34	38	45	0.007
J-SCH-04-25	25	39	57	67	82	92	102	122	0.019
J-SCH-04-26	8	14	22	27	34	39	44	54	0.009
J-SCH-05	131	202	320	417	539	627	714	895	0.173
J-SCH-06	126	200	331	414	519	600	680	841	0.159
J-SCH-06-01	9	15	25	31	39	45	51	62	0.010
J-SCH-06-02	5	9	16	20	25	30	34	42	0.007
J-SCH-06-03	5	8	11	13	15	17	19	22	0.003
J-SCH-06-UP	14	23	36	44	55	62	70	85	0.013
J-SCH-07	103	167	277	347	436	505	572	706	0.134
J-SCH-07-01	6	11	19	24	30	35	40	48	0.008
J-SCH-07-UP	98	159	262	327	411	475	537	662	0.121
J-SCH-08	93	152	249	310	389	449	509	626	0.114
J-SCH-09	86	141	232	289	363	419	474	582	0.104
J-SCH-09-01	32	57	103	133	172	202	232	290	0.054
J-SCH-09-02	29	52	94	122	157	184	211	264	0.049
J-SCH-09-03	4	8	14	18	24	28	32	39	0.006
J-SCH-09-04	21	38	70	90	116	136	156	195	0.035
J-SCH-09-UP	44	78	139	177	227	265	304	378	0.068
J-SCH-10	12	22	36	45	56	65	73	89	0.014
J-SCH-11	3	6	11	13	17	20	23	28	0.004

Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
J-SCH-12	190	239	294	314	395	458	519	692	0.587
P1-SCH-02-01	86	128	301	377	462	533	604	745	0.140
P1-SCH-02-01-OUT	86	128	301	377	462	533	604	745	0.140
P2-SCH-02-01	102	154	339	415	493	546	577	801	0.186
P2-SCH-02-01-IN	103	155	372	470	586	684	778	965	0.186
P-SCH-01	596	820	1073	1182	1273	1336	1390	1720	0.679
P-SCH-02-15	3	4	5	6	7	7	8	8	0.003
P-SCH-02-15-IN	5	7	10	12	14	16	17	20	0.003
P-SCH-04	329	487	759	913	1075	1186	1569	2117	0.438
P-SCH-04-IN	349	538	861	1078	1345	1551	1755	2157	0.438
P-SCH-12	496	754	1229	1512	1890	2151	2405	2929	0.587
P-SCH-12-IN	602	875	1304	1577	1921	2178	2433	2956	0.587
P-SCH-12-OUT	496	754	1229	1512	1890	2151	2405	2929	0.587
R-SCH-01-01	15	25	41	51	63	72	81	99	0.016
R-SCH-02	326	482	734	804	816	854	941	1298	0.451
R-SCH-02-01	57	89	236	301	364	413	464	561	0.140
R-SCH-02-01-NW	29	39	65	76	98	119	140	184	0.000
R-SCH-02-01-SW	29	39	65	76	98	119	140	184	0.000
R-SCH-02-02-DN	96	156	261	328	413	478	542	669	0.126
R-SCH-02-02-NE	43	70	123	156	198	231	264	328	0.064
R-SCH-02-02-SE	56	93	149	185	231	266	299	364	0.063
R-SCH-02-03-E	8	14	21	25	31	35	39	47	0.007
R-SCH-02-03-NE	35	60	105	134	171	199	227	283	0.054
R-SCH-02-05	28	48	86	111	142	167	191	238	0.044
R-SCH-02-07	12	20	35	45	57	66	76	94	0.017
R-SCH-02-07-E	40	65	101	124	154	175	196	237	0.040
R-SCH-02-08	9	15	24	29	36	41	47	57	0.009
R-SCH-02-09	6	11	18	23	28	33	37	45	0.007
R-SCH-02-10	3	5	9	12	15	18	20	25	0.004
R-SCH-02-13	11	17	24	28	33	37	40	47	0.007
R-SCH-02-13-E	26	43	68	85	106	121	136	165	0.028
R-SCH-02-14	3	4	5	6	7	7	8	8	0.003
