

2019 Nevada Transportation Conference North Truckee Drain Relocation

By
Noel Laughlin, PE





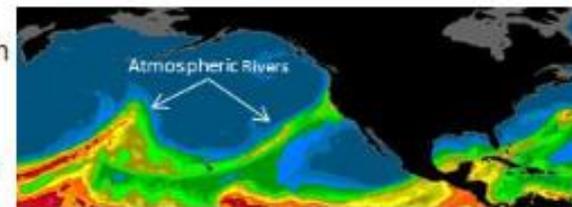
Truckee River

What's an Atmospheric River?



National Weather Service
Los Angeles/Oxnard, CA
weather.gov/losangeles

- ✓ A long and narrow flowing column of water vapor in the atmosphere
- ✓ The term "Atmospheric River" was first coined in a 1998 research publication
- ✓ A primary feature of the entire global water cycle
- ✓ Responsible for 30-50% of all annual precipitation in the U.S. west coast
- ✓ Thanks to more than a decade of scientific studies using new satellite, radar, aircraft, and other observations, we know much more about them today



The science behind atmospheric rivers

An atmospheric river (AR) is a flowing column of condensed water vapor in the atmosphere responsible for producing significant levels of rain and snow, especially in the Western United States. When ARs move inland and sweep over the mountains, the water vapor rises and cools to create heavy precipitation. Though many ARs are weak systems that simply provide beneficial rain or snow, some of the larger, more powerful ARs can create extreme rainfall and floods capable of disrupting travel, inducing mudslides and causing catastrophic damage to life and property. Visit www.research.noaa.gov to learn more.

A strong AR transports an amount of water vapor roughly equivalent to 7.5-15 times the average flow of water at the mouth of the Mississippi River.

ARs are a primary feature in the entire global water cycle and are tied closely to both water supply and flood risks, particularly in the Western U.S.

On average, about 30-50% of annual precipitation on the West Coast occurs in just a few AR events and contributes to the water supply — and flooding risk.

ARs move with the weather and are present somewhere on Earth at any given time.

ARs are approximately 250-375 miles wide on average.

Scientists' improved understanding of ARs has come from roughly a decade of scientific studies that use observations from satellites, radar and aircraft as well as the latest numerical weather models. More studies are underway, including a 2015 scientific mission that added data from instruments aboard a NOAA ship.

