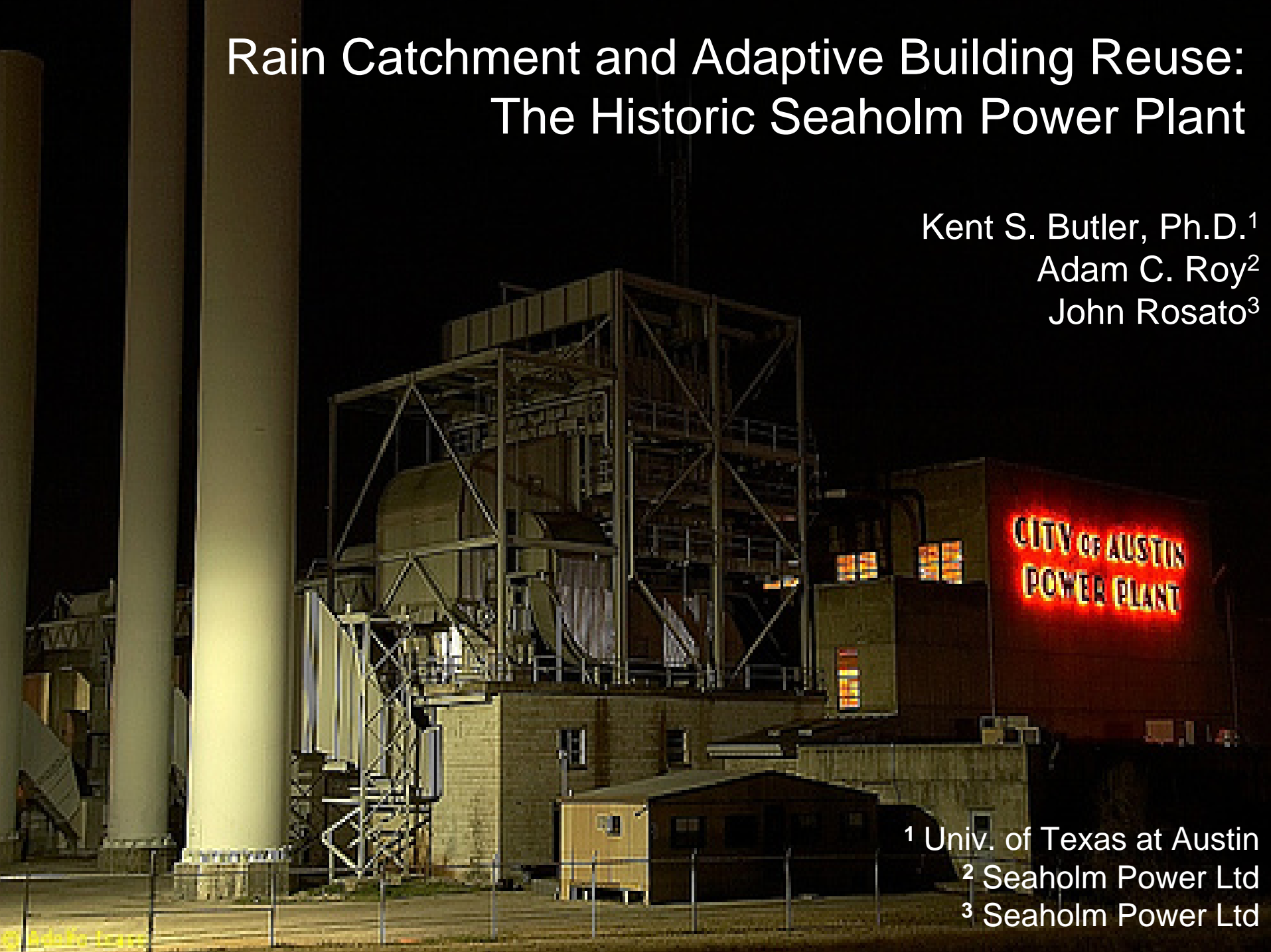


Rain Catchment and Adaptive Building Reuse: The Historic Seaholm Power Plant

Kent S. Butler, Ph.D.¹

Adam C. Roy²

John Rosato³



¹ Univ. of Texas at Austin

² Seaholm Power Ltd

³ Seaholm Power Ltd

Seaholm Power Plant

**Seaholm
Power Plant**

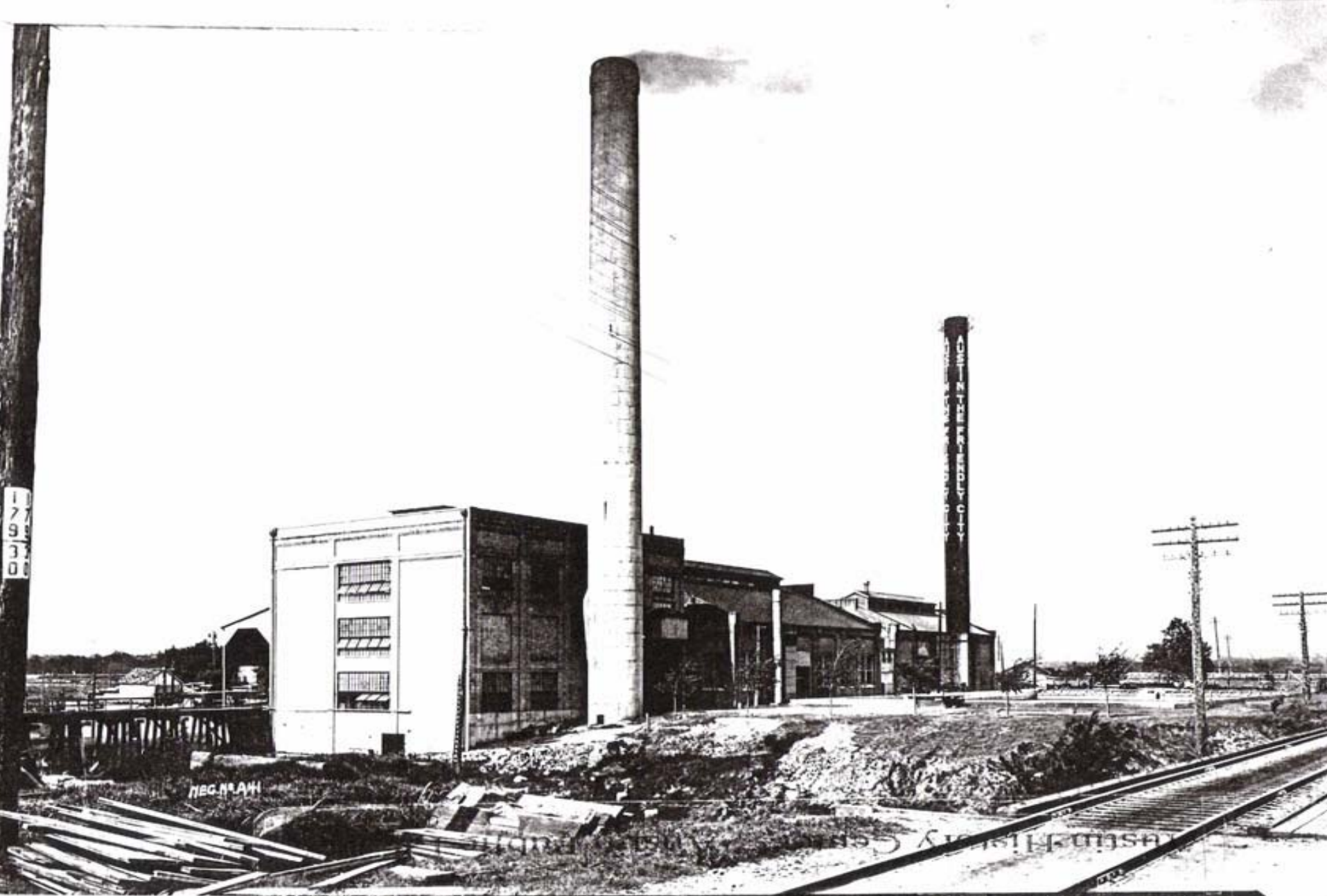
