Subsurface Drainage Issues

- In many cases, existing Subsurface Drainage not installed correctly
- Comprehensive Drainage Design must be performed before new subsurface Drainage can be installed
- Outfall elevation is the controlling factor for Design of Subsurface Drainage
- Installing new subsurface Drainage without proper plans and design will increase existing Drainage problems
- Significant resources will be required
- Can not be implemented on a single lot basis

Subsurface Drainage Issues

Basic Design Considerations for every Street /Drainage Area

- Inverts and capacity of culverts and bridges to Final Outfall
- Topographical Survey of Streets, culverts and ditches required
- Determine the culvert sizing, inverts and top cover depth for every resident on the street
- Determine conflicts with Utilities

Subsurface Drainage Issues

Consequences of improper installations of culverts

- Increased flooding of streets due to higher water elevation
- Ponding of ditches due to incorrect inverts of culverts and improper slope
- Duplication of costs when drainage conveyance is corrected in the future
- Increase volume of water seeking lower surface elevation

Subsurface Drainage Incorrectly Installed

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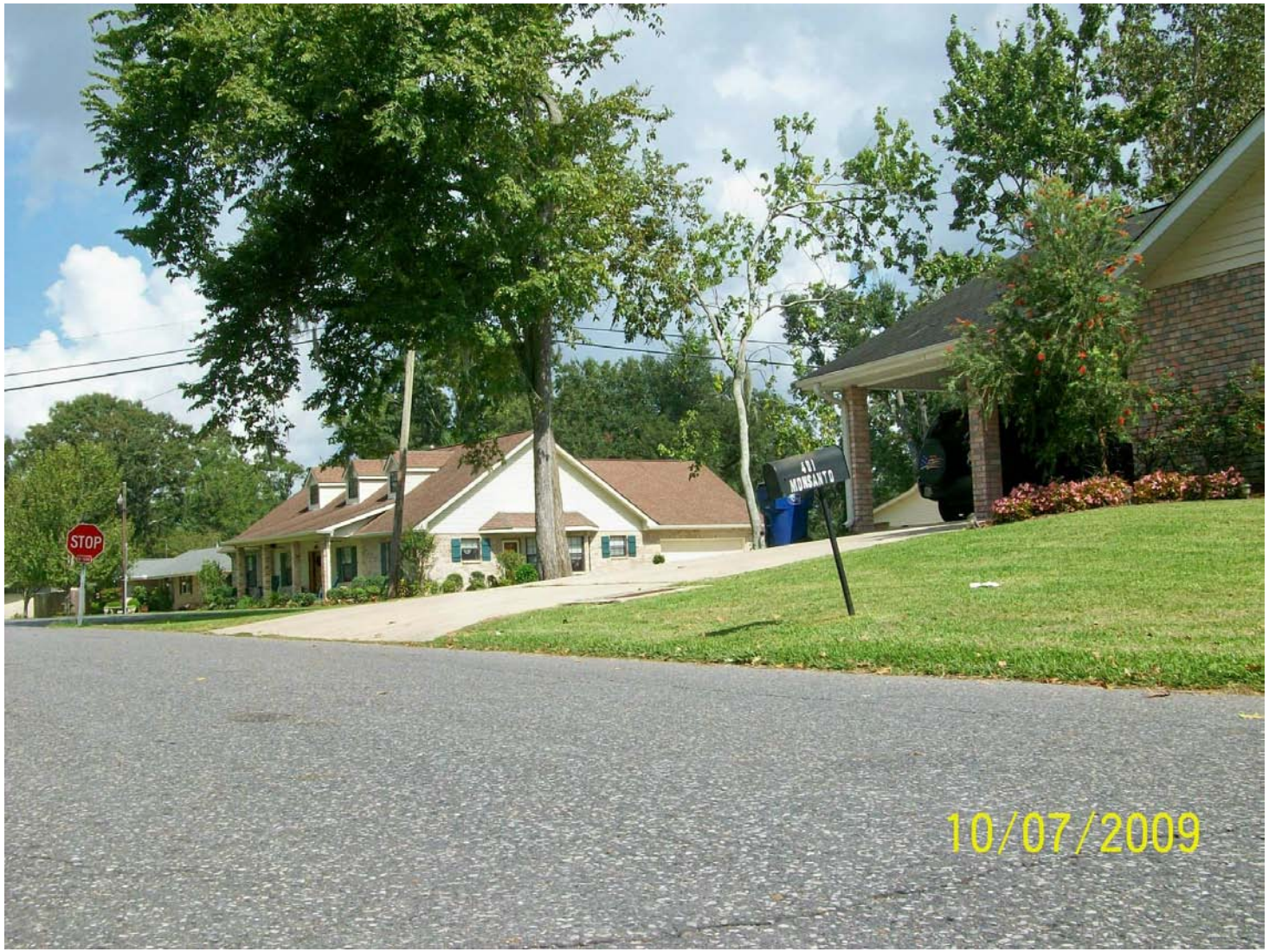