<http://www.noaa.gov/stories/what-are-atmospheric-rivers>

WATER
VAPOR
COOLS

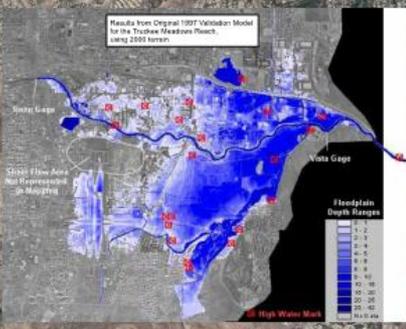
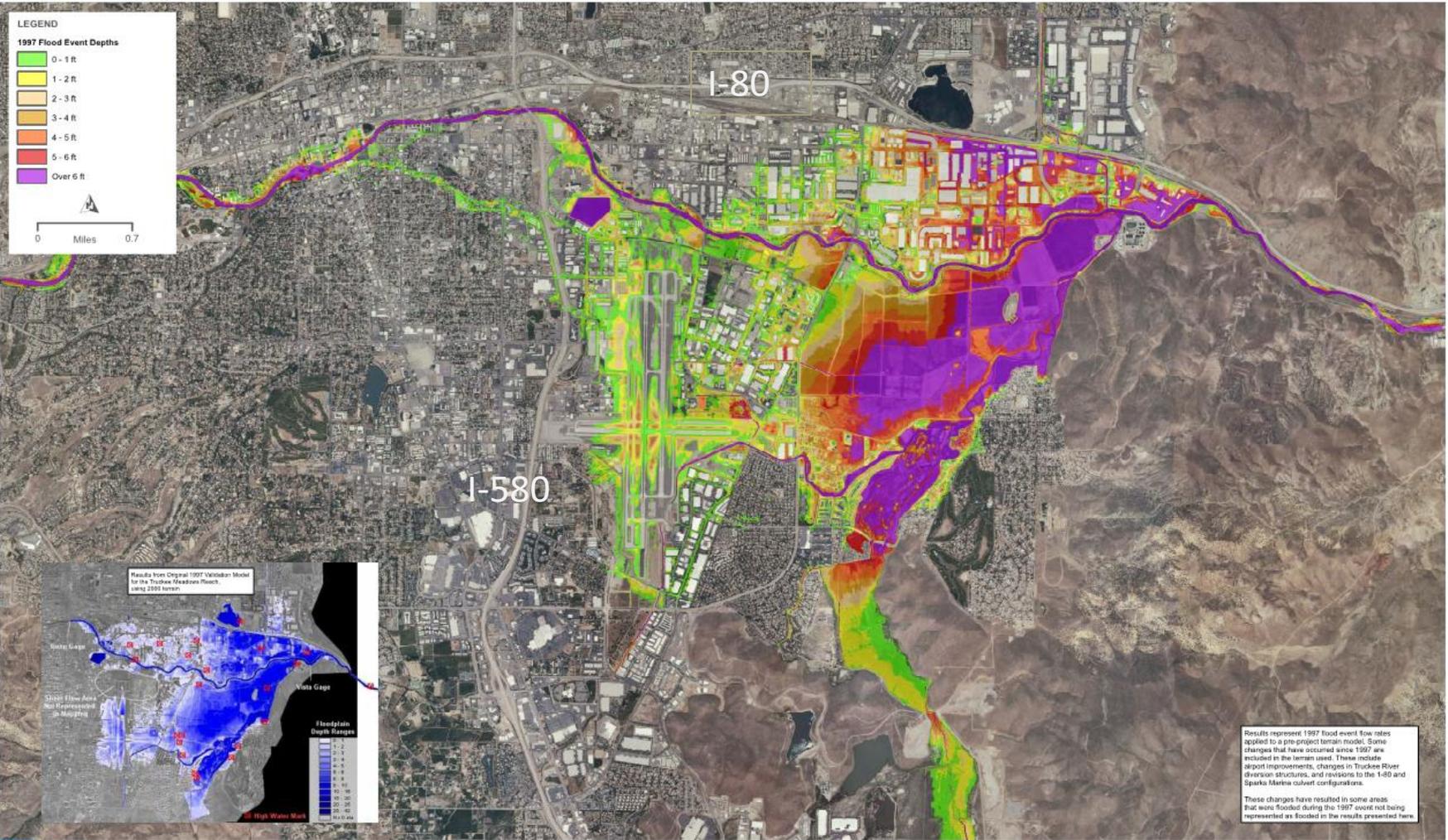
CALIFORNIA



The graphic above shows amounts of atmospheric water vapor as seen by satellite, with the green through red colors showing higher amounts of water vapor. Note the long and narrow streams of high water vapor content stretching across the Pacific Ocean, one stretching from Hawaii to the west coast of North America. These are Atmospheric Rivers.

A "Pineapple Express" is one variety of an Atmospheric River — referring to one that originates around Hawaii





Results represent 1997 flood event flow rates applied to a pre-project terrain model. Some changes that have occurred since 1997 are included in the terrain used. These include airport improvements, changes in Truckee River diversion structures, and revisions to the I-80 and Sparks Marina culvert configurations.

These changes have resulted in some areas that were flooded during the 1997 event not being represented as flooded in the results presented here.