**Austin Central
Business District**

**Town Lake
(Colorado River)**

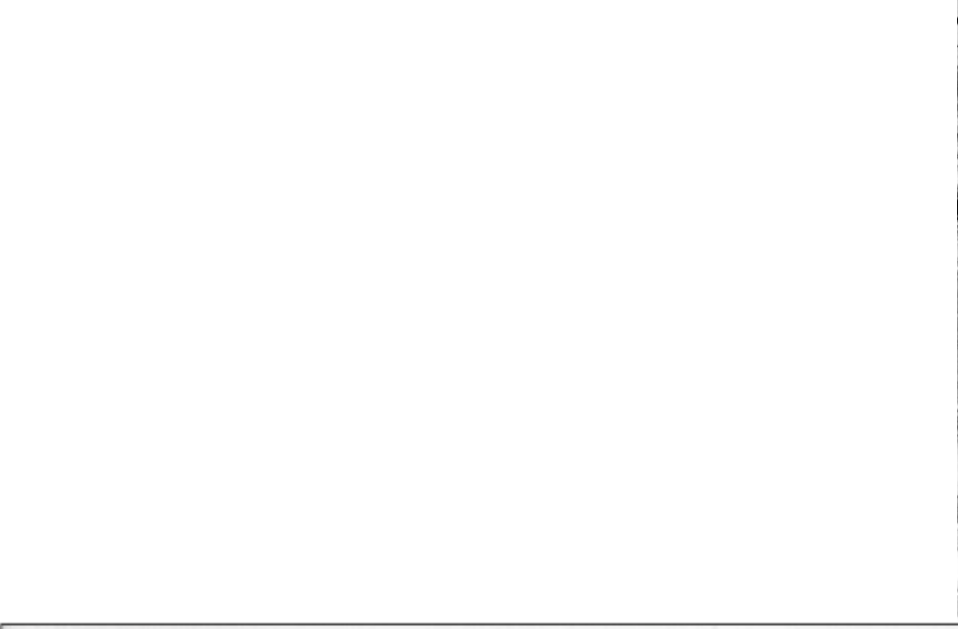




DOWNTOWN AUSTIN, 2006



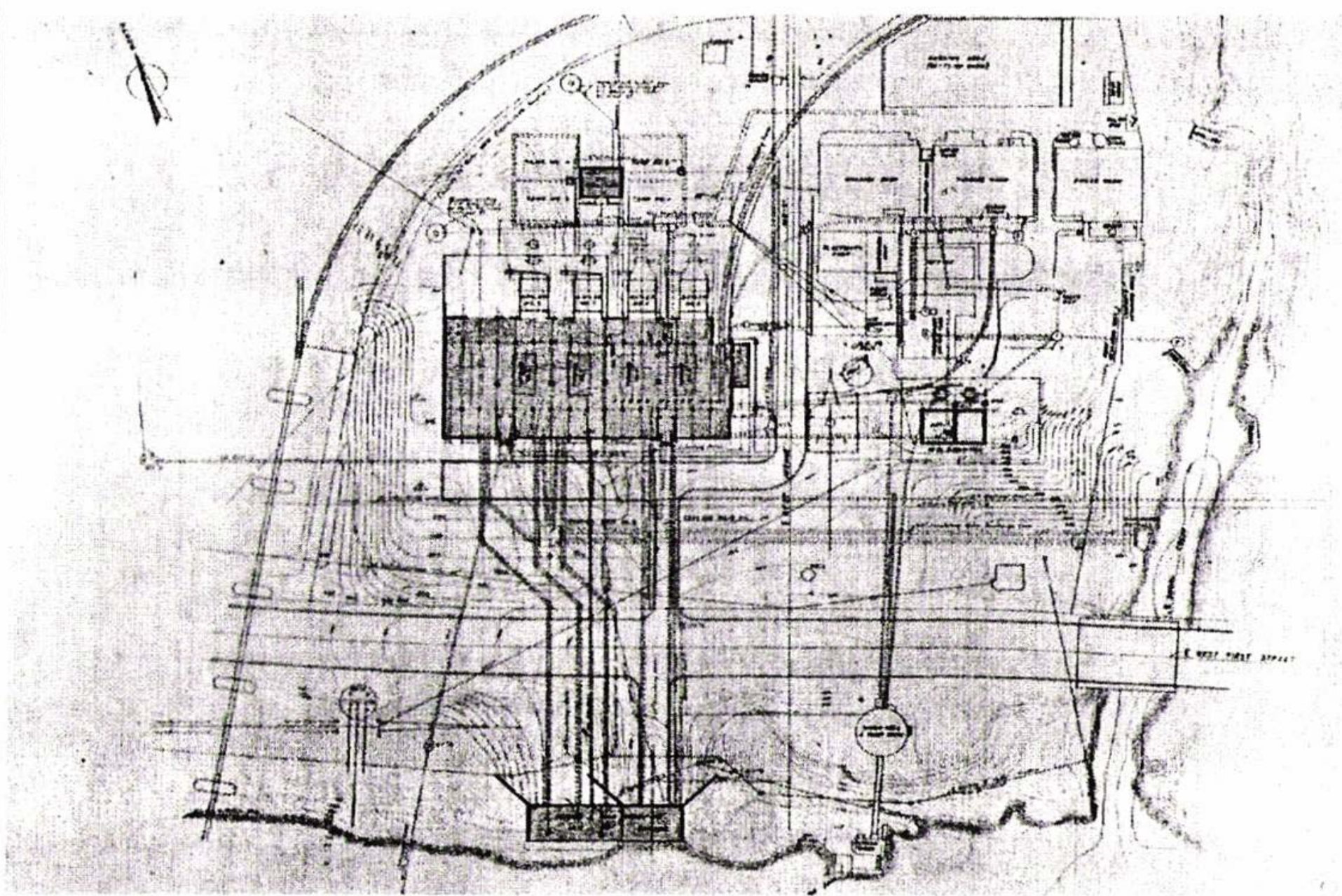
THE FIRST AUSTIN POWER PLANT, 1893



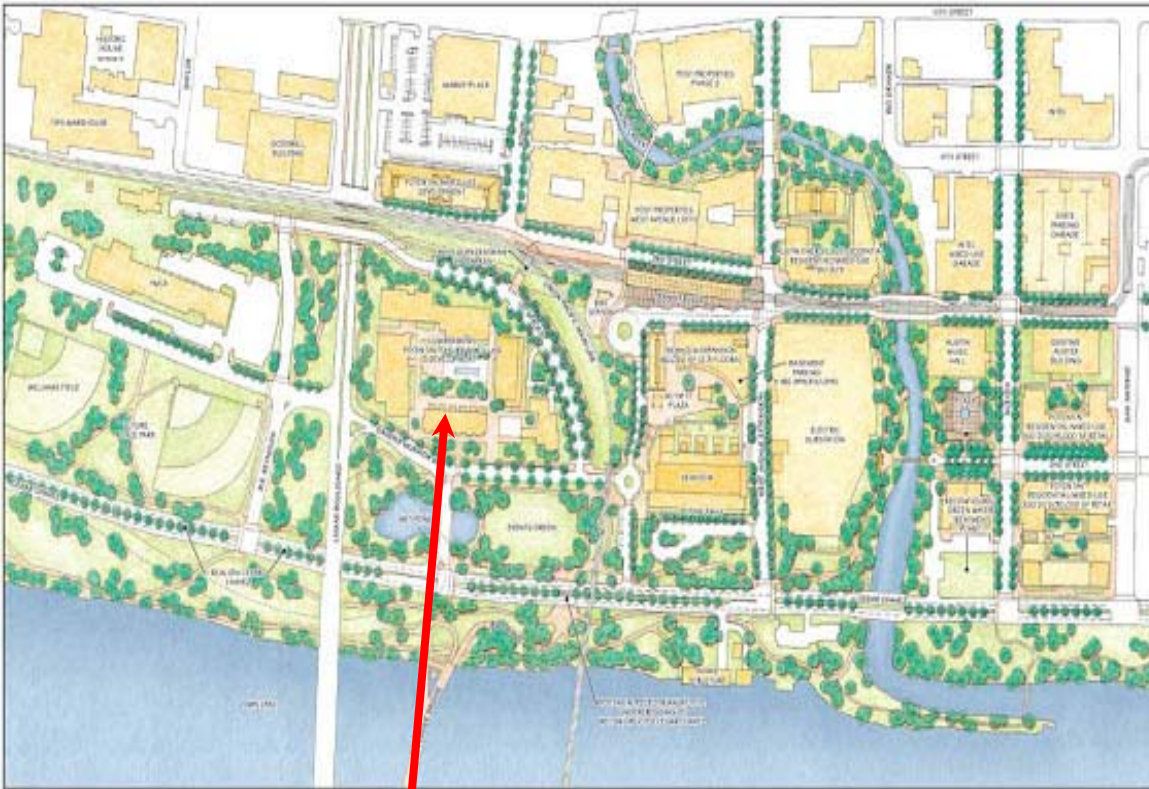
Seaholm Power Plant at Full-scale Production, late 1950s