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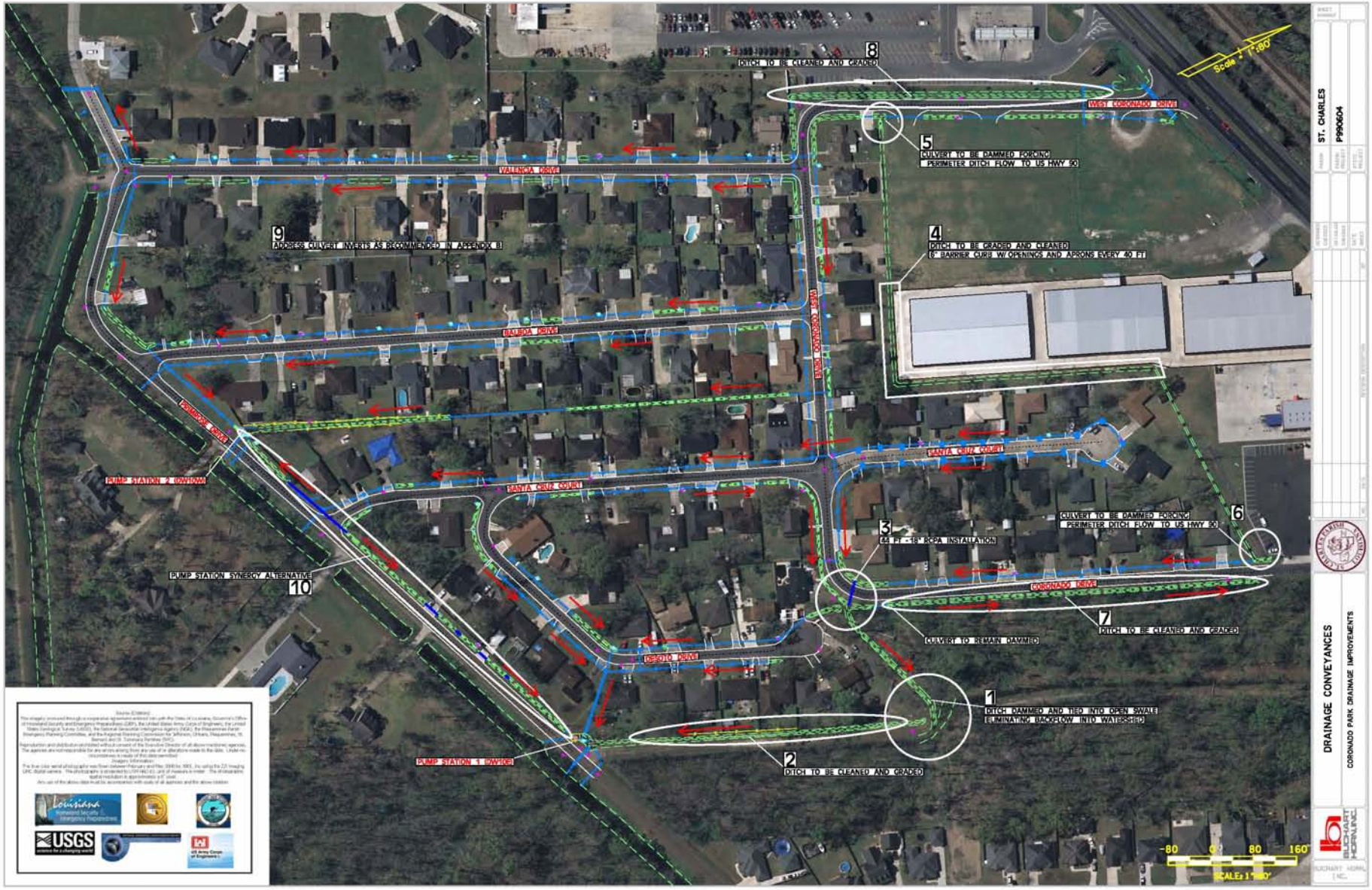

Coronado Drainage Profiles

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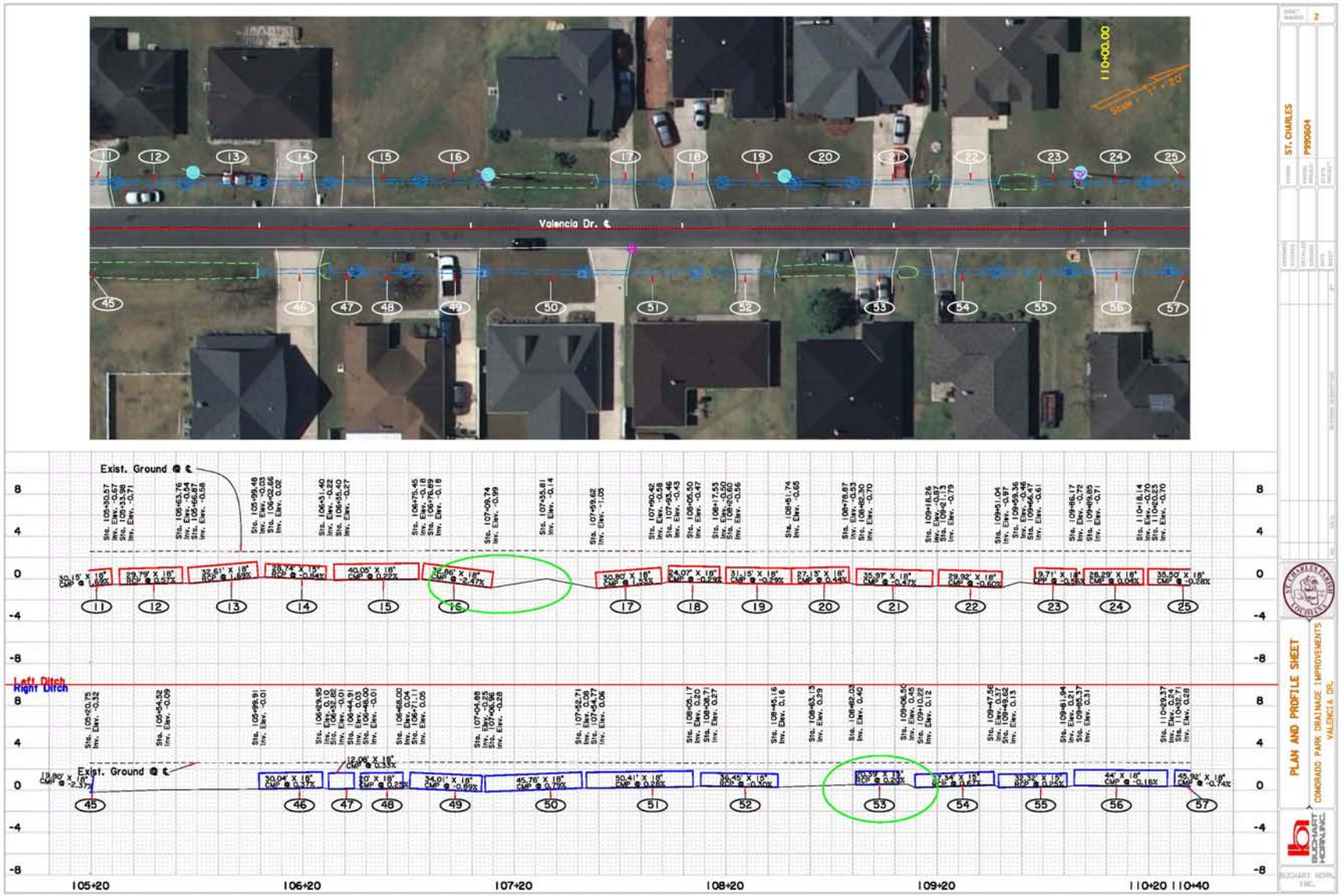