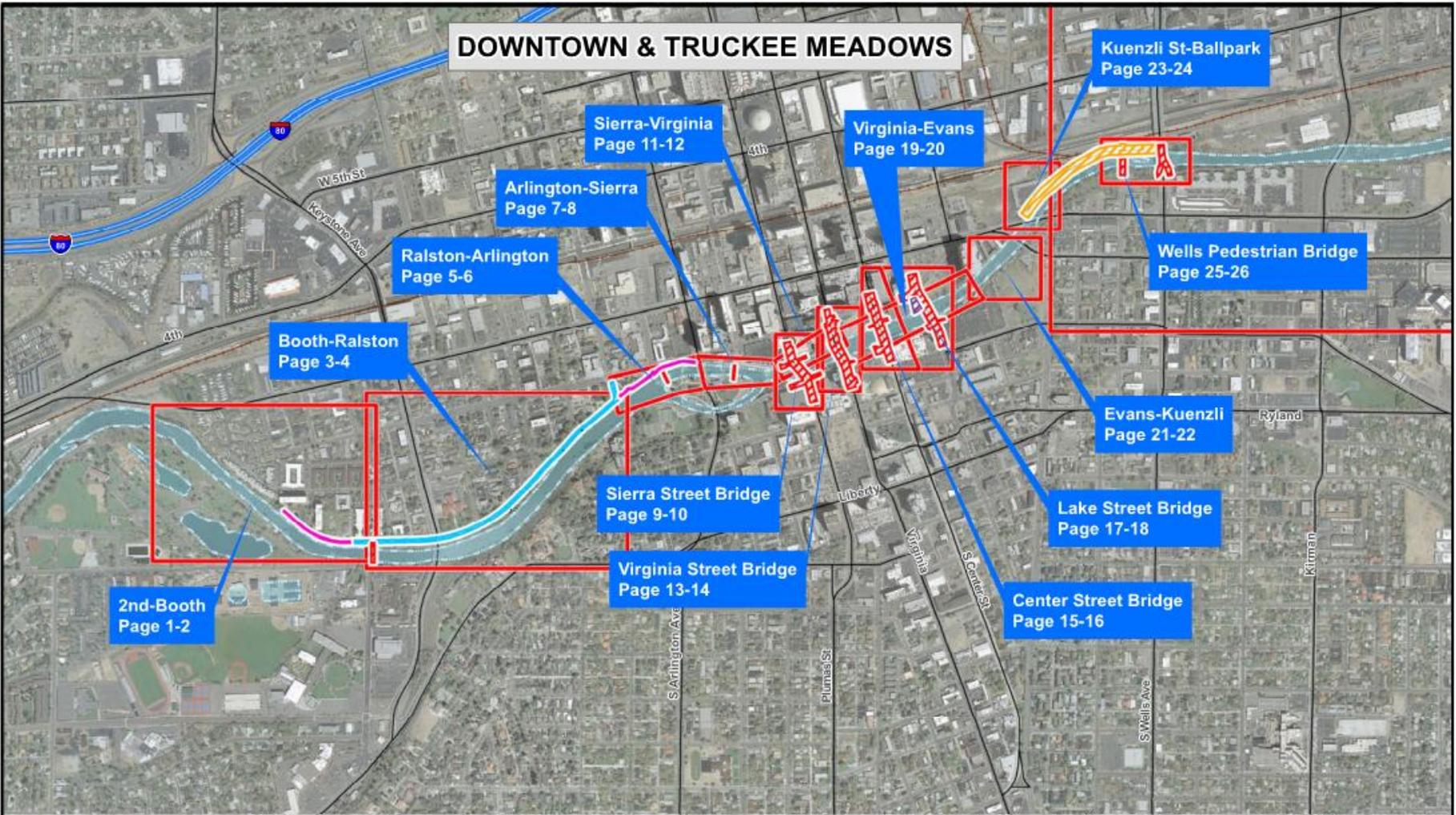




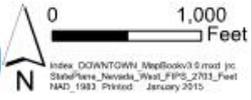
1997 Flooding in the Sparks Industrial Area

Photo by John Glancy, USGS

DOWNTOWN & TRUCKEE MEADOWS



LPP & LRP: Index Downtown



Index: DOWNTOWN_WebBook\3.5.mxd
 StatePlane: Nevada_Web\NAD_1983_Feet
 1/24/2015 Printed: January 2015