POWER PLANT SITE REMEDIATED, 2006



ORIGINAL SITE PLAN DRAWING, LATE 1940s



SEAHOLM DISTRICT
MASTER PLAN, 2000





TURBINE HALL SCHEME -- SECTION



West Side Entry

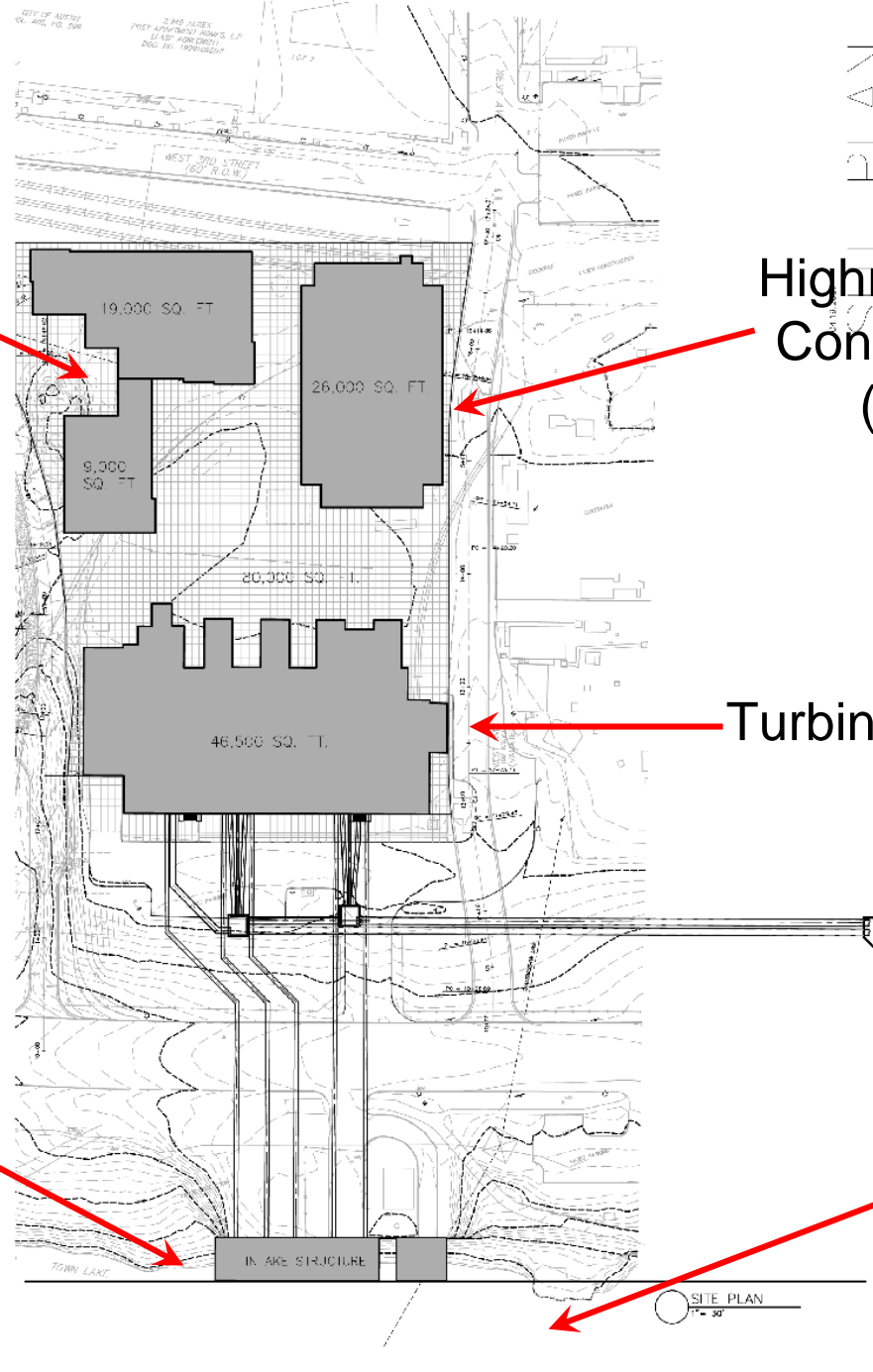
Office Building
(NEW)

Highrise Hotel/ Condominium (NEW)

