CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN:
2010 UPDATE
SECTION 9

PLAYA SYSTEM J

9.1 GENERAL

Playa System J drains approximately 3,938 acres in the area studied. The upper end of System J begins near Kent Street, and the system extends generally southeastward to north of 34th Street. The system is bounded roughly by Martin Luther King, Jr. Boulevard near its northwest limits, and extends east of Wood Avenue to the southeast limits of the detailed study area. The area studied includes playa lakes L061, L062, L063, L064, and L066, which were also incorporated into the City of Lubbock's 2007 Flood Insurance Study (2007 FIS) with Zone AE designations. The remaining lakes (L070, L072, L073, L074, and L075) were also covered in the 2007 FIS, however these lakes were not labeled in the 2007 FIS and received only Zone A flood hazard designations. All ten lakes in this playa system were studied for fully-urbanized hydrological conditions for the 1997 City of Lubbock Master Drainage Plan (1997 LMDP).

Playa System J was not re-studied for this 2010 MDP Update. The data and graphics have been imported into this 2010 MDP Update from the 1997 LMDP, and translated to NAD83 coordinates and NAVD88 datum.

System J is comprised of five playa sub-systems, being Sub-system J1 through Sub-system J5, and contains ten individual playa lakes and their associated drainage sub-basins. The overall drainage pattern is southeastward, although individual playas may exhibit other patterns.

Figure 9-1 illustrates the detailed study area for Playa System J as well as its position relative to the City of Lubbock and the City's contour map coverage.

9.2 WESTERN CONTRIBUTING AREAS

There are not any apparent contributing areas located west of the playa system boundary shown in Figure 9-1. The western boundary of Playa System J, as shown in Figure 9-1, is apparently the upstream limit for that playa system.

9.3 PLAYA LAKES

System J contains ten playa lakes for which hydrologic and hydraulic parameters were developed, including the five playas with Zone AE designations listed previously within the limits of the 2007 FIS. Each playa receives storm water runoff from an individual drainage sub-area, or sub-basin. The drainage sub-basin designations and the designated playa lakes associated with each are as follows:

	Sub-basin I.D.	Lake I.D.
Sub-system J1	J101	L062
	J102	L061
	J103	L064
	J104	L066
	J105	L073
	J106	L074
Sub-system J2	J201	L063
Sub-system J3	J301	L070
Sub-system J4	J401	L075
Sub-system J5	J501	L072

Two separate pairs of playa lakes exist in System J wherein each pair behaves as a single playa lake during overflow events for the "downstream" playa in the pair. That is, in each pair, the overflow elevation of the "downstream" playa is higher than the elevation of the intervening ridge between them. The storm event modeled in the study results in an overflow condition for both lakes in each pair. Therefore, each pair of lakes was modeled hydrologically and hydraulically as an individual playa lake, although runoff parameters were developed for each playa's distinct sub-basin. This data may be useful for studying more frequent rainfall events generating less total runoff than that used in the study, or for other purposes. The playa lake pairs exhibiting this behavior are playas L061 and L062, and playas L073 and L074.

Table 9-1 lists the hydrologic characteristics associated with each sub-basin according to the predicted future developed condition of each sub-basin. As indicated, sub-basin drainage areas ranged from approximately 99 acres to about 819 acres. Sub-basin acreages were converted to square miles for use in the HEC-HMS model for the system.

The lag time, or T_{LAG}, indicated for each sub-basin was obtained by calculating the time of concentration for each sub-basin and multiplying that value by 0.6 to derive the T_{LAG}. The resulting value was utilized as each sub-basin's time parameter input for the HEC-HMS model. The table also lists the calculated developed condition runoff curve number for each sub-basin. The curve number, sub-basin area, and T_{LAG}, together with the rainfall data, complete the descriptive hydrologic information necessary to calculate a runoff hydrograph for each sub-basin studied. The peak discharges for the 100-year and 500-year 24-hour storm events for each sub-basin are also included in Table 9-1.

Table 9-2 summarizes the primary results for each playa lake modeled in System J. As noted in Section 1: Introduction to this plan, playa lakes which did not demonstrate overflow under the conditions studied were analyzed only for the natural storage capacity derived from available one-foot interval contour maps. In addition to natural storage capacity analysis, lakes which did exhibit overflow were also analyzed for potential reclamation in the 1997 LMDP, using parameters defined by the City of Lubbock. Therefore, for overflow playas both a natural playa lake predicted water surface elevation and a reclaimed playa lake predicted water surface elevation were calculated for the 1997 LMDP, and are included herein. The elevations described and corresponding peak discharges are listed in Table 9-2. Detailed results for each playa lake are summarized in Table AJ-2 in Appendix A.

In System J, playa lakes L063 and L075 are classified as marginally non-overflow playas. Playa lake L066 is classified as a true non-overflowing playa. The remainder of the playa lakes in System J (L061, L062, L064, L070, L072, L073 and L074) are classified as overflow playas.

9.4 OVERFLOW ROUTES

Overflow routes were analyzed for the 1997 LMDP in HEC-2 open channel water surface profile models from overflow playa lakes downstream to the next playa lake or to the end of the detailed study area as applicable. Analyses were performed for both the natural channel cross-sections condition, and for a simulated effective flow condition. The parameters for the analysis of each condition are detailed in Section 1: Introduction.

Table AJ-3 lists the upstream and downstream playa lakes that form the endpoints for the designated tributary, or overflow reach. The natural playa peak discharge flow rate was used for the natural cross section water surface profile. The reclaimed playa peak discharge flow rate was used for the effective flow water surface profile. Since the width of flow varies in the HEC-2 models, a range of water surface widths within each overflow route is listed for the applicable water surface profile.

In the two instances described above where a pair of playa lakes were modeled as one lake (at lakes L061 and L062, and at lakes L073 and L074), no separate overflow route analysis between the two lakes in each pair was considered. Again, this is because the intervening ridge between each pair of lakes will be submerged before the lake pairs are overflowing as a single lake to the next point downstream.

At playa lake L061, any storm water that overflows out of the lake must currently pass through 36-inch diameter culvert pipes beneath the embankments for the old Panhandle and Santa Fe Railroad track and Municipal Drive. These pipes would be submerged before the water in the lake reaches the apparent overflow crest elevation near the southeastern portion of Lot 5, Lubbock Industrial Park Addition. For the purposes of this study, the effect of the pipes on the overflow conveyance out of lake L061 was not considered. Depending upon a number of factors, the pipes may or may not have the effect of impeding the outflow. This possibility could be examined on an event by event basis, depending on the goals of the study being performed. For this study, only the overland and reservoir routed flow was considered, in order to account for full, “non-artificially" attenuated overflow to playa lake L064. (Note: For similar reasons, runoff flowing into lake L061 from portions of its sub-basin now draining to these pipes was likewise not routed through them.)

At playa lake L063, both the natural and reclaimed overflow rates are less than 25 cubic feet per second, and neither was mapped. However, cross sections and the streamline for the overflow route (TA063J2) were mapped, and the associated HEC-2 models delivered.

Playa lake L066 was deemed a special case due to its location and unusual configuration. This lake is located at the intersection of Loop 289 and U. S. Highway 62-82 Northeast (Idalou Highway). The majority of the available storage in the lake exists on the west side of the intersection where, presumably, borrow material was obtained for construction of the interchange, resulting in a

relatively deep pit configuration. However, some lake storage also exists on both the north and south sides of the intersection, as well as within some of the drainage ditches constructed between frontage roads and main lanes. This results in a configuration which, due to limitations in the contour mapping, makes it difficult to completely account for all available storage associated with the lake. Additionally, examination of Texas Department of Transportation construction drawings and field reconnaissance indicate that this lake could possibly overflow through culverts draining Loop 289 south of the intersection, perhaps in combination with flow along or even over the Loop 289 frontage roads in the same area. Accurate analysis of this possibility would require fairly extensive field survey work to verify elevations, locations, and other data, and together with the modeling necessary to fully depict that information, this was considered to be beyond the scope of this study. As modeled and mapped for this study, playa lake L066 is classified as a marginally non-overflow lake since the predicted peak water surface elevation is approximately 0.5 feet below the presumed overflow elevation for the lake. It is further noted here that the impact of any overflow water leaving lake L066 for any event similar to, or less severe than, this study simulation should be minimal. This is because any such outflow from L066 would probably occur after downstream peak flows have already been realized, and also because the outflow would probably be attenuated somewhat due to the nature of the conveyance.