R-SCH-02-16	14	24	43	54	69	80	91	112	0.019
R-SCH-02-E	102	154	339	415	493	546	577	801	0.186
R-SCH-03	324	479	754	819	922	1014	1281	2186	0.438
R-SCH-04-01	81	124	193	238	295	339	381	468	0.091
R-SCH-04-01-DN	172	264	415	512	635	728	819	1007	0.198
R-SCH-04-01-NW	87	133	205	251	310	354	398	486	0.091
R-SCH-04-01-W	59	90	133	161	196	221	246	297	0.050
R-SCH-04-02	79	120	185	227	281	321	361	441	0.083
R-SCH-04-02-E	1	2	4	5	7	8	10	12	0.002

Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
R-SCH-04-03-E	69	105	161	196	240	274	307	374	0.069
R-SCH-04-03-W	7	11	16	20	25	28	31	38	0.006
R-SCH-04-05	66	98	148	179	220	249	279	338	0.061
R-SCH-04-06	49	75	107	128	154	173	192	229	0.036
R-SCH-04-07	26	41	56	66	79	87	96	113	0.016
R-SCH-04-07-E	14	20	28	33	39	43	48	56	0.009
R-SCH-04-11	85	129	197	240	295	336	377	458	0.083
R-SCH-04-12	79	119	181	220	269	306	342	414	0.073
R-SCH-04-13	71	107	161	195	238	271	302	367	0.064
R-SCH-04-13-E	3	5	7	9	11	12	13	16	0.002
R-SCH-04-15	54	83	122	146	177	199	222	266	0.044
R-SCH-04-15-E	12	17	27	33	40	46	52	62	0.011
R-SCH-04-16	5	9	13	15	19	21	23	28	0.004
R-SCH-04-18	47	73	103	122	146	164	181	215	0.033
R-SCH-04-19-NW	22	35	47	55	66	73	80	94	0.014
R-SCH-04-19-W	11	17	24	28	33	37	41	48	0.007
R-SCH-04-22	52	81	117	140	170	192	213	255	0.042
R-SCH-04-23	25	39	57	67	82	92	102	122	0.019
R-SCH-04-23-DN	35	54	78	92	112	126	140	167	0.027
R-SCH-04-23-W	10	15	21	25	30	34	38	45	0.007
R-SCH-04-25	8	14	22	27	34	39	44	54	0.009
R-SCH-05	125	194	305	397	511	592	673	837	0.159
R-SCH-06-01	5	9	16	20	25	30	34	42	0.007
R-SCH-06-E	9	15	25	31	39	45	51	62	0.010
R-SCH-06-N	103	167	277	347	436	505	572	706	0.134
R-SCH-06-S	5	8	11	13	15	17	19	22	0.003
R-SCH-06-SE	14	23	36	44	55	62	70	85	0.013
R-SCH-07	93	152	249	310	389	449	509	626	0.114
R-SCH-07-E	6	11	19	24	30	35	40	48	0.008
R-SCH-07-E1	98	159	262	327	411	475	537	662	0.121
R-SCH-08	86	141	232	289	363	419	474	582	0.104
R-SCH-09-01	29	52	94	122	157	184	211	264	0.049
R-SCH-09-02	21	38	70	90	116	136	156	195	0.035
R-SCH-09-DN	44	78	139	177	227	265	304	378	0.068
R-SCH-09-E	12	22	36	45	56	65	73	89	0.014
R-SCH-09-SE	32	57	103	133	172	202	232	290	0.054
R-SCH-10	3	6	11	13	17	20	23	28	0.004
SCH-01	14	27	50	65	84	99	114	142	0.024
SCH-01-01	10	18	31	40	51	60	68	84	0.015
SCH-01-02	15	25	41	51	63	72	81	99	0.016
SCH-02	4	8	17	22	30	36	42	53	0.010

Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
SCH-02-01	23	42	79	104	136	161	186	234	0.046
SCH-02-02	13	22	37	46	58	66	75	91	0.014
SCH-02-03	2	3	6	8	10	12	14	17	0.003