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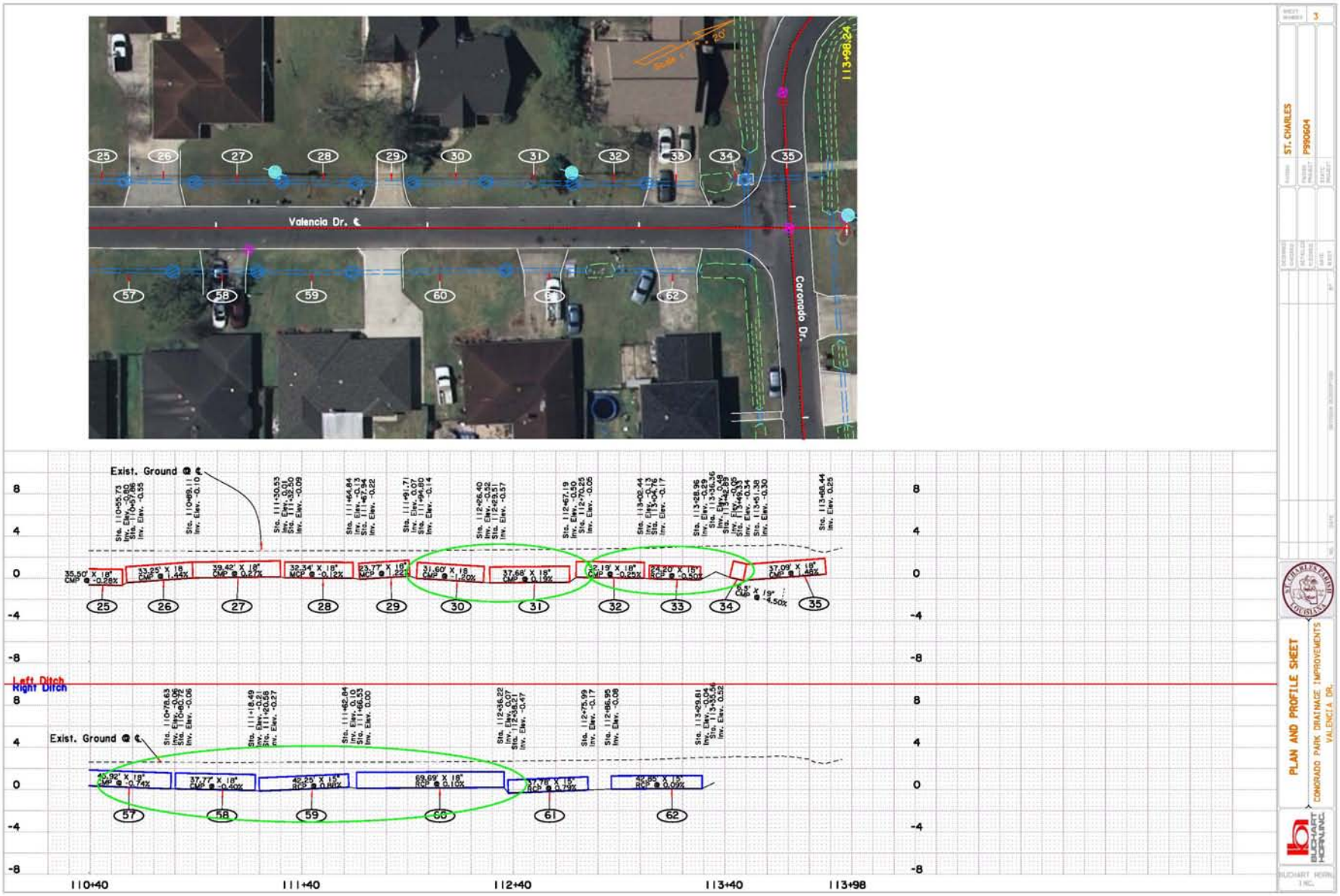