- Turbine Building

Water Intake & Pumphouse

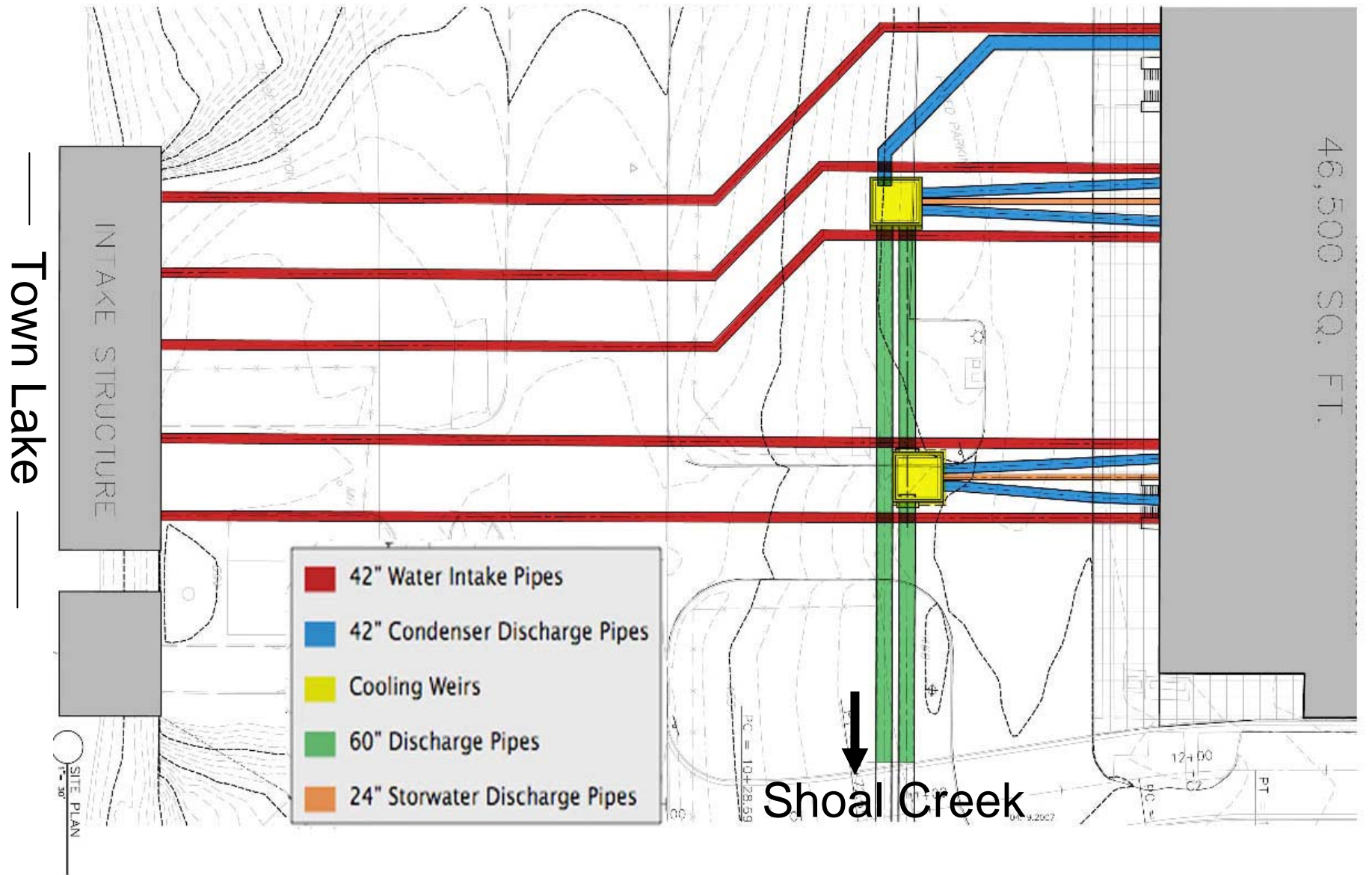
Town Lake

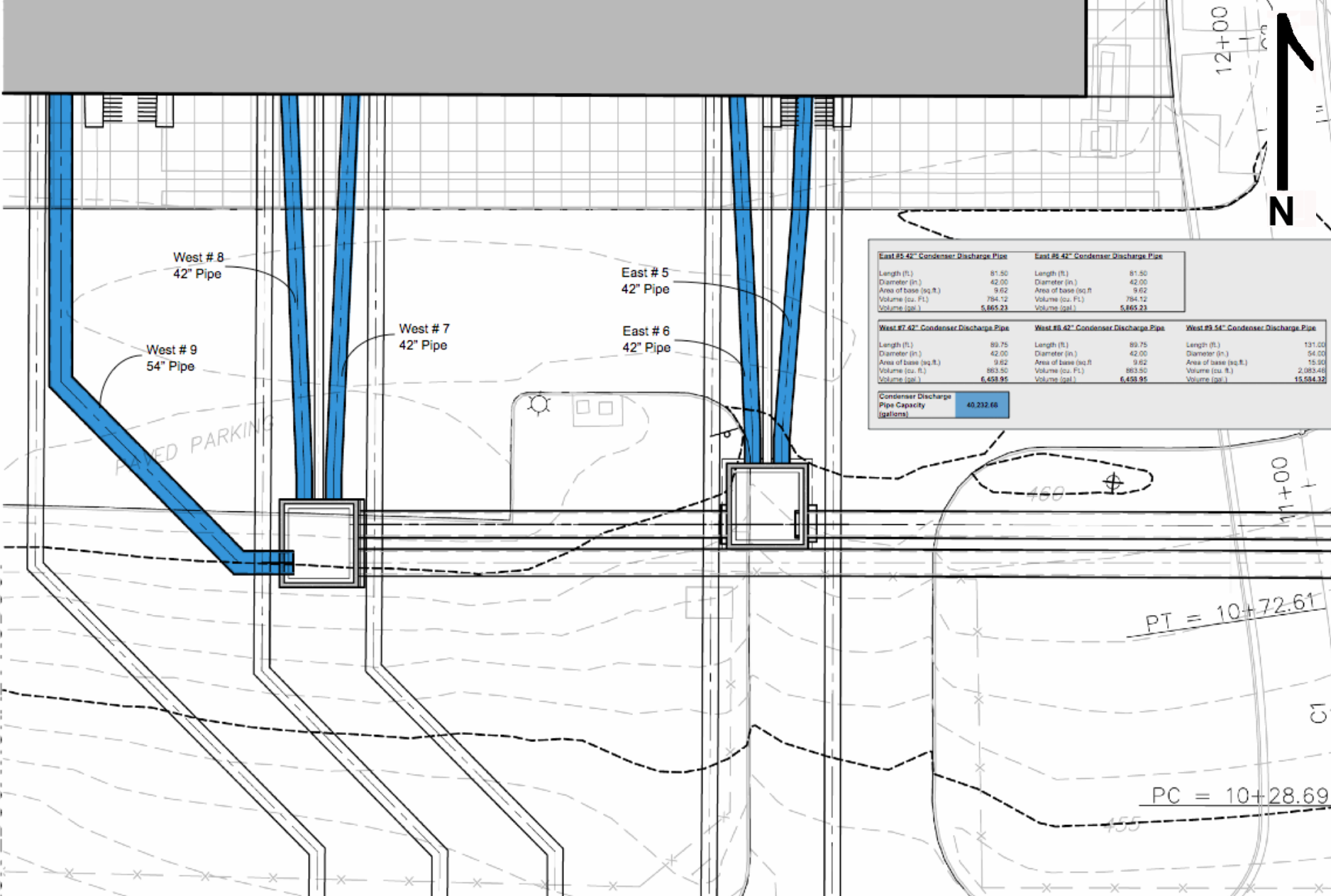




Years to Achieve Return on Investment				
	Water Price Inflation (%)			
Scenario	2	3	4	5
A	29	23	20	19
B	27	21	20	18
C	34	29	26	22
D	46	36	30	27

FEASIBILITY STUDY: PAYBACK PERIODS





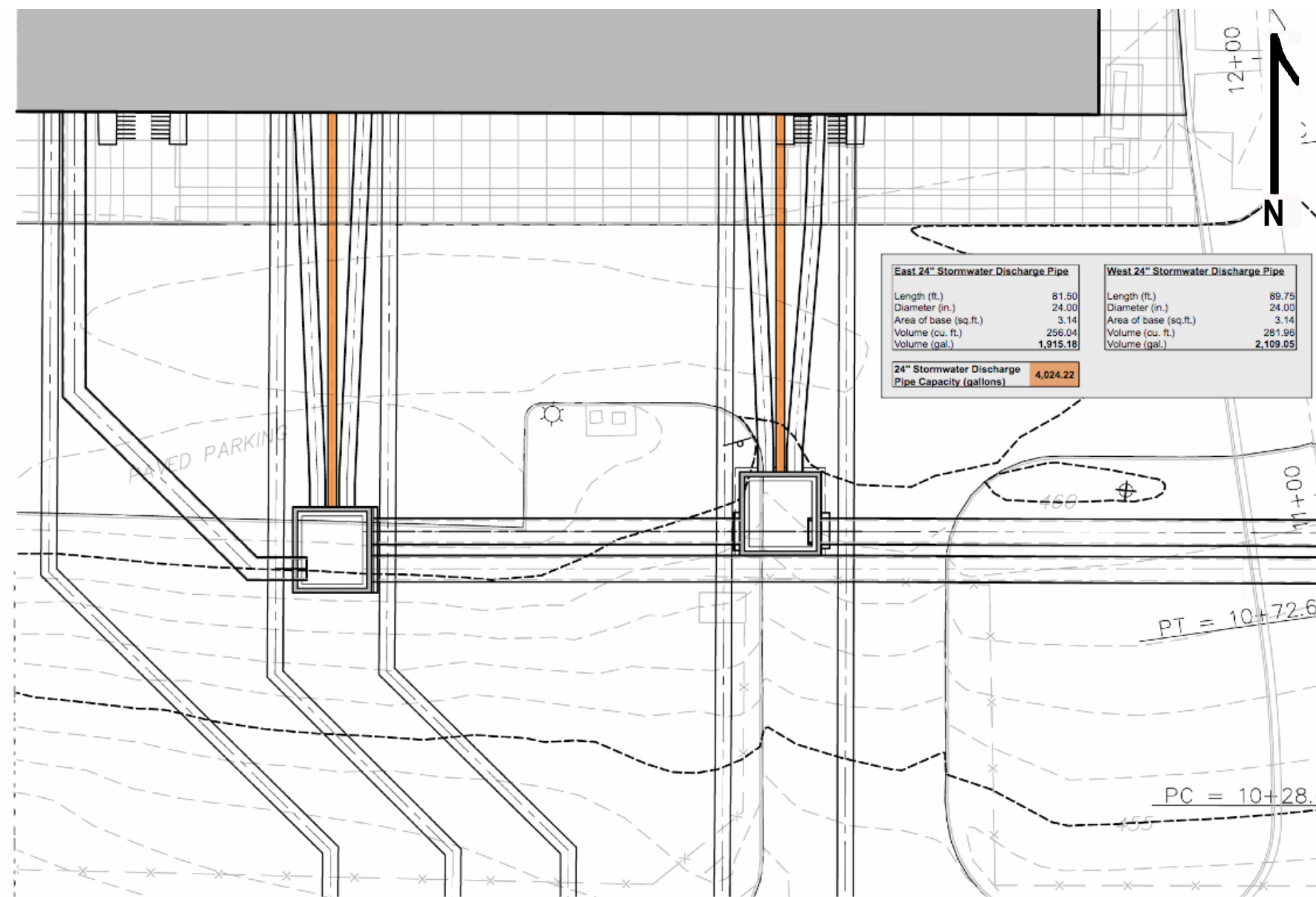
East #5 42" Condenser Discharge Pipe				East #6 42" Condenser Discharge Pipe			
Length (ft.)	81.50	Length (ft.)	81.50	Length (ft.)	81.50	Length (ft.)	81.50
Diameter (in.)	42.00	Diameter (in.)	42.00	Diameter (in.)	42.00	Diameter (in.)	42.00
Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62
Volume (cu. ft.)	784.12	Volume (cu. ft.)	784.12	Volume (cu. ft.)	784.12	Volume (cu. ft.)	784.12
Volume (gal.)	5,865.23	Volume (gal.)	5,865.23	Volume (gal.)	5,865.23	Volume (gal.)	5,865.23