SCH-02-04	8	14	21	25	31	35	39	47	0.007
SCH-02-05	11	19	29	36	44	50	56	67	0.010
SCH-02-06	28	48	86	111	142	167	191	238	0.044
SCH-02-07	5	9	15	19	24	27	31	38	0.006
SCH-02-08	3	7	14	18	24	29	33	42	0.008
SCH-02-09	4	6	8	9	11	12	13	15	0.002
SCH-02-10	3	6	9	11	13	15	17	20	0.003
SCH-02-11	3	5	9	12	15	18	20	25	0.004
SCH-02-12	11	17	24	28	33	37	40	47	0.007
SCH-02-13	5	9	14	17	22	25	28	34	0.005
SCH-02-14	10	16	22	26	31	35	38	46	0.007
SCH-02-15	5	7	10	12	14	16	17	20	0.003
SCH-02-16	14	24	43	54	69	80	91	112	0.019
SCH-03	5	10	21	28	37	45	53	67	0.013
SCH-04	11	19	34	44	56	66	75	93	0.016
SCH-04-01	7	13	27	36	47	57	66	84	0.017
SCH-04-02	3	5	11	15	19	23	27	34	0.006
SCH-04-03	3	7	14	18	24	28	33	41	0.007
SCH-04-04	7	11	16	20	25	28	31	38	0.006
SCH-04-05	5	9	17	23	29	35	40	50	0.009
SCH-04-06	18	29	47	59	75	86	98	121	0.025
SCH-04-07	10	18	29	36	44	51	57	70	0.011
SCH-04-08	26	41	56	66	79	87	96	113	0.016
SCH-04-09	14	20	28	33	39	43	48	56	0.009
SCH-04-10	1	2	4	5	7	8	10	12	0.002
SCH-04-11	3	6	12	16	21	25	29	37	0.008
SCH-04-12	7	12	21	27	34	40	45	56	0.010
SCH-04-13	7	11	17	21	26	30	34	41	0.006
SCH-04-14	3	5	7	9	11	12	13	16	0.002
SCH-04-15	6	12	20	26	33	39	44	54	0.009
SCH-04-16	8	14	22	26	32	36	40	48	0.007
SCH-04-17	5	9	13	15	19	21	23	28	0.004
SCH-04-18	8	13	22	28	35	41	46	58	0.012
SCH-04-19	14	23	35	42	51	58	64	77	0.012
SCH-04-20	11	17	24	28	33	37	41	48	0.007
SCH-04-21	22	35	47	55	66	73	80	94	0.014
SCH-04-22	6	10	17	21	26	30	34	42	0.009
SCH-04-23	18	27	40	48	58	66	73	88	0.015

Appendix 5-C. High School Drainage Basin Existing Flow Rates (CFS)									
HMS Junction	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year	Drainage Area, mi^2
SCH-04-24	10	15	21	25	30	34	38	45	0.007
SCH-04-25	18	30	40	47	55	61	67	78	0.010
SCH-04-26	8	14	22	27	34	39	44	54	0.009
SCH-05	9	17	30	39	50	59	68	84	0.014
SCH-06	14	24	37	45	55	62	69	83	0.012
SCH-06-01	5	8	11	13	16	18	20	23	0.003
SCH-06-02	5	9	16	20	25	30	34	42	0.007
SCH-06-03	5	8	11	13	15	17	19	22	0.003
SCH-07	6	12	24	31	41	48	56	70	0.012
SCH-07-01	6	11	19	24	30	35	40	48	0.008
SCH-08	11	19	29	36	44	50	55	66	0.010
SCH-09	42	63	93	112	136	154	171	207	0.036
SCH-09-01	3	6	11	14	18	21	24	30	0.005
SCH-09-02	5	9	16	20	26	31	35	44	0.007
SCH-09-03	4	8	14	18	24	28	32	39	0.006
SCH-09-04	21	38	70	90	116	136	156	195	0.035
SCH-10	10	17	27	33	42	48	54	65	0.010
SCH-11	3	6	11	13	17	20	23	28	0.004
SCH-12	5	10	16	21	26	31	35	43	0.007



Appendix 5-D
Existing Flood Profiles
Downtown Basin
High School

City of Sapulpa, OK

PREPARED BY
Meshek & Associates, PLC.