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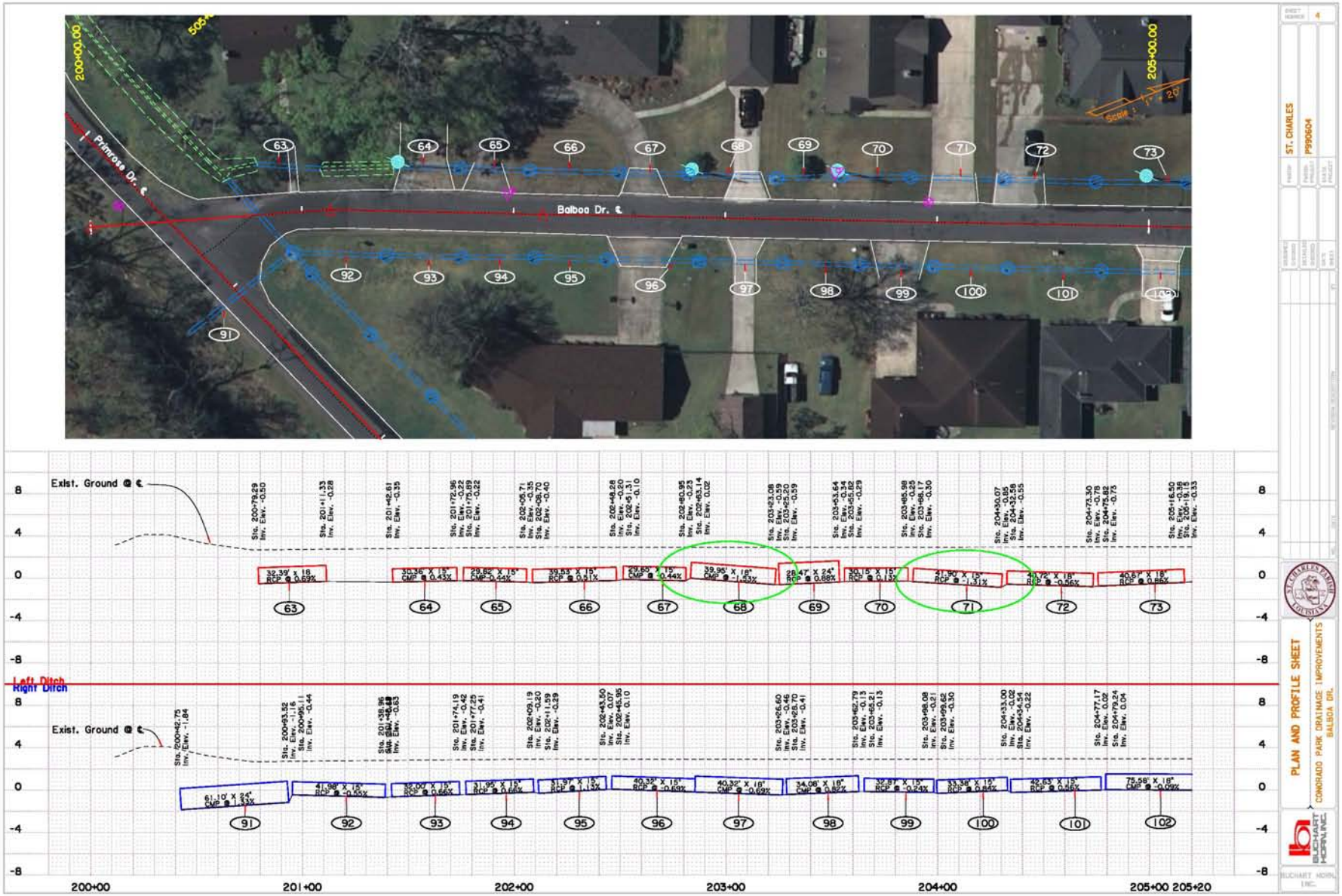

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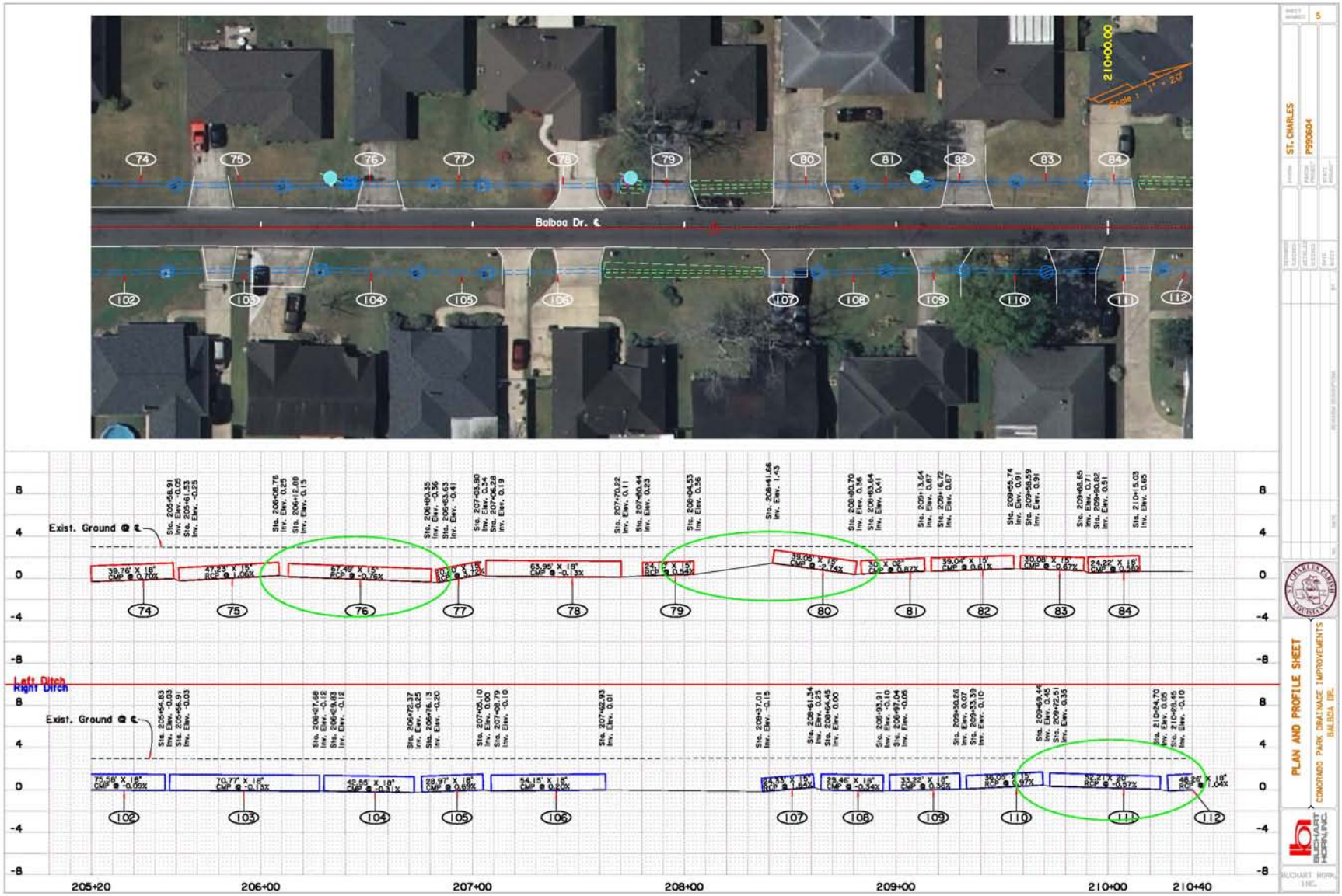