West #7 42" Condenser Discharge Pipe				West #8 42" Condenser Discharge Pipe				West #9 54" Condenser Discharge Pipe			
Length (ft.)	89.75	Length (ft.)	89.75	Length (ft.)	89.75	Length (ft.)	89.75	Length (ft.)	131.00	Length (ft.)	131.00
Diameter (in.)	42.00	Diameter (in.)	42.00	Diameter (in.)	42.00	Diameter (in.)	42.00	Diameter (in.)	54.00	Diameter (in.)	54.00
Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	9.62	Area of base (sq.ft.)	15.90	Area of base (sq.ft.)	15.90
Volume (cu. ft.)	863.50	Volume (cu. ft.)	863.50	Volume (cu. ft.)	863.50	Volume (cu. ft.)	863.50	Volume (cu. ft.)	2,083.48	Volume (cu. ft.)	2,083.48
Volume (gal.)	6,458.95	Volume (gal.)	6,458.95	Volume (gal.)	6,458.95	Volume (gal.)	6,458.95	Volume (gal.)	15,584.32	Volume (gal.)	15,584.32

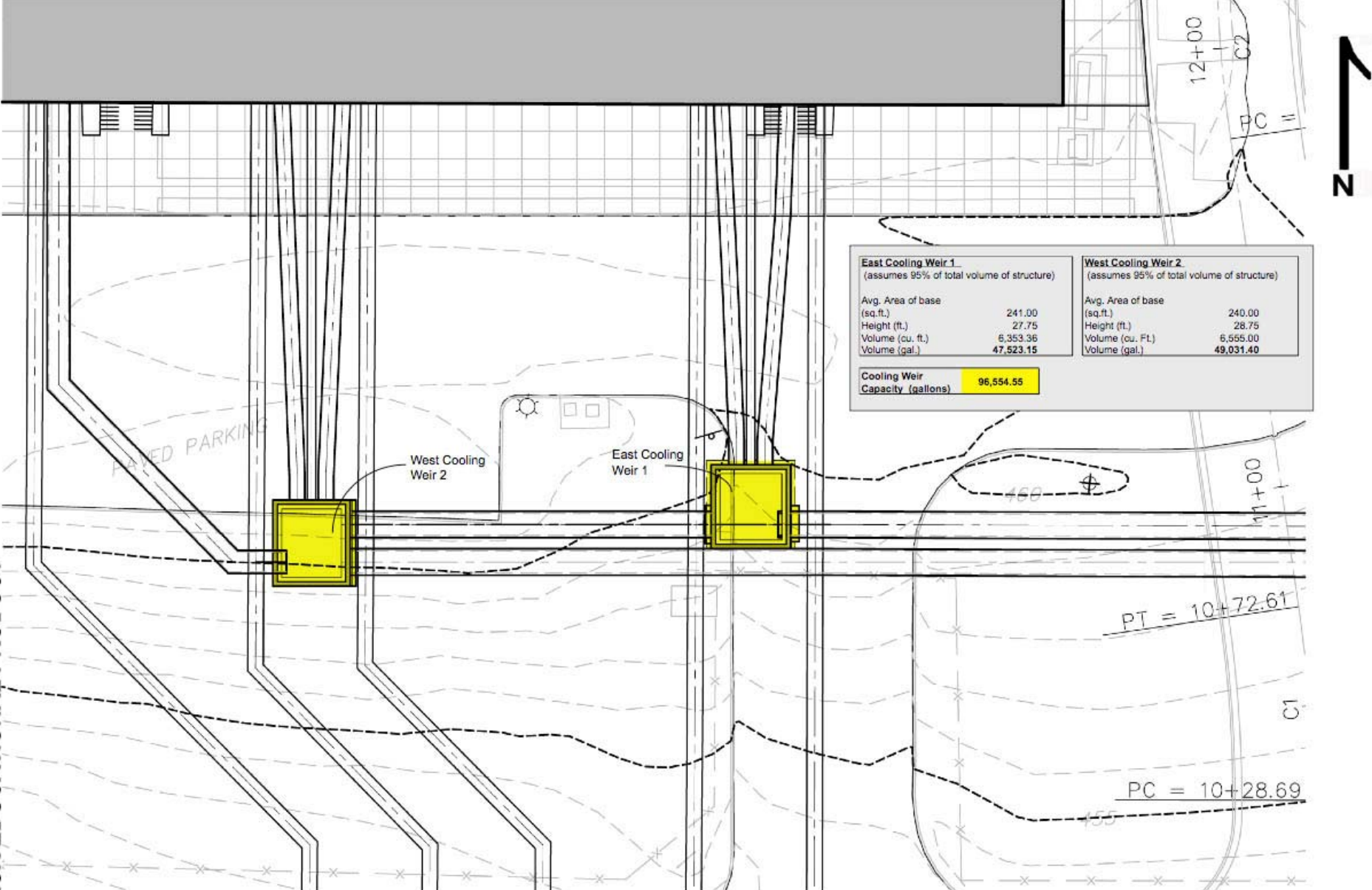
Condenser Discharge Pipe Capacity (gallons)	40,232.66
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CONDENSER DISCHARGE PIPES

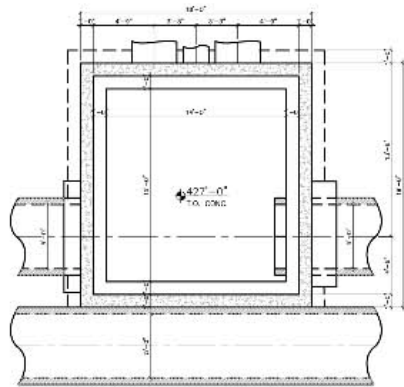




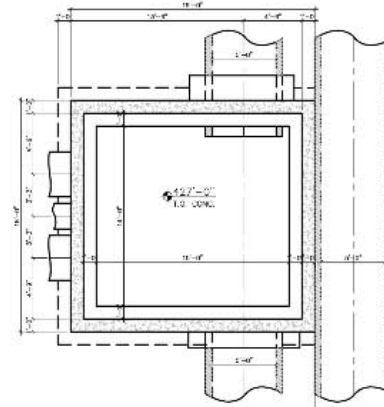
STORMWATER DISCHARGE PIPES



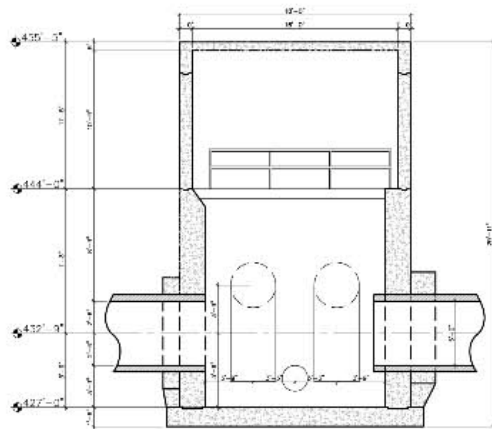
COOLING WEIRS, PLAN VIEW



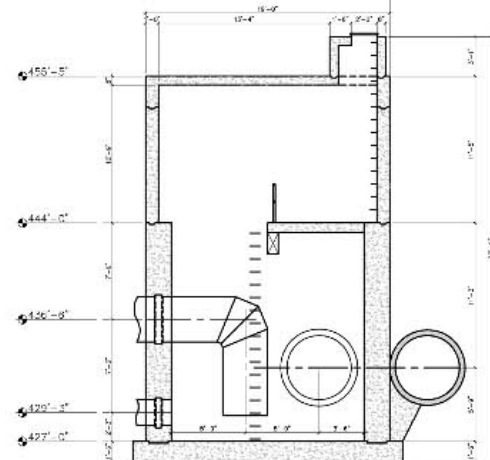
EAST WEIR PLAN
1/8" = 1'



EAST WEIR PLAN
1/8" = 1'



NORTH SECTION
1/8" = 1'