The downstream limit of the System J detailed study area was set east of Wood Avenue, near the downstream ends of the overflow routes from playas L072 and L074.

9.5 SYSTEM J PLAN MAPS

Figure 9-1 illustrates the detailed study area and sub-basins for System J relative to the City's map coverage. The plan maps which exhibit the results of the master drainage planning process are shown on Figures 9-2 through 9-11.

END

TABLE 9-1
SYSTEM J SUB-BASIN CHARACTERISTICS

Sub-Basin ID	Playa Lake ID	Sub-Basin Area (Acres)	Developed AMCII Runoff Curve Number	T_{LAG} (Hours)	100-Year 24-Hour Peak Local Runoff (CFS)	500-Year 24-Hour Peak Local Runoff (CFS)
Sub-System J1						
J101 & J102	L062 & L061	783	84.4	0.57	2,201	NA
J103	L064	502	79.7	0.34	1,742	NA
J104	L066	339	83.3	0.28	1,424	NA
J105 & J106	L073 & L074	1,375	84.0	0.50	4,164	NA
Sub-System J2						
J201	L063	183	79.6	0.36	617	NA
Sub-System J3						
J301	L070	99	82.9	0.35	364	NA
Sub-System J4						
J401	L075	172	82.8	0.41	574	NA
Sub-System J5						
J501	L072	484	84.0	0.88	1,005	NA

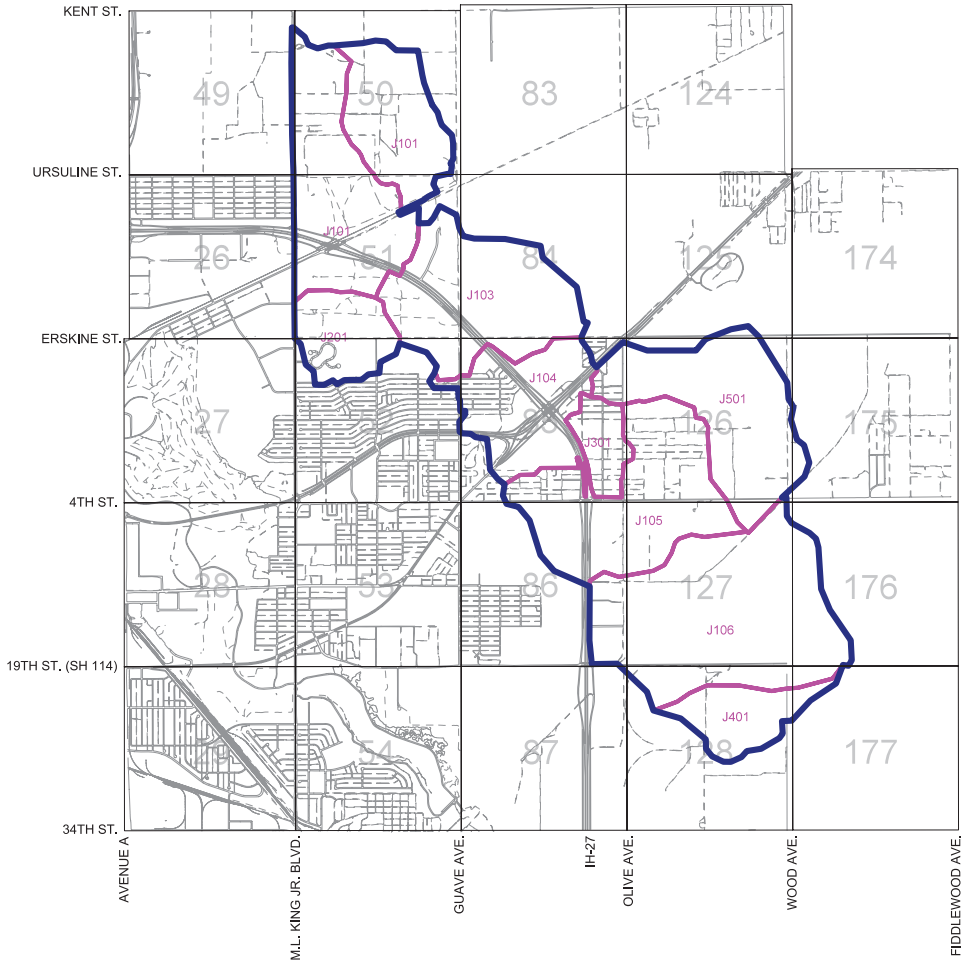
NA - Results not available, analysis not performed in prior studies
Sub-basin J101 and J102 were modeled as a single sub-basin in the 1997 LMDP.
Sub-basin J105 and J106 were modeled as a single sub-basin in the 1997 LMDP.

TABLE 9-2
SYSTEM J PLAYA LAKE RESULTS

Sub-Basin ID	Playa Lake ID	Playa Lake Type	Natural Lake Overflow Elevation (NAVD 88)	100-Year Natural PWSEL (NAVD 88)	100-Year Reclaimed PWSEL (NAVD 88)	500-Year Natural PWSEL (NAVD 88)	100-Year Natural Peak Discharge (CFS)	100-Year Reclaimed Peak Discharge (CFS)	500-Year Natural Peak Discharge (CFS)	Downstream Receiving Playa Lake
Sub-System J1										
J101	L062	Overflow	3210.9	3211.4	3211.9	NA	180	273	NA	L064
J102	L061	Overflow	3210.9	3211.4	3211.9	NA	180	273	NA	L064
J103	L064	Overflow	3198.1	3198.5	3199.1	NA	119	157	NA	L066
J104	L066	True	3195.3	3194.7	NA	NA	0	NA	NA	L070
J105	L073	Overflow	3176.3	3176.9	3177.6	NA	212	321	NA	END
J106	L074	Overflow	3176.3	3176.9	3177.6	NA	212	321	NA	END
Sub-System J2										
J201	L063	Marginal	3214.4	3214.4	NA	NA	12	NA	NA	L064
Sub-System J3										
J301	L070	Overflow	3185.1	3185.9	3186.4	NA	344	365	NA	L073
Sub-System J4										
J401	L075	Marginal	3184.7	3184.4	NA	NA	0	NA	NA	END
Sub-System J5										
J501	L072	Overflow	3174.5	3175.4	3176.0	NA	711	912	NA	END

Natural Overflow Elevations and Natural Predicted Water Surface Elevations were converted from NGVD 29 vertical datum to NAVD 88 by the conversion factor +1.26'
PWSEL = Predicted Water Surface Elevation
NA - Results not available, analysis not performed in prior studies
Playa lakes L061 and L062 function as a single lake.
Playa lakes L073 and L074 function as a single lake.
Playa Lake Type Refers To: True Non-Overflow, Marginal Non-Overflow, Overflow Classifications in the City of Lubbock Drainage Criteria Manual

PLAYA SYSTEM J



LEGEND

Study Area Limits 1997 MDP — Sub-Basin Limits 1997 MDP

J101 Sub-Basin ID

N

2000' 1000' 0 2000' 4000' 8000'