1437 S. Boulder Ave. - Suite 1000
Tulsa, OK 74119
(918) 392-6620

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Areas 1 & 5 Alternate 1						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	223.06	TEMPORARY SILT FENCE	LF	9614	$ 2.00	$ 19,228.00
2	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	711	$ 2.50	$ 1,777.78
3	411.06(A)	PAVEMENT REPLACEMENT	SY	5876	$ 45.00	$ 264,420.00
4	611.06(A)	6' I.D. MANHOLE W/ FRAME AND LID	EA	7	$ 3,500.00	$ 24,500.00
5	611.06(A)	STORM SEWER JUNCTION BOX	EA	8	$ 10,000.00	$ 80,000.00
6	611.06(K)	4'x4' CURB INLET	EA	72	$ 3,500.00	$ 252,000.00
7	613.06(B)	21" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1000	$ 60.00	$ 60,000.00
8	613.06(B)	24" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1150	$ 70.00	$ 80,500.00
9	613.06(B)	36" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	100	$ 120.00	$ 12,000.00
10	613.06(B)	42" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1900	$ 162.00	$ 307,800.00
11	613.06(B)	60" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	657	$ 300.00	$ 197,100.00
12	613.06(S)	TRENCH EXCAVATION	CY	7334	$ 8.00	$ 58,670.52
13	613.06(T)	STANDARD BEDDING MATERIAL	CY	3718	$ 20.00	$ 74,358.48
14	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 25,000.00	$ 25,000.00
15	619.06(B)	PAVEMENT REMOVAL	SY	5876	$ 7.00	$ 41,132.00
					Subtotal	**$ 1,498,486.78**
					15% Contingency	**$ 224,773.02**
					Subtotal	**$ 1,723,259.79**
					25% Utility Relocation Contingency	**$ 430,814.95**
					Total	***$ 2,154,074.74***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Areas 1 & 5 Alternate 2						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	202.06(A)	UNCLASSIFIED EXCAVATION	CY	1156	$ 12.00	$ 13,866.67
2	223.06	TEMPORARY SILT FENCE	LF	10414	$ 2.00	$ 20,828.00
3	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	1289	$ 2.50	$ 3,222.22
4	411.06(A)	PAVEMENT REPLACEMENT	SY	5976	$ 45.00	$ 268,920.00
5	611.06(A)	6' I.D. MANHOLE W/ FRAME AND LID	EA	7	$ 3,500.00	$ 24,500.00
6	611.06(A)	STORM SEWER JUNCTION BOX	EA	6	$ 10,000.00	$ 60,000.00
7	611.06(K)	4'x4' CURB INLET	EA	66	$ 3,500.00	$ 231,000.00
8	613.06(B)	18" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	675	$ 48.00	$ 32,400.00
9	613.06(B)	21" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1175	$ 60.00	$ 70,500.00
10	613.06(B)	24" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1125	$ 70.00	$ 78,750.00
11	613.06(B)	48" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	1250	$ 220.00	$ 275,000.00
12	613.06(B)	60" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	657	$ 300.00	$ 197,100.00
13	613.06(X)	4'x3' C850 REINFORCED CONCRETE BOX	LF	325	$ 260.00	$ 84,500.00
14	613.06(S)	TRENCH EXCAVATION	CY	6425	$ 8.00	$ 51,400.96
15	613.06(T)	STANDARD BEDDING MATERIAL	CY	3223	$ 20.00	$ 64,464.48
16	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 25,000.00	$ 25,000.00
17	619.06(B)	PAVEMENT REMOVAL	SY	5976	$ 7.00	$ 41,832.00
					Subtotal	**$ 1,543,284.33**
					15% Contingency	**$ 231,492.65**
					Subtotal	**$ 1,774,776.98**
					25% Utility Relocation Contingency	**$ 443,694.25**
					Total	***$ 2,218,471.23***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 2 Alternate 1						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	223.06	TEMPORARY SILT FENCE	LF	3590	$ 2.00	$ 7,180.00
2	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	240	$ 2.50	$ 600.00