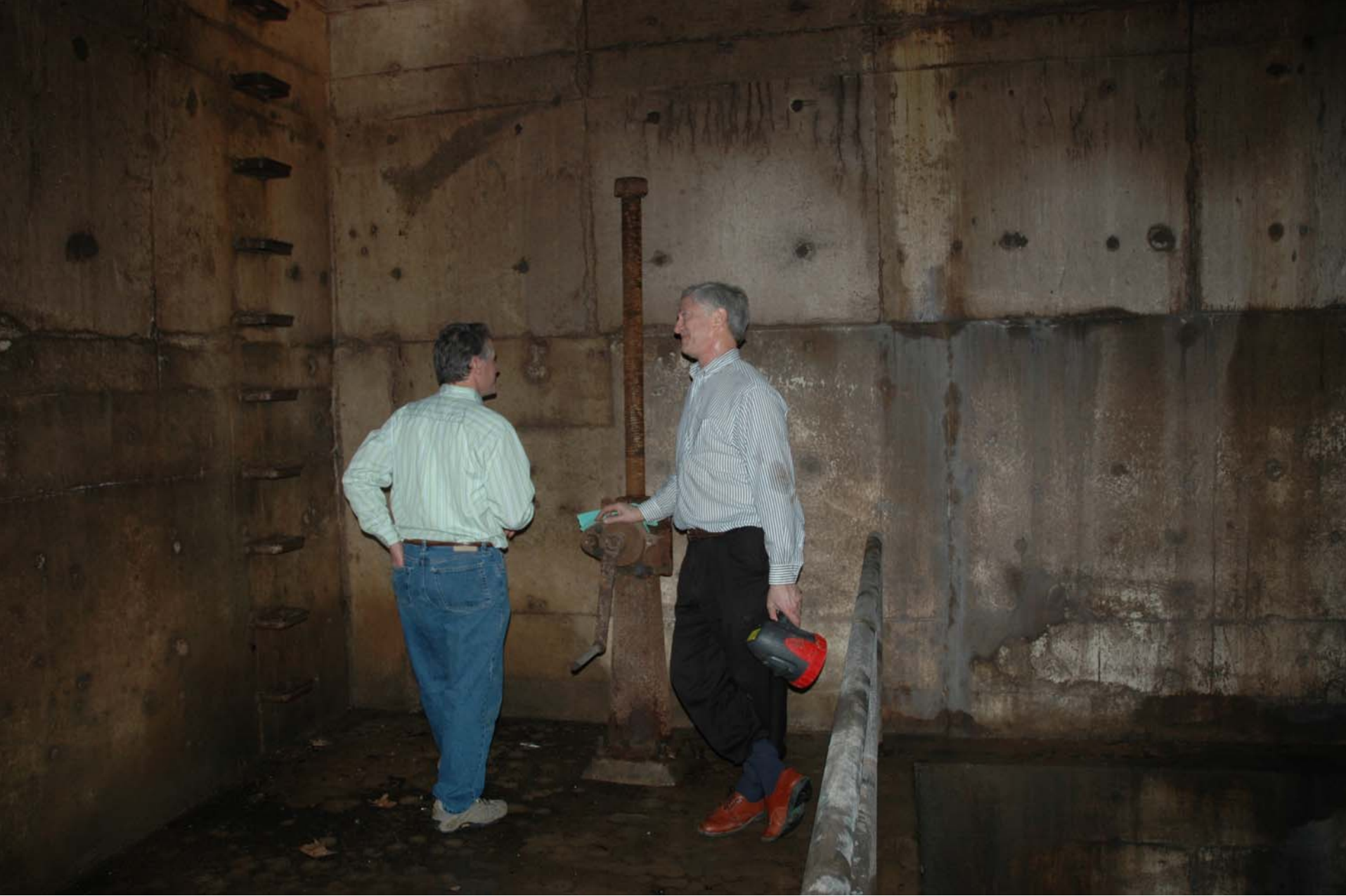


EAST SECTION
1/8" = 1'

Plan

Section

EAST COOLING WEIR



Young men posing (for scale) in East Cooling Weir

Cooling Weir Dimensions: - East Weir

Manhole elevation @ grade => 457' - 6"

Base slab elevation => 425' - 0"

Ceiling elevation => 454' - 9"

Clear span height => 29' - 9"

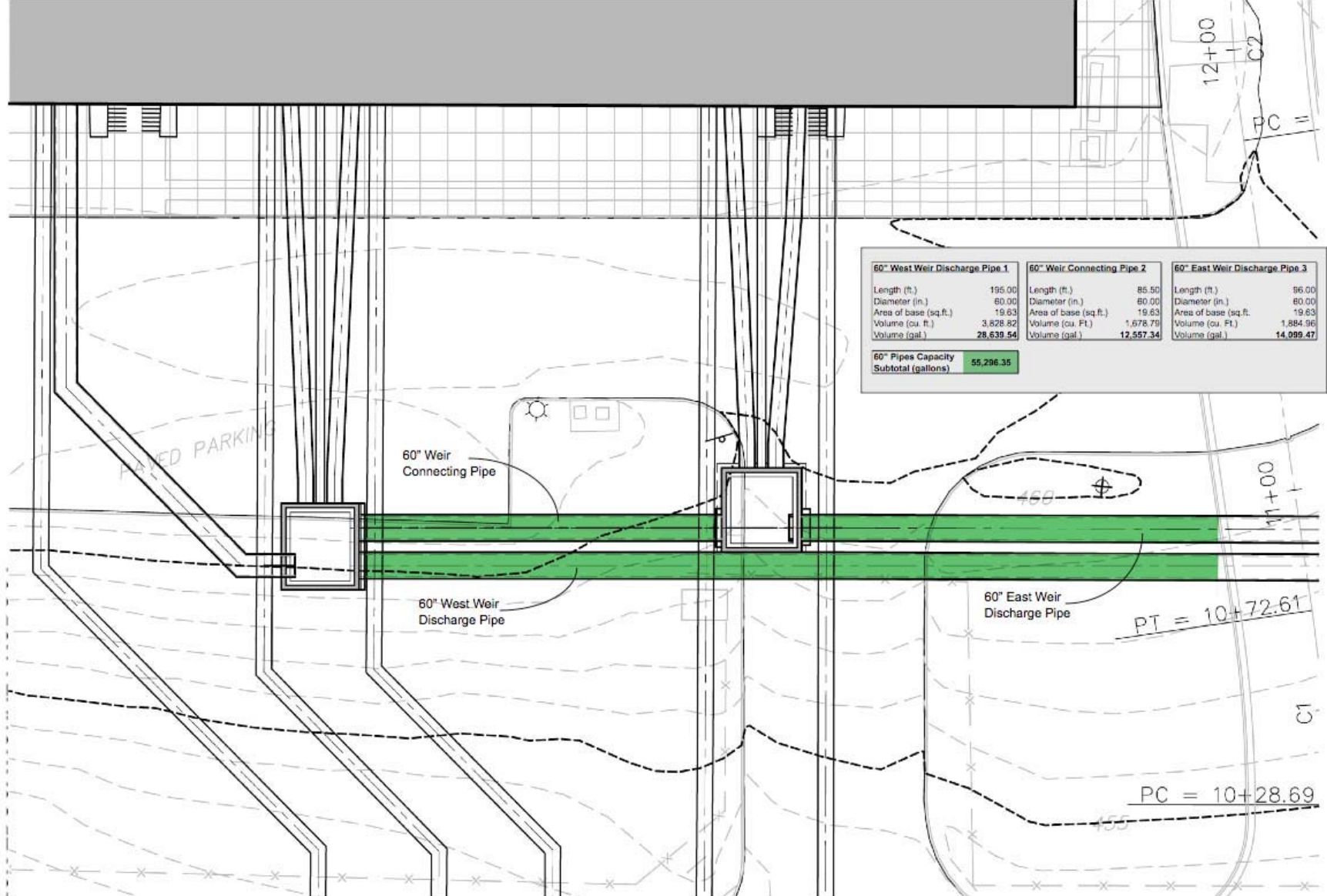
Base slab dimensions => 15' - 0" X 14' - 0"

Avg. base slab area => 240 sq. ft.

Total Vol. at 95% Capacity => 49,000 gal.