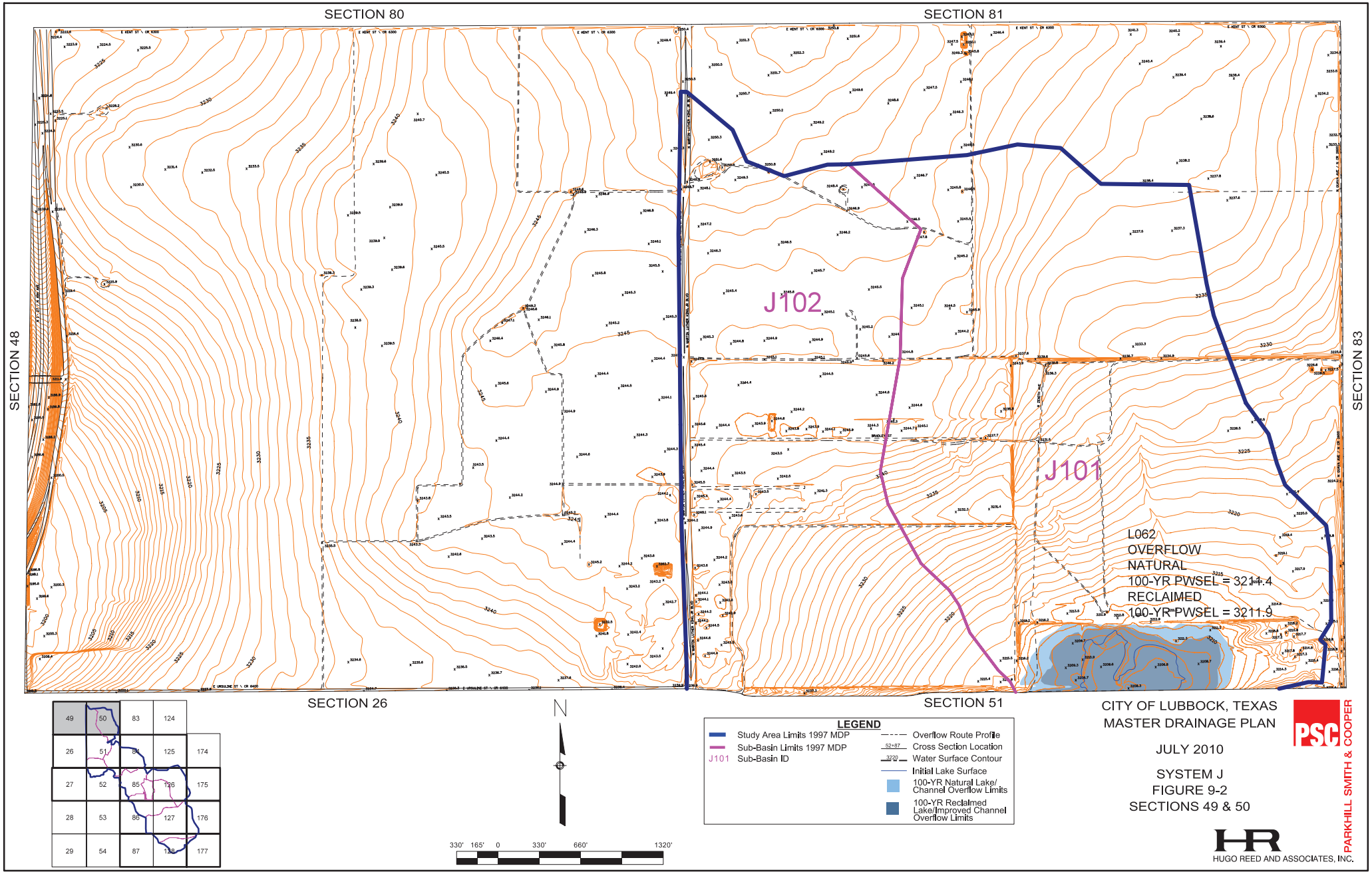
CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-1

PSC PARKHILL SMITH & COOPER

HR HUGO REED AND ASSOCIATES, INC.



CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-2
SECTIONS 49 & 50

PSC
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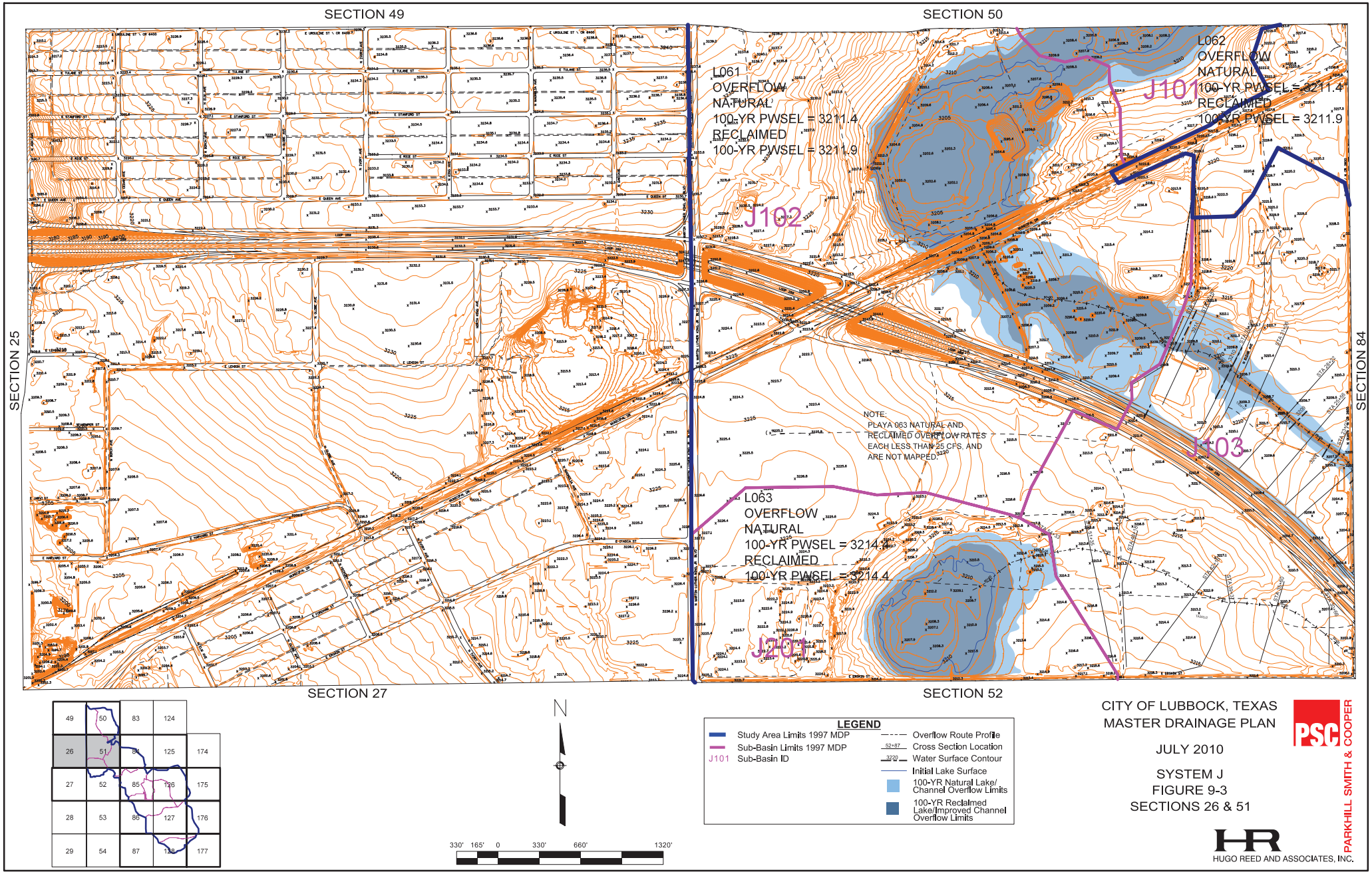
HUGO REED AND ASSOCIATES, INC.



CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-3
SECTIONS 26 & 51

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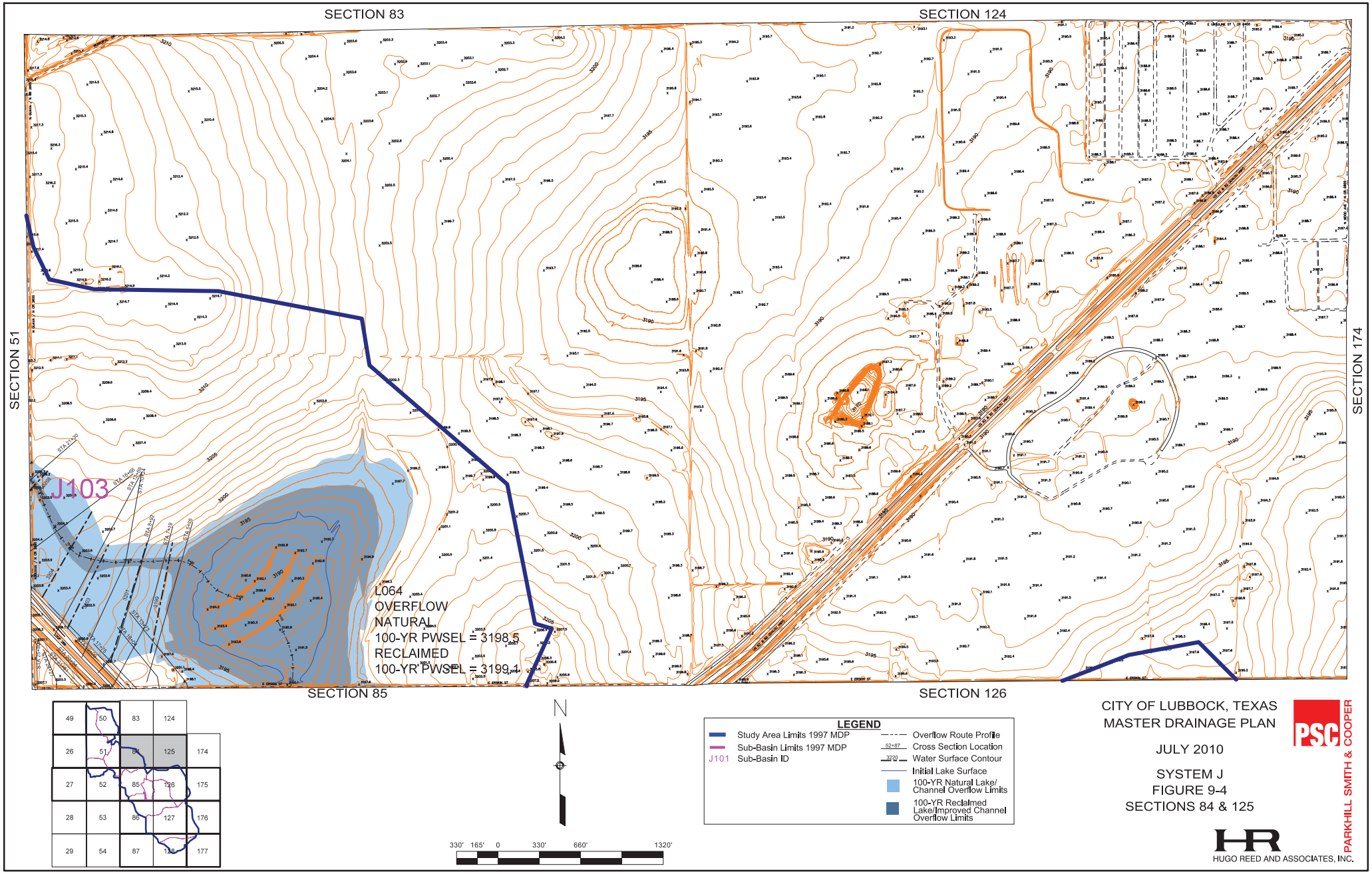
HUGO REED AND ASSOCIATES, INC.



CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-4
SECTIONS 84 & 125

PSC
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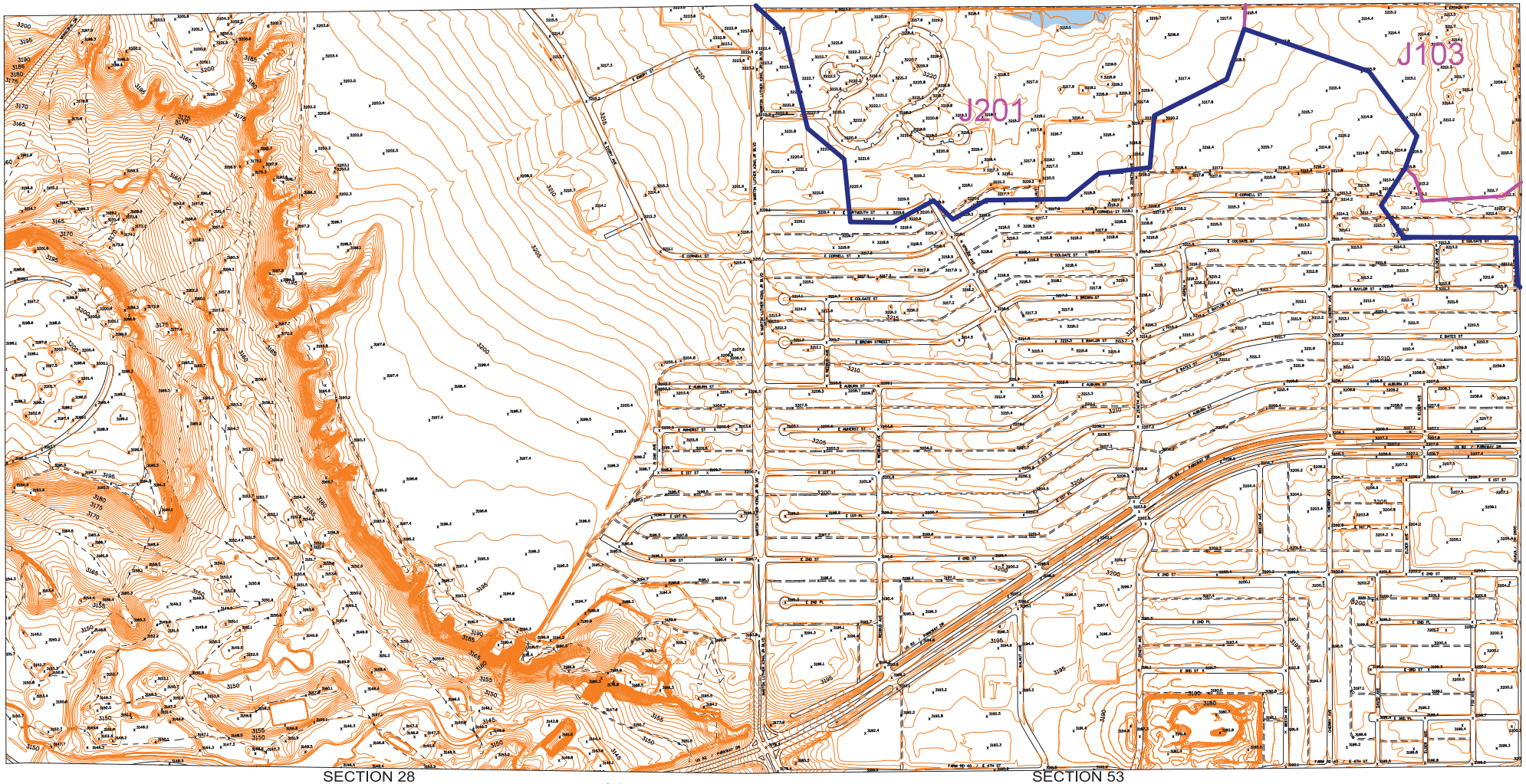