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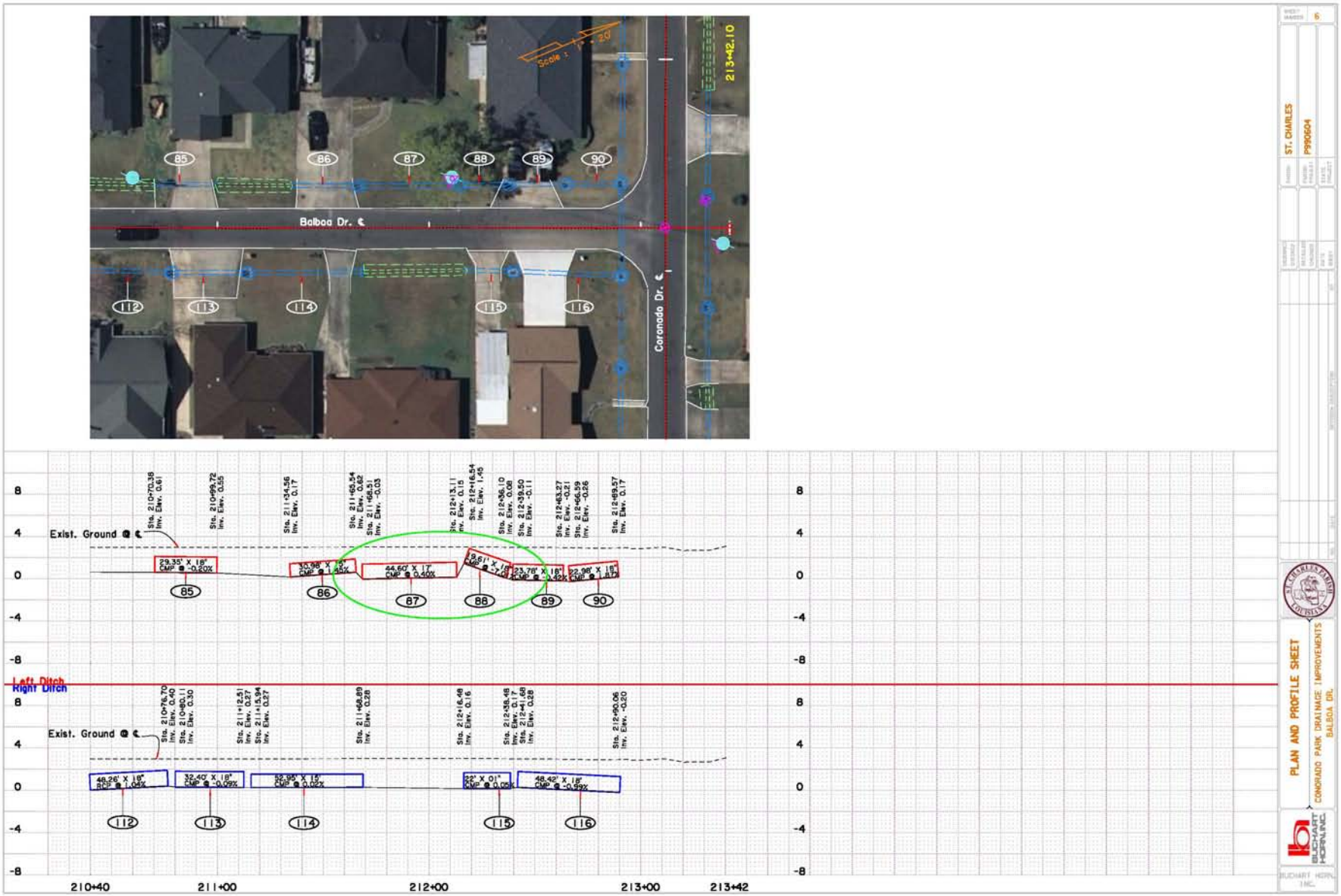

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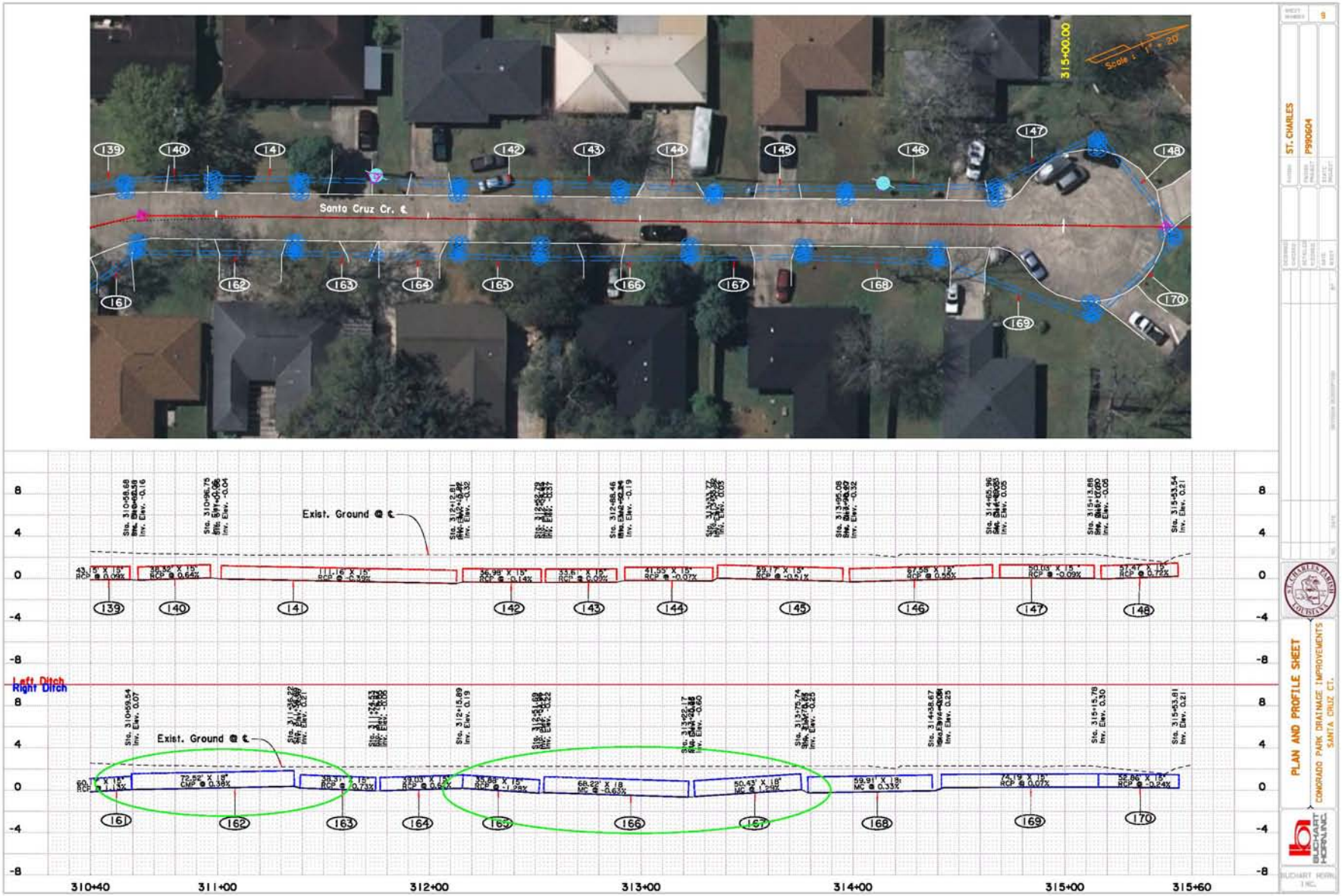