3	411.06(A)	PAVEMENT REPLACEMENT	SY	2153	$ 45.00	$ 96,900.00
4	611.06(A)	6' I.D. MANHOLE W/ FRAME AND LID	EA	6	$ 3,500.00	$ 21,000.00
5	611.06(K)	4'x4' CURB INLET	EA	36	$ 3,500.00	$ 126,000.00
6	613.06(B)	15" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	165	$ 42.00	$ 6,930.00
7	613.06(B)	18" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	300	$ 48.00	$ 14,400.00
8	613.06(B)	24" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	350	$ 70.00	$ 24,500.00
9	613.06(B)	42" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	800	$ 162.00	$ 129,600.00
10	613.06(B)	48" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	180	$ 220.00	$ 39,600.00
11	613.06(S)	TRENCH EXCAVATION	CY	1963	$ 8.00	$ 15,702.22
12	613.06(T)	STANDARD BEDDING MATERIAL	CY	1138	$ 20.00	$ 22,755.80
13	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 25,000.00	$ 25,000.00
14	619.06(B)	PAVEMENT REMOVAL	SY	2153	$ 7.00	$ 15,073.33
					Subtotal	**$ 545,241.36**
					15% Contingency	**$ 81,786.20**
					Subtotal	**$ 627,027.56**
					25% Utility Relocation Contingency	**$ 156,756.89**
					Total	***$ 783,784.45***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 3 Alternate 1						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	202.06(A)	UNCLASSIFIED EXCAVATION	CY	1034	$ 12.00	$ 12,402.78
1	223.06	TEMPORARY SILT FENCE	LF	2350	$ 2.00	$ 4,700.00
2	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	783	$ 2.50	$ 1,958.33
3	411.06(A)	DRIVEWAY REPLACEMENT	SY	347	$ 45.00	$ 15,600.00
4	509.06	CLASS C CONCRETE	CY	69	$ 300.00	$ 20,656.50
5	613.06(B)	18" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	156	$ 46.00	$ 7,176.00
6	613.06(B)	18" PRECAST END SECTION	EA	26	$ 970.00	$ 25,220.00
7	613.06(T)	STANDARD BEDDING MATERIAL	CY	43	$ 20.00	$ 854.88
8	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 10,000.00	$ 10,000.00
9	619.06(B)	PAVEMENT REMOVAL	SY	347	$ 7.00	$ 2,426.67
					Subtotal	**$ 100,995.16**
					15% Contingency	**$ 15,149.27**
					Subtotal	**$ 116,144.43**
					25% Utility Relocation Contingency	**$ 29,036.11**
					Total	***$ 145,180.54***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 4 Alternate 1						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	223.06	TEMPORARY SILT FENCE	LF	1000	$ 2.00	$ 2,000.00
2	230.06(A)	SOLID SLAB BERMUDA SODDING	SY	302	$ 2.50	$ 755.56
3	411.06(A)	PAVEMENT REPLACEMENT	SY	173	$ 45.00	$ 7,800.00
4	611.06(A)	6' I.D. MANHOLE W/ FRAME AND LID	EA	2	$ 3,500.00	$ 7,000.00
5	611.06(K)	4'x4' CURB INLET	EA	8	$ 3,500.00	$ 28,000.00
6	613.06(B)	15" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	160	$ 42.00	$ 6,720.00
7	613.06(B)	18" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	305	$ 48.00	$ 14,640.00
8	613.06(B)	30" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	35	$ 92.00	$ 3,220.00
9	613.06(S)	TRENCH EXCAVATION	CY	289	$ 8.00	$ 2,315.56
10	613.06(T)	STANDARD BEDDING MATERIAL	CY	141	$ 20.00	$ 2,818.40
11	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 25,000.00	$ 25,000.00
12	619.06(B)	PAVEMENT REMOVAL	SY	173	$ 7.00	$ 1,213.33
					Subtotal	**$ 101,482.84**
					15% Contingency	**$ 15,222.43**
					Subtotal	**$ 116,705.27**
					25% Utility Relocation Contingency	**$ 29,176.32**
					Total	***$ 145,881.59***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 4 Alternate 2						
ITEM	**ITEM NO.**	**DESCRIPTION**	**UNIT**	**TOTAL**	**UNIT PRICE**	**TOTAL COST**