WEST WEIR PLAN
1/8" = 1'

WEST SECTION
1/8" = 1'



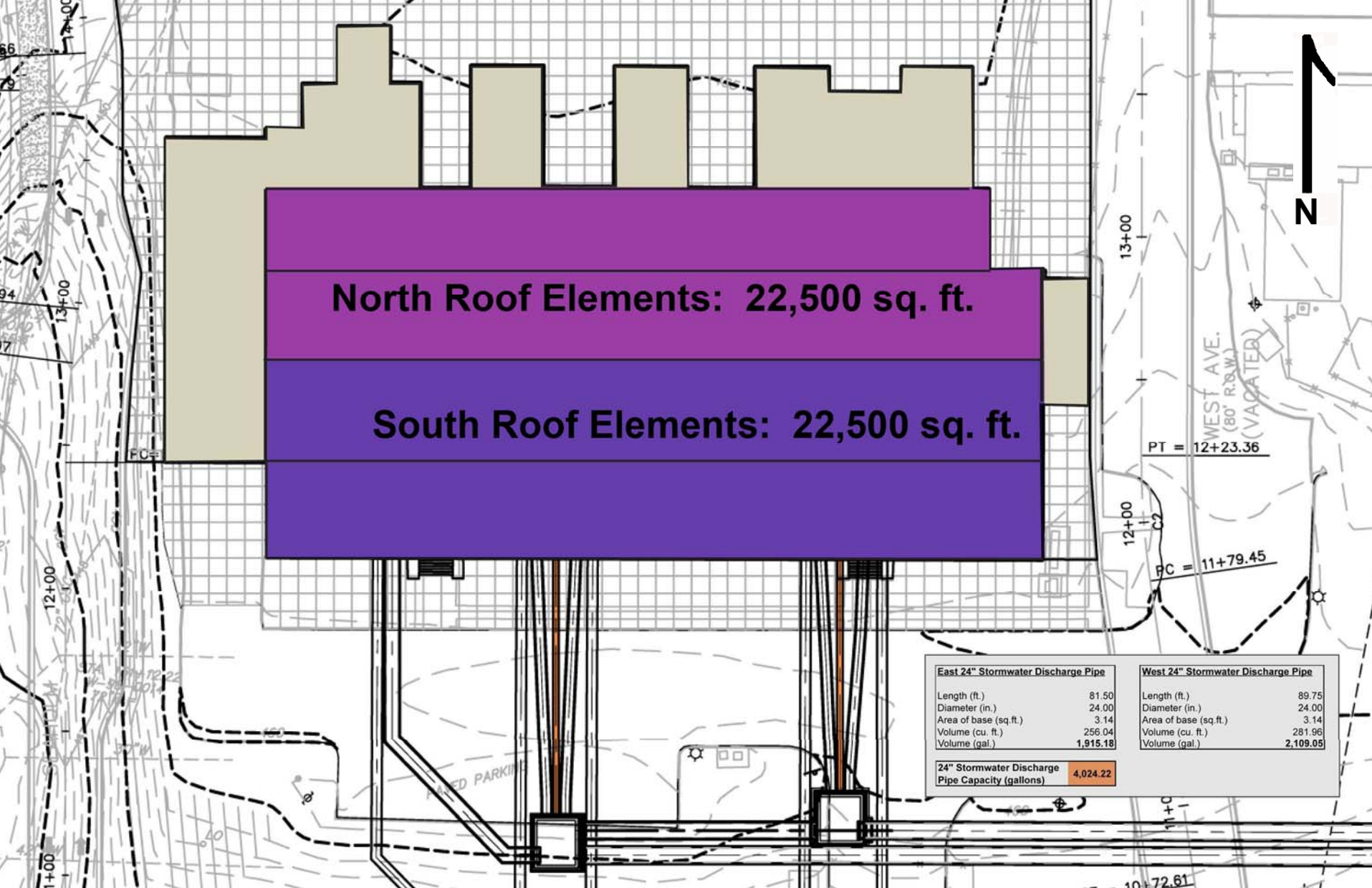
Cooling Weir Discharge Pipes



COOLING WEIR DISCHARGE PIPE, 60" DIA.

Turbine Infrastructure Storage Capacities

West cooling weir (16'L x 15'W x 28'H)	55,000 gal.
East cooling weir (same as west weir)	47,000 gal.
West weir discharge pipe (60" dia.)	28,600 gal.
East weir discharge pipe (60" dia.)	14,100 gal.
Weir connector pipe (60" dia.)	12,600 gal.
Condenser discharge pipe (54" dia.)	<u>15,600 gal.</u>
TOTAL STORAGE CAPACITY:	172,900 gal.



ROOF ELEMENTS OF TURBINE BUILDING

CATCHMENT AREA CALCULATIONS

Turbine Hall	45,000 sq. ft. ✓
Office/parking (2 floors	28,000 sq. ft. ✓
Hotel/Condo	<u>26,000 sq. ft.</u>
Total roof area	99,000 sq. ft.

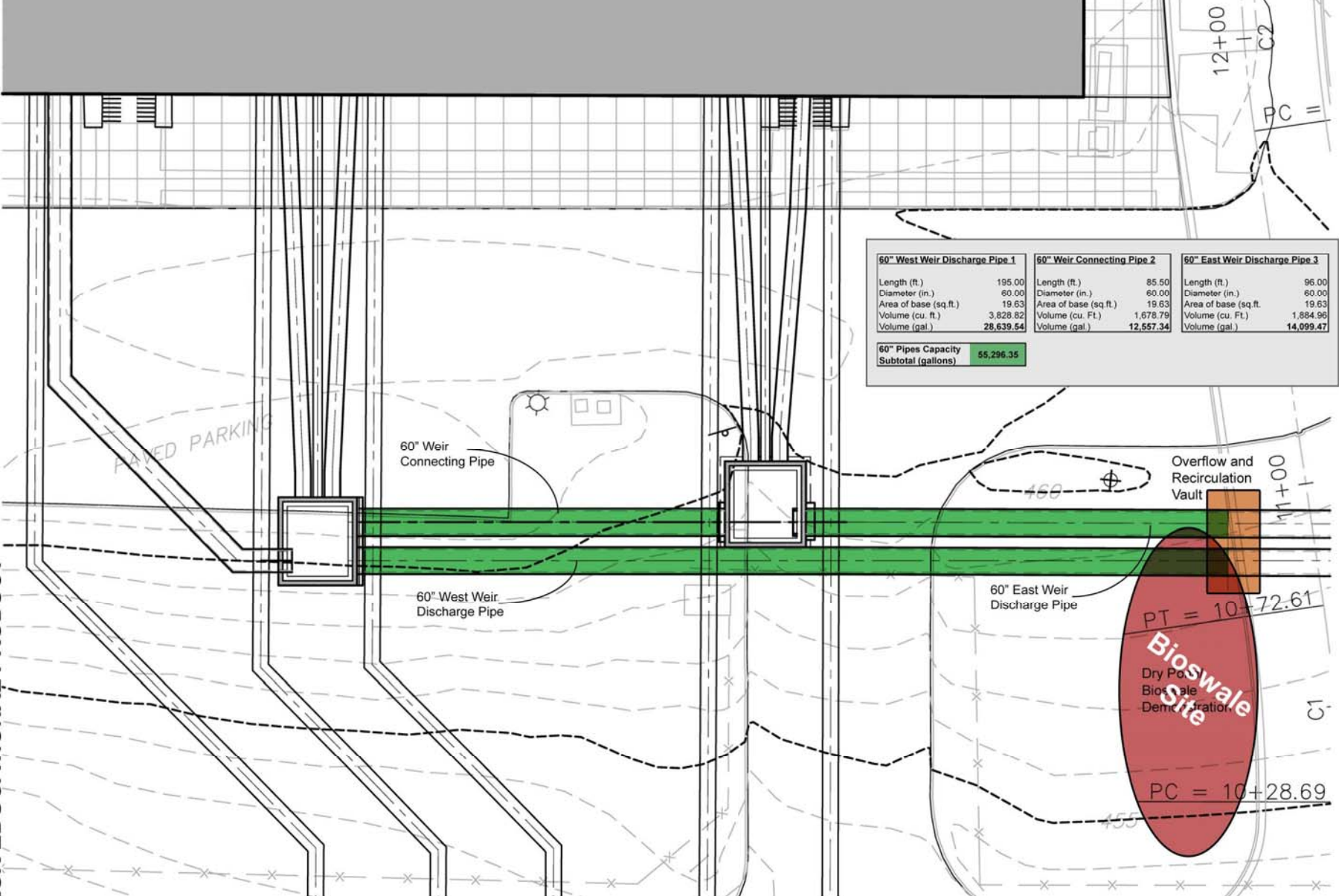
Plaza Hardscape	<u>45,000 sq. ft.</u> ✓
Total Catchment Area	144,000 sq. ft.

Plantings, streets, parking	<u>65,000 sq. ft.</u>
Total Developed Area	209,000 sq. ft.