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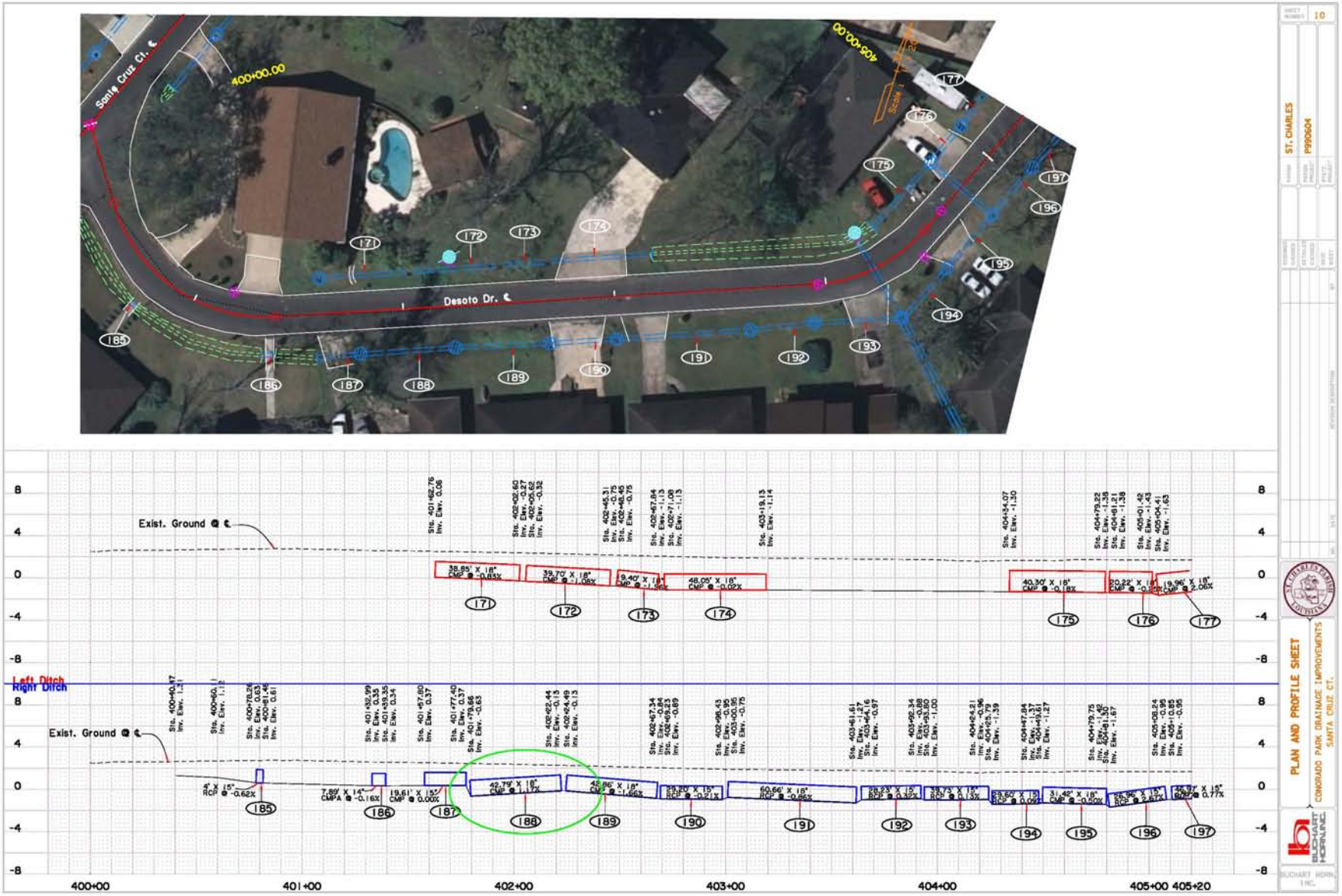