1	**223.06**	**TEMPORARY SILT FENCE**	**LF**	1180	$ 2.00	$ 2,360.00
2	**230.06(A)**	**SOLID SLAB BERMUDA SODDING**	**SY**	471	$ 2.50	$ 1,177.78
3	**411.06(A)**	**PAVEMENT REPLACEMENT**	**SY**	80	$ 45.00	$ 3,600.00
4	**611.06(A)**	**6' I.D. MANHOLE W/ FRAME AND LID**	**EA**	2	$ 3,500.00	$ 7,000.00
5	**611.06(K)**	**4'x4' CURB INLET**	**EA**	4	$ 3,500.00	$ 14,000.00
6	**613.06(B)**	**15" C76 CL IV RCP W/ OMNIFLEX GASKETS**	**LF**	60	$ 42.00	$ 2,520.00
7	**613.06(B)**	**18" C76 CL IV RCP W/ OMNIFLEX GASKETS**	**LF**	530	$ 48.00	$ 25,440.00
8	**613.06(S)**	**TRENCH EXCAVATION**	**CY**	328	$ 8.00	$ 2,622.22
9	**613.06(T)**	**STANDARD BEDDING MATERIAL**	**CY**	162	$ 20.00	$ 3,233.20
10	**619.06(B)**	**REMOVAL OF STRUCTURES AND OBSTRUCTIONS**	**LS**	1	$ 25,000.00	$ 25,000.00
11	**619.06(B)**	**PAVEMENT REMOVAL**	**SY**	80	$ 7.00	$ 560.00
					Subtotal	**$ 87,513.20**
					15% Contingency	**$ 13,126.98**
					Subtotal	**$ 100,640.18**
					25% Utility Relocation Contingency	**$ 25,160.05**
					Total	***$ 125,800.23***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 4 Alternate 3						
ITEM	ITEM NO.	DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL COST
1	223.06	TEMPORARY SILT FENCE	LF	2390	$ 2.00	$ 4,780.00
2	411.06(A)	PAVEMENT REPLACEMENT	SY	1593	$ 45.00	$ 71,700.00
3	611.06(A)	STORM SEWER JUNCTION BOX	EA	7	$ 10,000.00	$ 70,000.00
4	611.06(K)	4'x4' CURB INLET	EA	11	$ 3,500.00	$ 38,500.00
5	613.06(B)	18" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	120	$ 48.00	$ 5,760.00
6	613.06(B)	48" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	775	$ 220.00	$ 170,500.00
7	613.06(B)	60" C76 CL IV RCP W/ OMNIFLEX GASKETS	LF	300	$ 300.00	$ 90,000.00
8	613.06(S)	TRENCH EXCAVATION	CY	2316	$ 8.00	$ 18,530.22
9	613.06(T)	STANDARD BEDDING MATERIAL	CY	570	$ 20.00	$ 11,399.60
10	619.06(B)	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	$ 25,000.00	$ 25,000.00
11	619.06(B)	PAVEMENT REMOVAL	SY	1593	$ 7.00	$ 11,153.33
					Subtotal	**$ 517,323.16**
					15% Contingency	**$ 77,598.47**
					Subtotal	**$ 594,921.63**
					25% Utility Relocation Contingency	**$ 148,730.41**
					Total	***$ 743,652.04***

City of Sapulpa						
Appendix 5-E. High School Drainage Basin - Problem Area 6 Alternate 1						
ITEM	**ITEM NO.**	**DESCRIPTION**	**UNIT**	**TOTAL**	**UNIT PRICE**	**TOTAL COST**
1	**223.06**	**TEMPORARY SILT FENCE**	**LF**	1210	$ 2.00	$ 2,420.00
2	**411.06(A)**	**PAVEMENT REPLACEMENT**	**SY**	807	$ 45.00	$ 36,300.00
3	**611.06(A)**	**6' I.D. MANHOLE W/ FRAME AND LID**	**EA**	2	$ 3,500.00	$ 7,000.00
4	**611.06(K)**	**SMD INLET**	**EA**	2	$ 3,500.00	$ 7,000.00
5	**611.06(K)**	**4'x4' CURB INLET**	**EA**	2	$ 3,500.00	$ 7,000.00
6	**613.06(B)**	**24" C76 CL IV RCP W/ OMNIFLEX GASKETS**	**LF**	265	$ 70.00	$ 18,550.00
7	**613.06(B)**	**30" C76 CL IV RCP W/ OMNIFLEX GASKETS**	**LF**	75	$ 92.00	$ 6,900.00
8	**613.06(B)**	**36" C76 CL IV RCP W/ OMNIFLEX GASKETS**	**LF**	265	$ 120.00	$ 31,800.00
9	**613.06(S)**	**TRENCH EXCAVATION**	**CY**	662	$ 8.00	$ 5,299.79
10	**613.06(T)**	**STANDARD BEDDING MATERIAL**	**CY**	358	$ 20.00	$ 7,152.60
11	**619.06(B)**	**REMOVAL OF STRUCTURES AND OBSTRUCTIONS**	**LS**	1	$ 10,000.00	$ 10,000.00
12	**619.06(B)**	**PAVEMENT REMOVAL**	**SY**	807	$ 7.00	$ 5,646.67
					Subtotal	**$ 145,069.06**
					15% Contingency	**$ 21,760.36**
					Subtotal	**$ 166,829.42**
					25% Utility Relocation Contingency	**$ 41,707.35**
					Total	***$ 208,536.77***