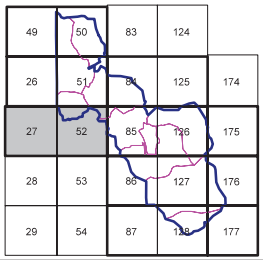

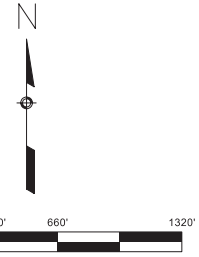

LEGEND

- Study Area Limits 1997 MDP
- Sub-Basin Limits 1997 MDP
- J101 Sub-Basin ID
- Overflow Route Profile
- 52+87 Cross Section Location
- 3220 Water Surface Contour
- Initial Lake Surface
- 100-YR Natural Lake/ Channel Overflow Limits
- 100-YR Reclaimed Lake/Improved Channel Overflow Limits

CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-5
SECTIONS 27 & 52

PSC
PARKHILL SMITH & COOPER

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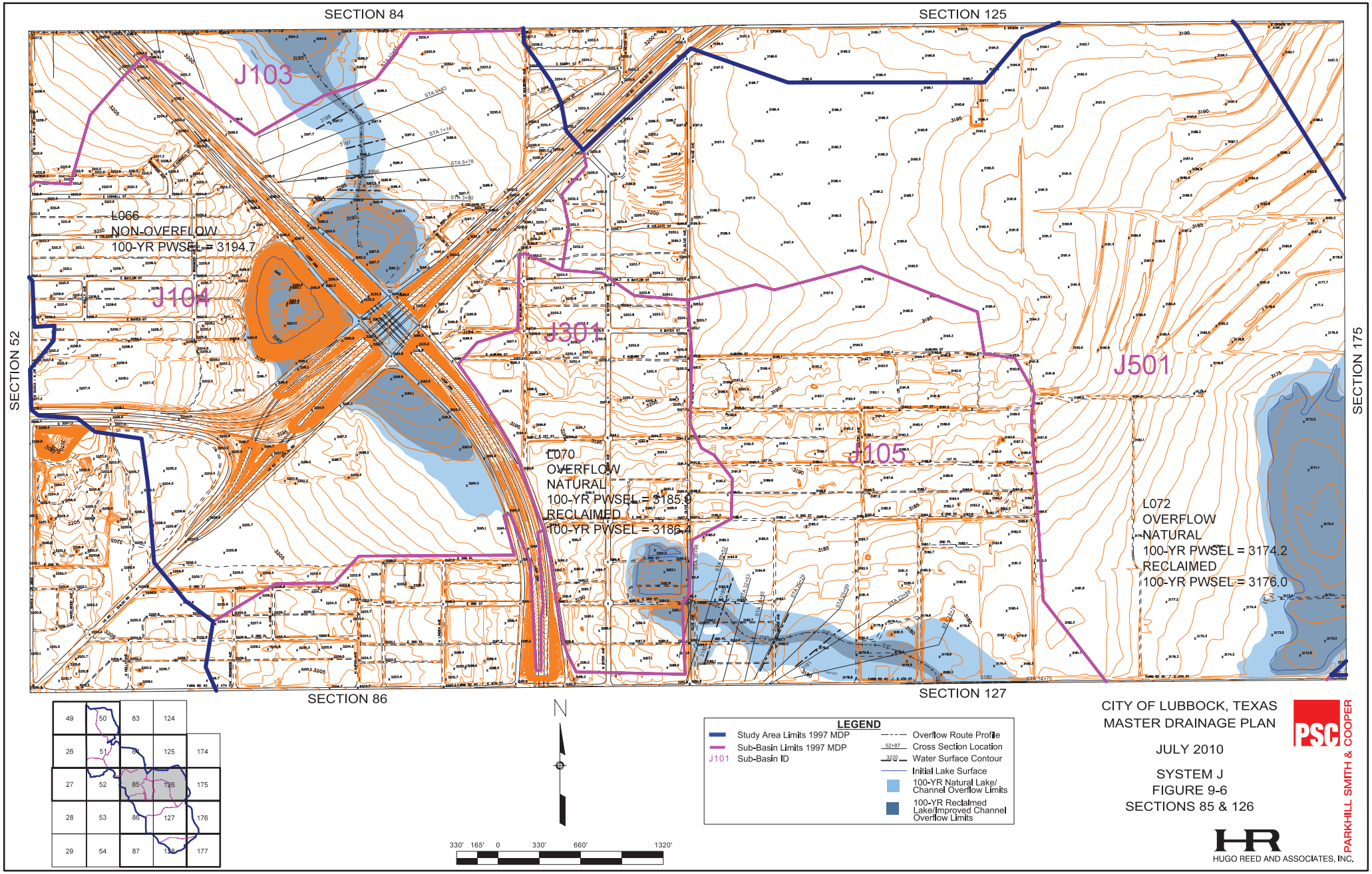
HUGO REED AND ASSOCIATES, INC.



CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-6
SECTIONS 85 & 126

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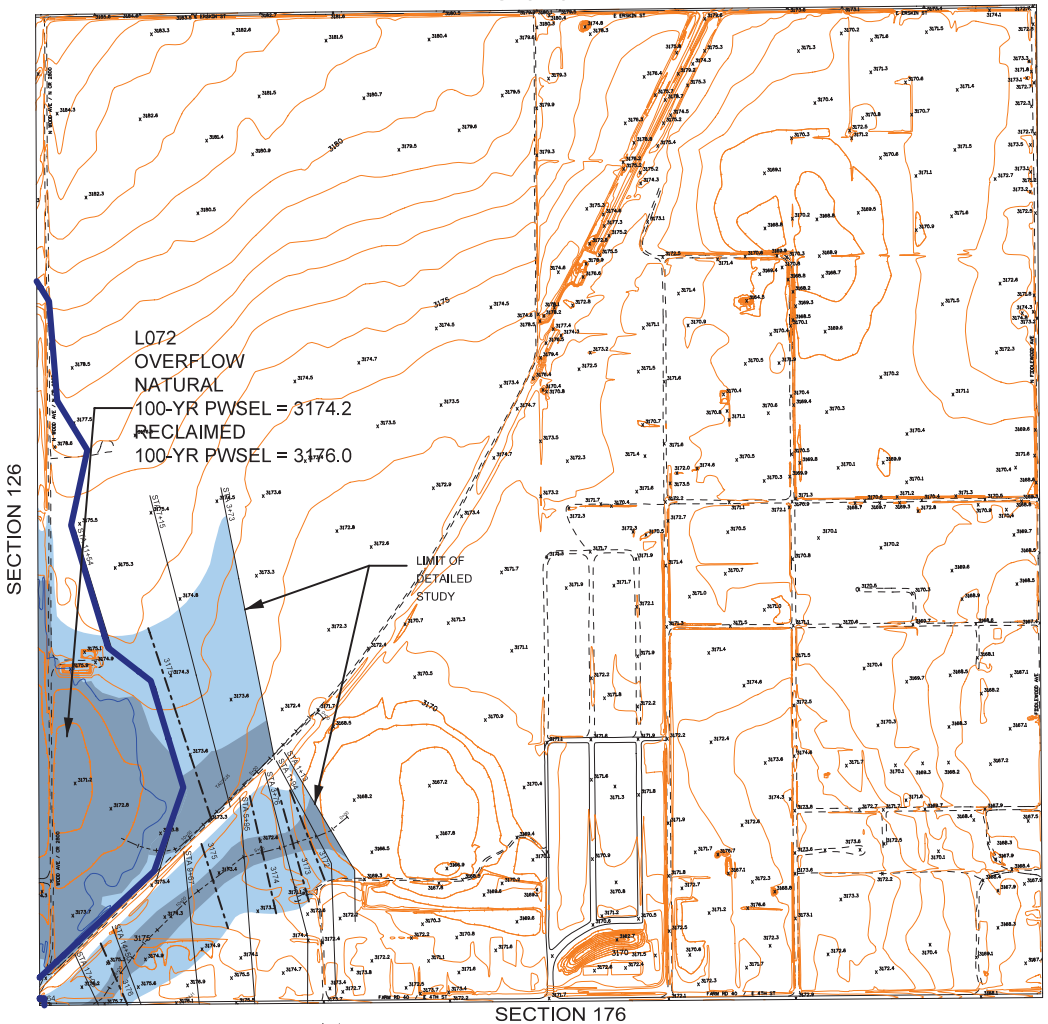
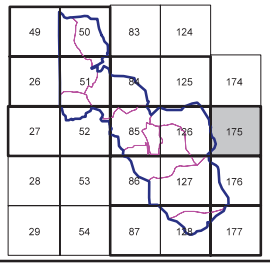
SECTION 174