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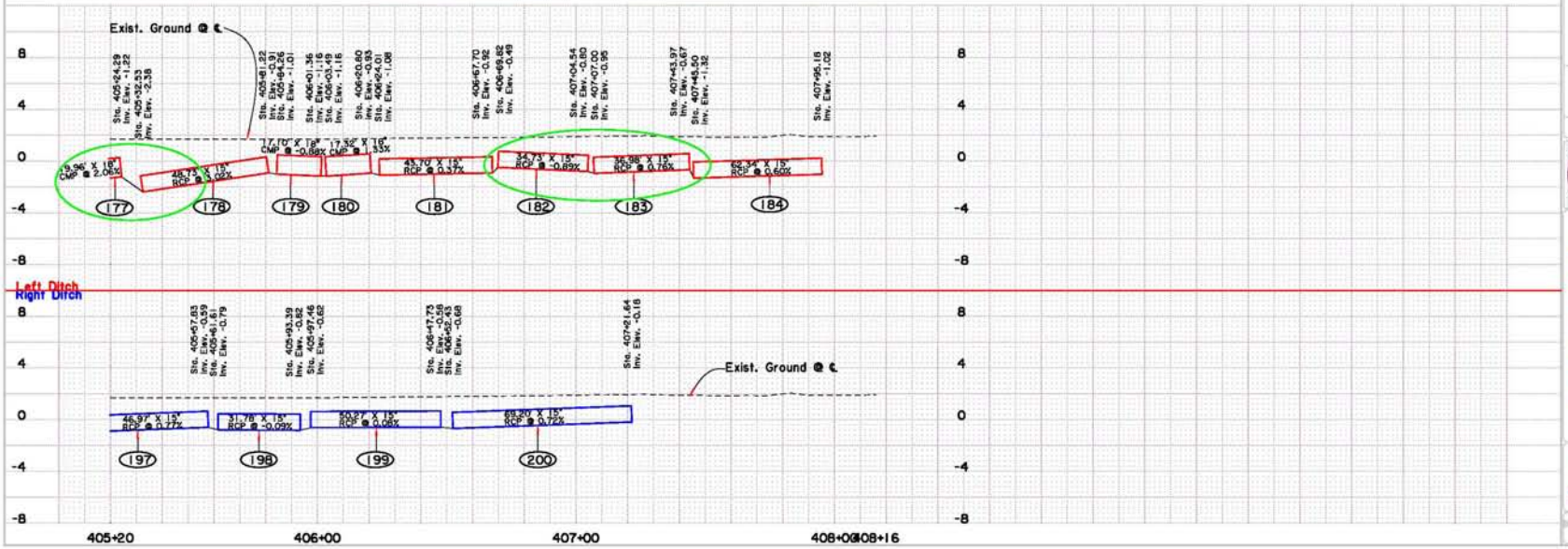

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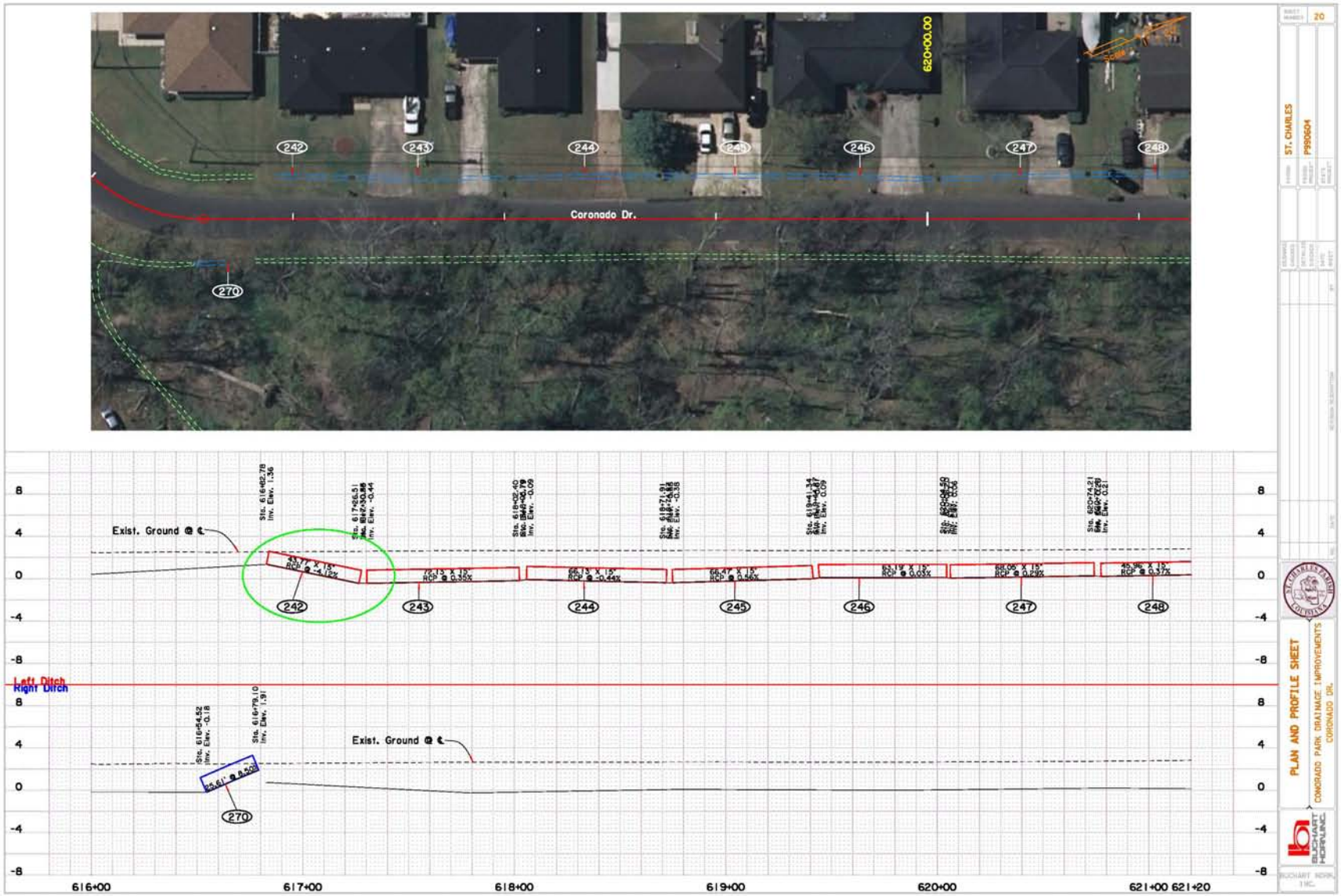
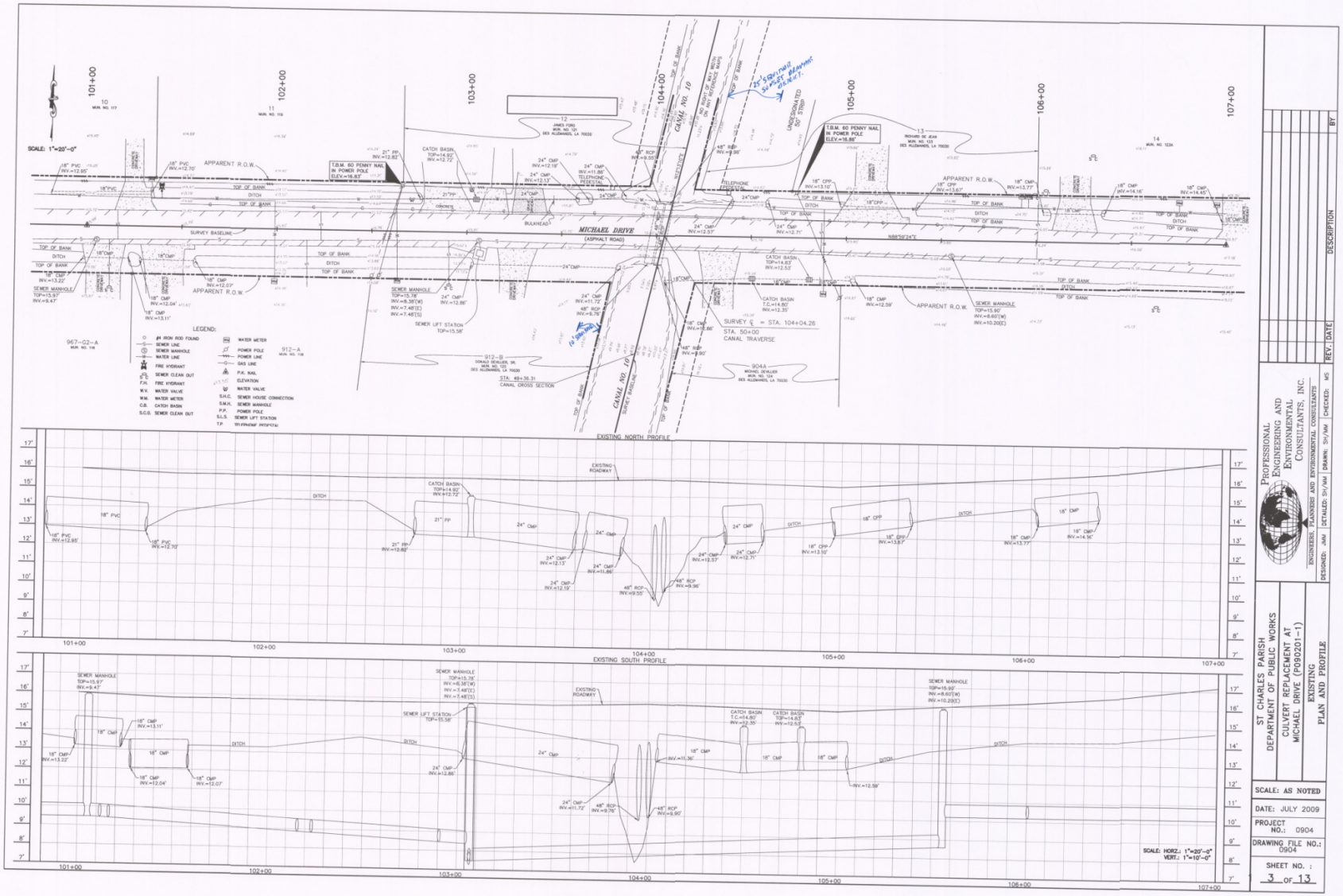