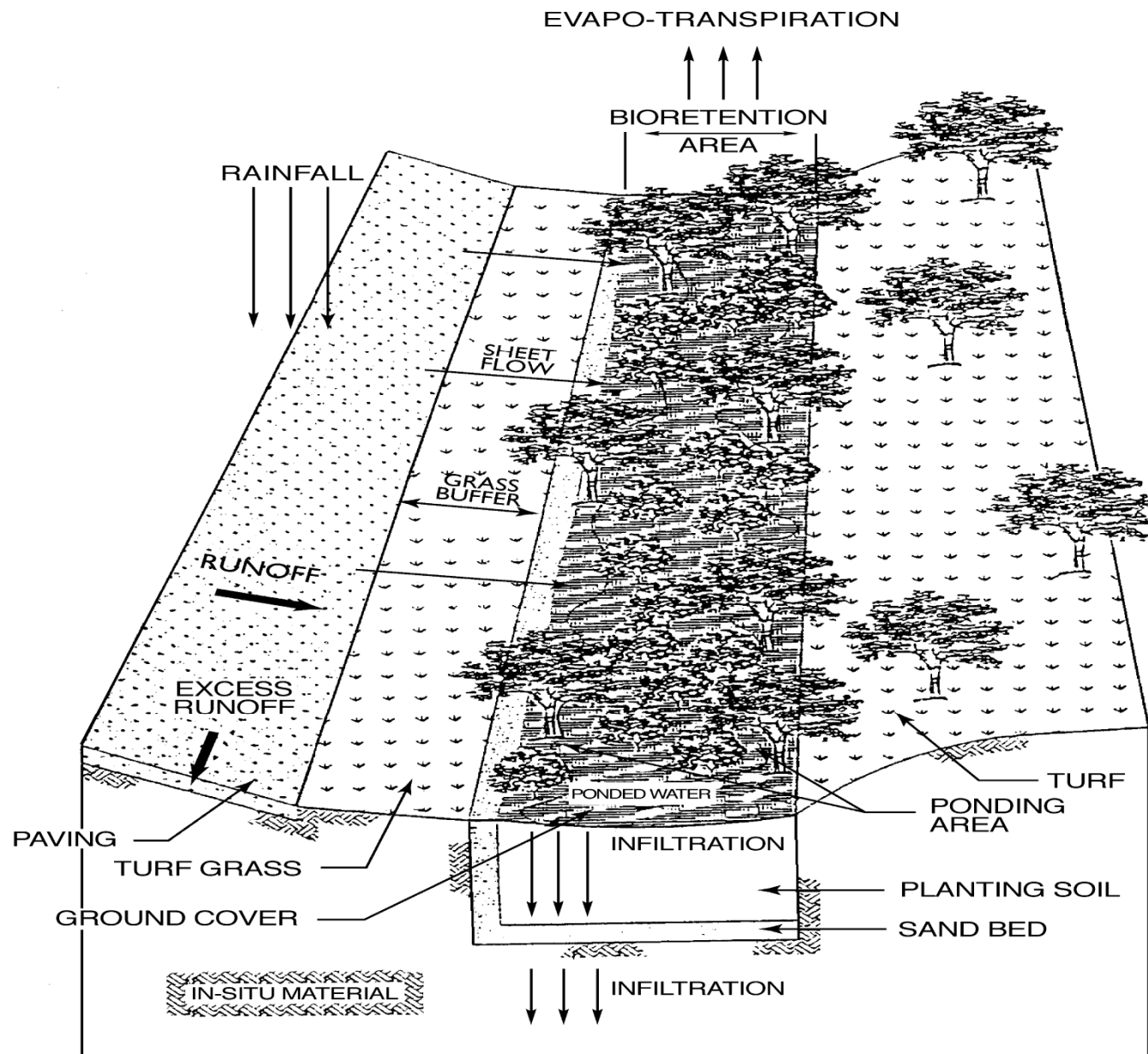
Month	Total Irrigation Demand	Average rainfall	Gallons/ft ² collection coefficient	Rooftop Rainfall collected (90% efficiency of 45,000 s.f.)	Plaza Runoff collected (60% efficiency of 28,000 s.f.)	Total Rainfall and Plaza Runoff Collected	End of month storage	Supplemental Demand Required	Percentage of Demand from RWH
January	7,880	2.11	0.62	52,982	21,978	74,960	67,080	0	100.00%
February	7,880	2.41	0.62	60,515	25,103	85,618	196,108	0	100.00%
March	135,139	2.15	0.62	51,779	21,353	73,132	2,311	132,827	5.389%
April	135,139	3.81	0.62	75,531	31,352	106,883	0	28,256	79.13%
May	135,139	4.38	0.62	109,982	45,622	155,604	20,465	0	100.00%
June	204,780	3.46	0.62	86,381	36,039	122,420	0	82,360	60.03%
July	204,780	2.65	0.62	61,475	25,233	86,708	0	118,072	15.56%
August	204,780	2.23	0.62	55,995	23,228	79,223	0	125,557	38.52%
September	92,719	3.38	0.62	84,872	35,206	120,078	27,359	0	100.00%
October	92,719	3.35	0.62	84,119	34,894	119,012	26,293	0	100.00%
November	92,719	2.28	0.62	57,251	23,748	80,999	0	11,720	87.36%
December	7,880	2.46	0.62	61,771	25,623	87,394	79,514	0	100.00%
Total	1,321,554	33.17	0.62	832,899	345,499	1,178,397	-	441,603	89%
Average =									80%

(assuming 160,000 gals. min. storage capacity)

Total Annual Irrigation Demand:	1,322,000 gal.
Turbine Roof rainfall collected (75% effic'y):	694,000 gal.
Office roof rainfall collected (75% effic'y):	432,000 gal.
Municipal water supplementation:	196,000 gal.
Percentage of demand met by RWH:	69%



STORM OVERFLOW AND WATER QUALITY BMP



BIORETENTION SWALE FOR WATER QUALITY BMP

Month	Total Irrigation Demand	Average Rainfall	Collection surface size	Gallons/ft2 collection coefficient	Efficiency factor	Rainfall collected (90% efficiency)	End of month storage	Supplemental Demand Required	Percentage of Demand from RWH
January	7,880	2.11	45,000	0.62	90%	52,981	4,102	0	100.00%
February	7,880	2.46	45,000	0.62	90%	61,771	9,891	0	100.00%
March	135,139	3.01	45,000	0.62	90%	75,581	1,618	0	38.09%
April	135,139	3.01	45,000	0.62	90%	75,581	0	45,484	55.93%
May	135,139	4.18	45,000	0.62	90%	109,883	0	25,157	81.38%
June	104,800	3.16	45,000	0.62	90%	86,800	0	18,000	42.43%
July	104,800	2.15	45,000	0.62	90%	51,400	0	53,400	25.14%
August	204,780	2.23	45,000	0.62	90%	55,995	0	148,785	27.34%
September	92,719	3.38	45,000	0.62	90%	84,872	0	7,847	91.54%
October	92,719	3.27	45,000	0.62	90%	84,100	0	8,619	90.72%
November	92,719	2.13	45,000	0.62	90%	57,200	0	35,519	61.75%
December	7,880	2.46	45,000	0.62	90%	61,771	53,891	0	100.00%
Total	1,321,554.00	33.17	45,000.00	0.62	90%	832,899	-	542,546	63%
								Average =	68%

-- (assuming capture 1.2 inches of “first-flush” runoff for 75% impervious cover development)

Hotel/Condo	26,000 sq. ft.
Plaza Hardscape	<u>45,000 sq. ft.</u>
Total Catchment Area	71,000 sq. ft.

Total storm water detention volume: 7,100 cu. ft.
or 53,000 gal.

Runoff collected (70% efficiency): 37,000 gal.

WESTINGHOUSE

The image shows three electrical control panels for a generator system. The left panel is labeled "AC GENERATOR" and "HYDROGEN COOLED". It features several analog meters and switches, including a "FIELD AMMETER" (0 to 1.0), "EXCITING VOLTS" (0 to 100), and a "FIELD" switch. The middle panel is labeled "WATER-CHILLED ELECTRIC CONDENSATOR" and includes a "WATER FLOW" meter (0 to 100) and a "WATER TEMP" meter (0 to 100). The right panel is labeled "AC MOTOR DRIVE" and includes a "MOTOR AMP" meter (0 to 100) and a "MOTOR TEMP" meter (0 to 100). All panels have a "STOP" button and a "RESET" button.





Cesar Chavez

Seaholm Drive

Future Seaholm
Parking Garage