SECTION 126

SECTION 232

SECTION 176



N

330' 165' 0 330' 660' 1320'

LEGEND

- Study Area Limits 1997 MDP
- Sub-Basin Limits 1997 MDP
- J101 Sub-Basin ID
- Overflow Route Profile
- 52+87 Cross Section Location
- 3220 Water Surface Contour
- Initial Lake Surface
- 100-YR Natural Lake/ Channel Overflow Limits
- 100-YR Reclaimed Lake/Improved Channel Overflow Limits

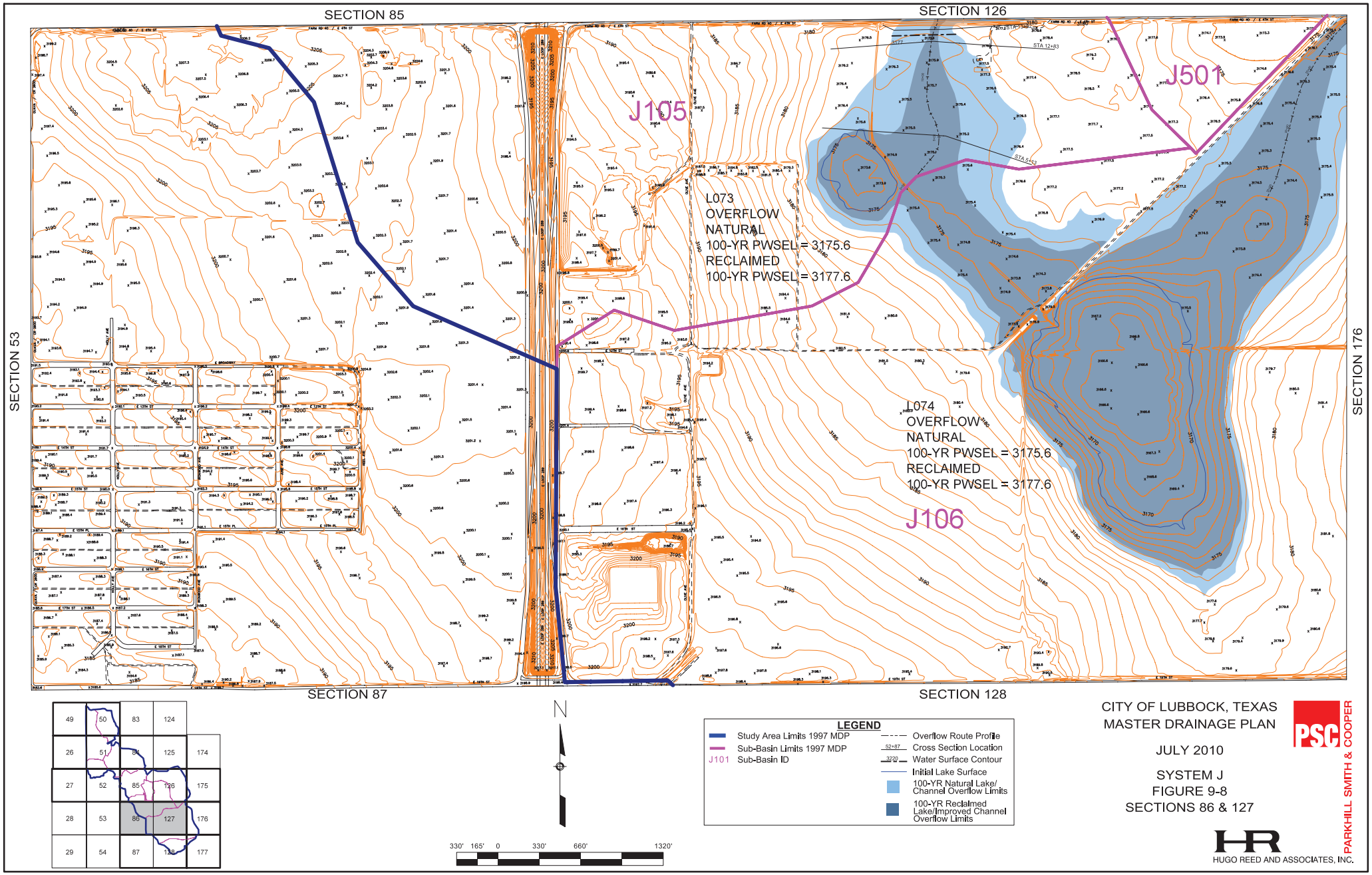
CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-7
SECTION 175

PSC PARKHILL SMITH & COOPER

HR HUGO REED AND ASSOCIATES, INC.



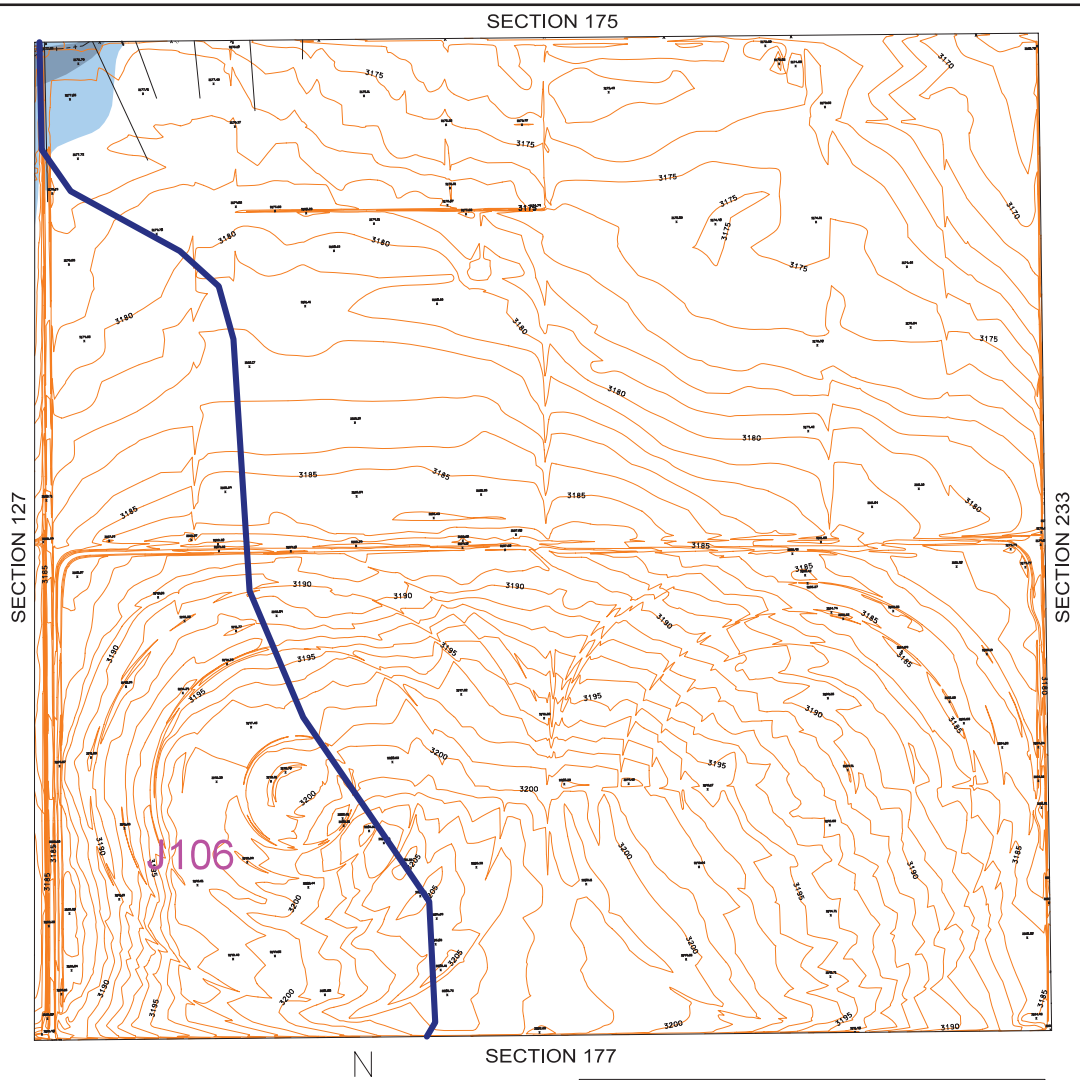
CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