Subsurface Drainage Profiles



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DEPARTMENT OF PUBLIC WORKS

ESTIMATED COST TO ADD TWO ADDITIONAL CREWS FOR SUBSURFACE

CREW 1&2	LABOR RATE W FRINGES	ANNUAL	EQUIPMENT	EQUIP & TOOLS	TOTAL ESTIMATED COST
FOREMAN	29.46	61,276.80	PICK UP TRUCK	16,000	77,276.80
OPERATOR III	22.75	47,320.00			47,320.00
OPERATOR II	18.18	37,814.40			37,814.40
OPERATOR I	16.30	33,904.00			33,904.00
LABORER (#1)	12.45	25,896.00			25,896.00
LABORER (#2)	12.45	25,896.00			25,896.00
LABORER (#3)	12.45	25,896.00			25,896.00
CARPENTER (#1)	24.12	50,169.60	UTILITY BODY TRUCK	30,000	80,169.60
CARPENTER (#2)	24.12	50,169.60	UTILITY BODY TRUCK	30,000	80,169.60
			TOOL BOXES, LAZER LEVELS, SHOVELS, ETC.	8,000	8,000.00
			EXCAVATOR	110,000	110,000.00
			DUMP TRUCKS (2)	150,000	150,000.00
			EQUIPMENT TRAILER	50,000	50,000.00
			CARPENTER TOOLS - SAWS, CONCRETE FLOATS, ETC.	4,000	4,000.00
		Labor 358,342.40		Tools&Equipment 398,000	756,342.40
Total-2-Crews		$716,684.80		$796,000.00	$1,512,684.80

Labor Estimate Year 1	$716,684.80	Labor Estimate Year 4	$ 953,908.00
Labor Estimate Year 2	$788,354.00	Labor Estimate Year 5	$1,049,299.00
Labor Estimate Year 3	$867,189.00		

ANNUAL ESTIMATED ENGINEERING COST - SUBSURFACE CULVERT INSTALLATION

Assumptions - All rates are typical
engineering rates for 50 weeks per year

	$/HR	HR/WK	$/YR	
Engineer, PE	$110	16	$88,000	
Engineer, EIT	$80	40	$160,000	
Cad Tech	$65	40	$130,000	
Inspector	$60	40	$120,000	Inspection for both banks
2 man survey crew	$98	40	$196,000	Cover both banks
Permits	$80	8	$32,000	Assumes some general type permit for watershed, subdivision, etc
Total			**$726,000**	

Drainage Priorities

$70MM of Critical Drainage Projects

- **$18MM Grant Applications**
- **$24MM Funding Identified**
- **$28MM Unfunded**

Which Projects should be deferred to direct funding to Subsurface Drainage???

Subsurface Drainage

Discussion