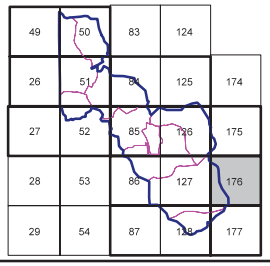
JULY 2010

SYSTEM J
FIGURE 9-8
SECTIONS 86 & 127

PSC PARKHILL SMITH & COOPER

HR HUGO REED AND ASSOCIATES, INC.





N

330' 165' 0 330' 660' 1320'

LEGEND

- Study Area Limits 1997 MDP
- Sub-Basin Limits 1997 MDP
- J101 Sub-Basin ID
- Overflow Route Profile
- 52+87 Cross Section Location
- 3220 Water Surface Contour
- Initial Lake Surface
- 100-YR Natural Lake/ Channel Overflow Limits
- 100-YR Reclaimed Lake/Improved Channel Overflow Limits

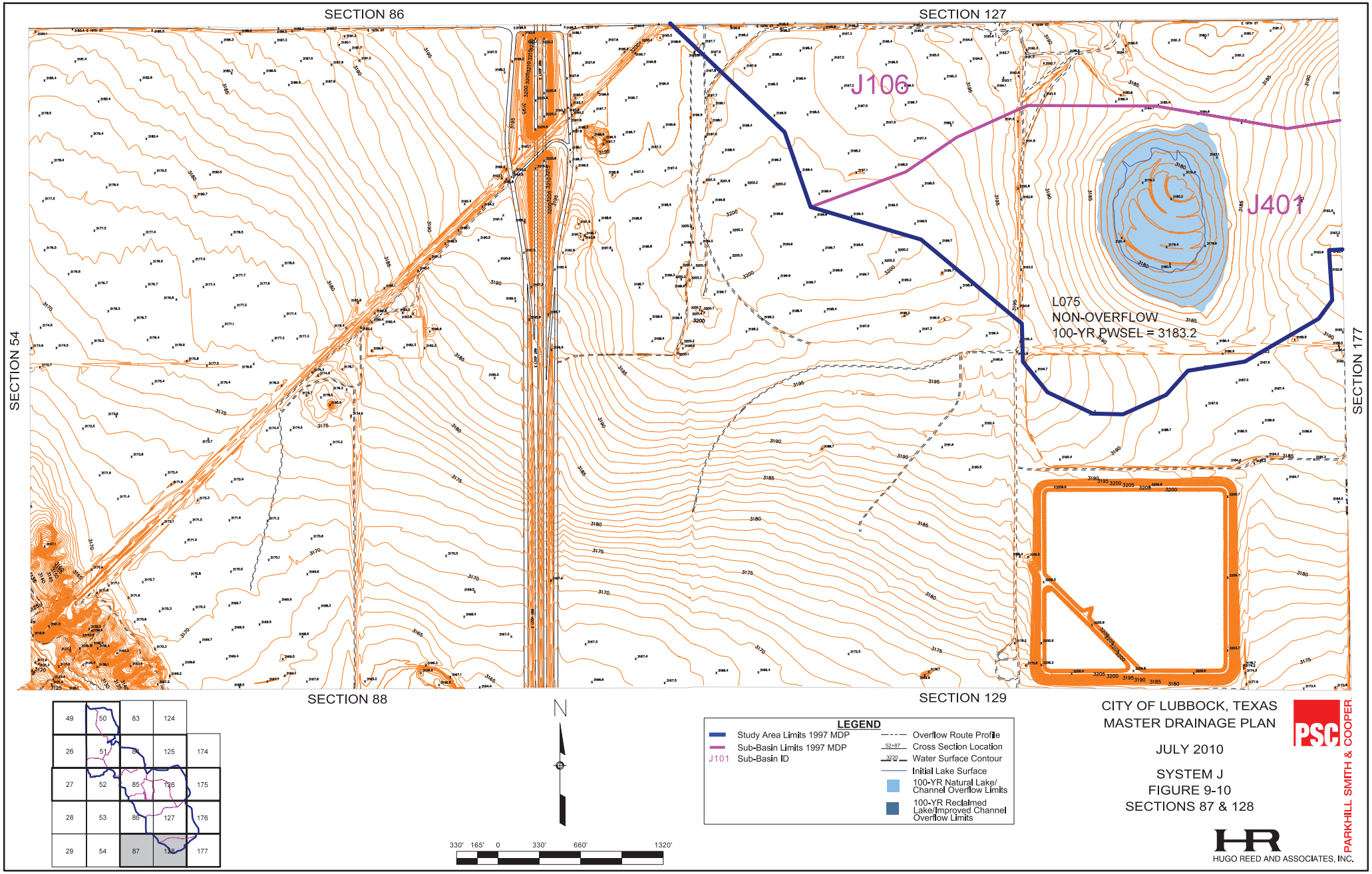
CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-9
SECTION 176

PSC PARKHILL SMITH & COOPER

HR HUGO REED AND ASSOCIATES, INC.



CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-10
SECTIONS 87 & 128

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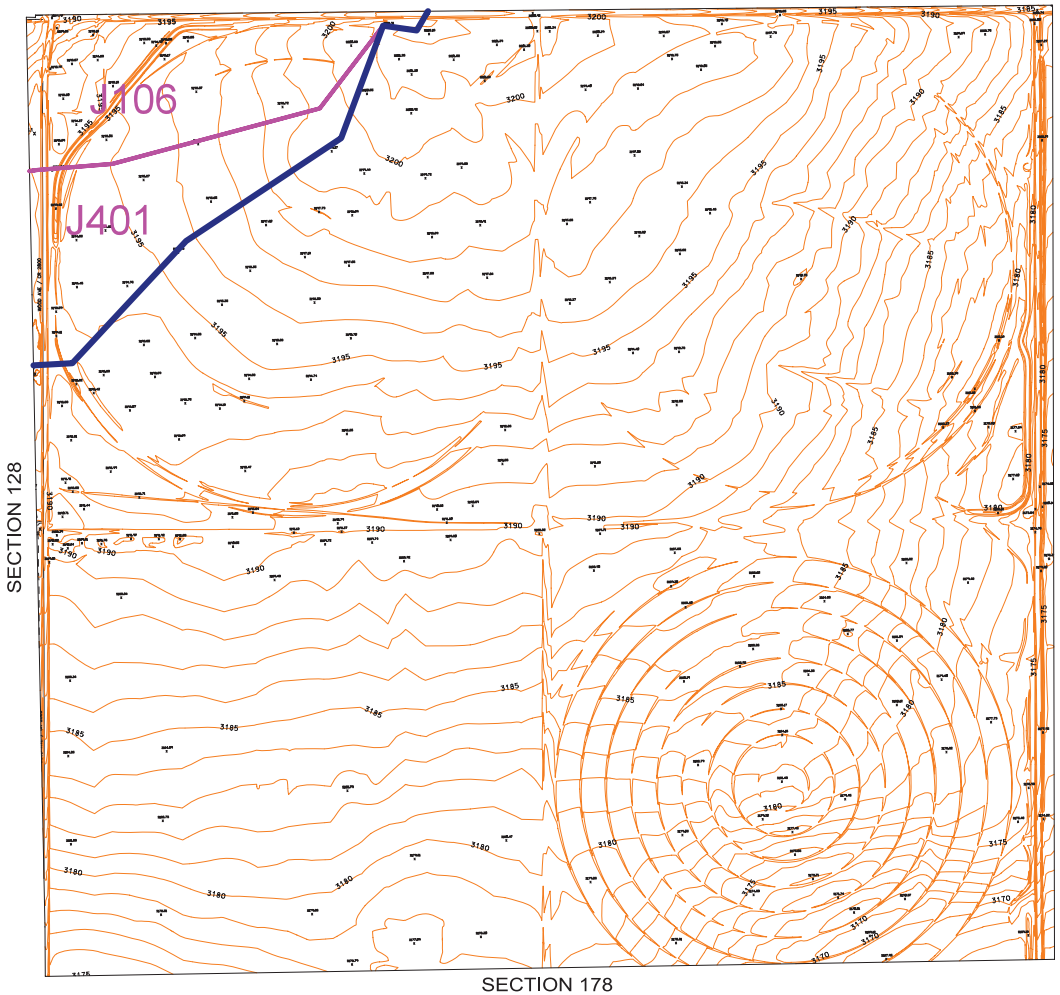
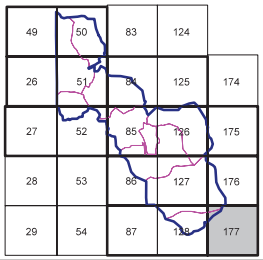
SECTION 176



SECTION 128

SECTION 234

SECTION 178



N

330' 165' 0 330' 660' 1320'

LEGEND

- Study Area Limits 1997 MDP
- Sub-Basin Limits 1997 MDP
- J101 Sub-Basin ID
- Overflow Route Profile
- 52+87 Cross Section Location
- 3220 Water Surface Contour
- Initial Lake Surface
- 100-YR Natural Lake/ Channel Overflow Limits
- 100-YR Reclaimed Lake/Improved Channel Overflow Limits

CITY OF LUBBOCK, TEXAS
MASTER DRAINAGE PLAN

JULY 2010

SYSTEM J
FIGURE 9-11
SECTION 177

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APPENDIX A FOR SYSTEM J

TABLE AJ-1
SYSTEM J RUNOFF CHARACTERISTICS

Sub-Basin ID	Lake ID	Sub-Basin Area (Acres)	Developed AMCII Runoff Curve Number	Time of Concentration (Hours)	T_{LAG} (Hours)	100-Year 24-Hour Rainfall Depth (Inches)	100-Year 24-Hour Runoff Depth (Inches)	Peak Inflow to Lake (CFS)
Sub-System J1								
J101 & J102	L602 & L061*	783	84.4	0.95	0.57	6.80	4.99	2,201.0
J103	L064	502	79.7	0.57	0.34	6.80	4.48	1,742.0
J104	L066	339	83.3	0.47	0.28	6.80	4.87	1,424.0
J105 & J106	L073 & L074*	1,375	84.0	0.83	0.50	6.80	4.95	4,176.0
Sub-System J2								
J201	L063	183	79.6	0.60	0.36	6.80	4.47	617.0
Sub-System J3								
J301	L070	99	82.9	0.58	0.35	6.80	4.83	364.0
Sub-System J4								
J401	L075	172	82.8	0.68	0.41	6.80	4.82	574.0
Sub-System J5								
J501	L072	485	84.0	1.47	0.88	6.80	4.95	1,005.0

TABLE AJ-2
SYSTEM J PLAYA LAKE RESULTS

Sub-Basin ID	Lake ID	Natural Overflow Elevation (NAVD 88)	Natural Storage to Natural Overflow Elevation (Ac. Ft.)	Initial Condition Runoff Volume (Ac. Ft.)	Lake Full to Overflow at Initial Condition (Yes/No)	100-year, 24-hour Runoff Volume (Ac. Ft.)	Total Runoff (Ac. Ft.)	True Non-Overflow, Marginal Non-Overflow, or Overflow	Natural Lake Predicted Water Surface Elevation (NAVD 88)	Reclaimed Lake Predicted Water Surface Elevation (NAVD 88)	Overflow Volume (Ac. Ft.)	Downstream Receiving Lake
Sub-System J1												
J101 & J102	L061 & L062*	3210.9	273.6	91.3	No	325.6	416.9	Overflow	3211.4	3211.9	143.3	L064
J103	L064	3198.1	254.2	58.6	No	187.4	246.0	Overflow	3198.5	3199.1	0.0	L066
J104	L066	3195.3	342.0	39.6	No	137.6	177.2	True	3194.7	NA	0.0	L070
J105 & J106	L073 & L074*	3176.3	503.7	160.4	No	567.2	727.6	Overflow	3176.9	3177.6	223.9	END
Sub-System J2												
J201	L063	3214.4	85.4	21.3	No	68.2	89.5	Marginal	3214.4	NA	4.1	L064
Sub-System J3												
J301	L070	3185.1	4.2	11.6	Yes**	39.8	51.4	Overflow	3185.9	3186.4	47.2	L073
Sub-System J4												
J401	L075	3184.7	95.3	20.0	No	69.1	89.1	Marginal	3184.4	NA	0.0	END
Sub-System J5												
J501	L072	3174.5	55.5	56.5	Yes**	200.1	256.6	Overflow	3175.4	3176.0	201.1	END

* Playa Lake L061 and L062 act as a single lake for the 100-year 24-hour storm event

* Playa Lake L073 and L074 act as a single lake for the 100-year 24-hour storm event

** If initial condition runoff volume exceed playa storage capacity, then the playa lake was considered as simply being full at the beginning of the 100-year storm event. The volume of initial condition runoff in excess of playa lake storage volume was discarded. Therefore, 100 percent of the 100-year 24-hour runoff volume overflowed to the next downstream playa lake.

TABLE AJ-3
SYSTEM J OVERFLOW ROUTE RESULTS

Upstream Playa Lake ID	Downstream Playa Lake ID	Tributary Reach ID (Overflow Route)	Natural Playa Peak Discharge 100-Year 24-Hour (CFS)	Natural Cross Section Flow Width Range (Feet)	Reclaimed Playa Peak Discharge 100-Year 24-Hour (CFS)	Effective Flow Analysis Width Range (Feet)
L061 & L602	L064	TA061J1	180	155-908	273	50-473
L063	L064	TA063J2	12	N.M*	13	N.M.*
L064	L066	TA064J1	119	198-547	157	50-140
L070	L073	TA070J3	344	369-1,470	365	85-475
L073 & L074	END	TA074JA	212	38-733	321	100-390
L072	END	TA072J5	711	1,084-1,316	912	204-398

* N.M. - Not Meaningful, therefore not mapped