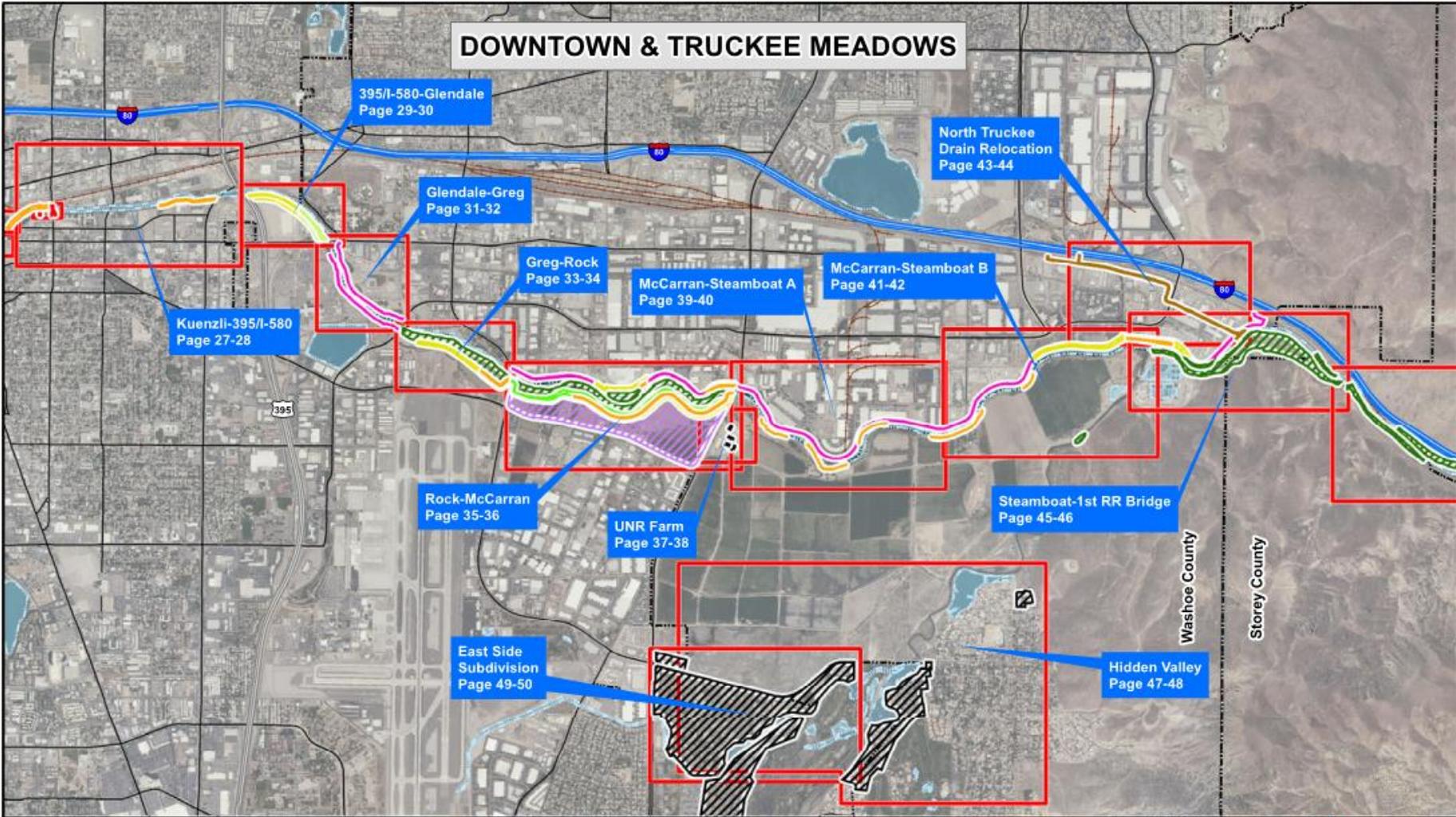
Projects

- | | | | |
|---------------------------|--------------------|----------------------|-------------------------|
| Terracing & River Parkway | New Berm | Detention Facility | City/County Boundaries |
| River Park Lands | Setback Floodwall | Road Realignment | Pump Station |
| Bridge Replacements | Loose | Ditch Realignment | Property to be Acquired |
| Bridge Extensions | Closed Conduit | On Adjacent Sheet | Flood Gate |
| New On-Bank Floodwall | Erosion Protection | Restoration Area | On-Site Spoil Area |
| | Flood Proofing | Reclaimed Water Pipe | |



Jan. 29, 2015

DOWNTOWN & TRUCKEE MEADOWS



395/I-580-Glendale
Page 29-30

North Truckee
Drain Relocation
Page 43-44

Glendale-Greg
Page 31-32

Greg-Rock
Page 33-34

McCarran-Steamboat A
Page 39-40

McCarran-Steamboat B
Page 41-42

Kuenzli-395/I-580
Page 27-28

Rock-McCarran
Page 35-36

UNR Farm
Page 37-38

Steamboat-1st RR Bridge
Page 45-46

East Side
Subdivision
Page 49-50

Hidden Valley
Page 47-48

Washoe County

Storey County

LPP & LRP: Index Truckee Meadows



0 1,000 Feet
 State Plans, Nevada, West, PIPS, 2/2010, Feet
 NAG, 1980 Present January 2015

Projects

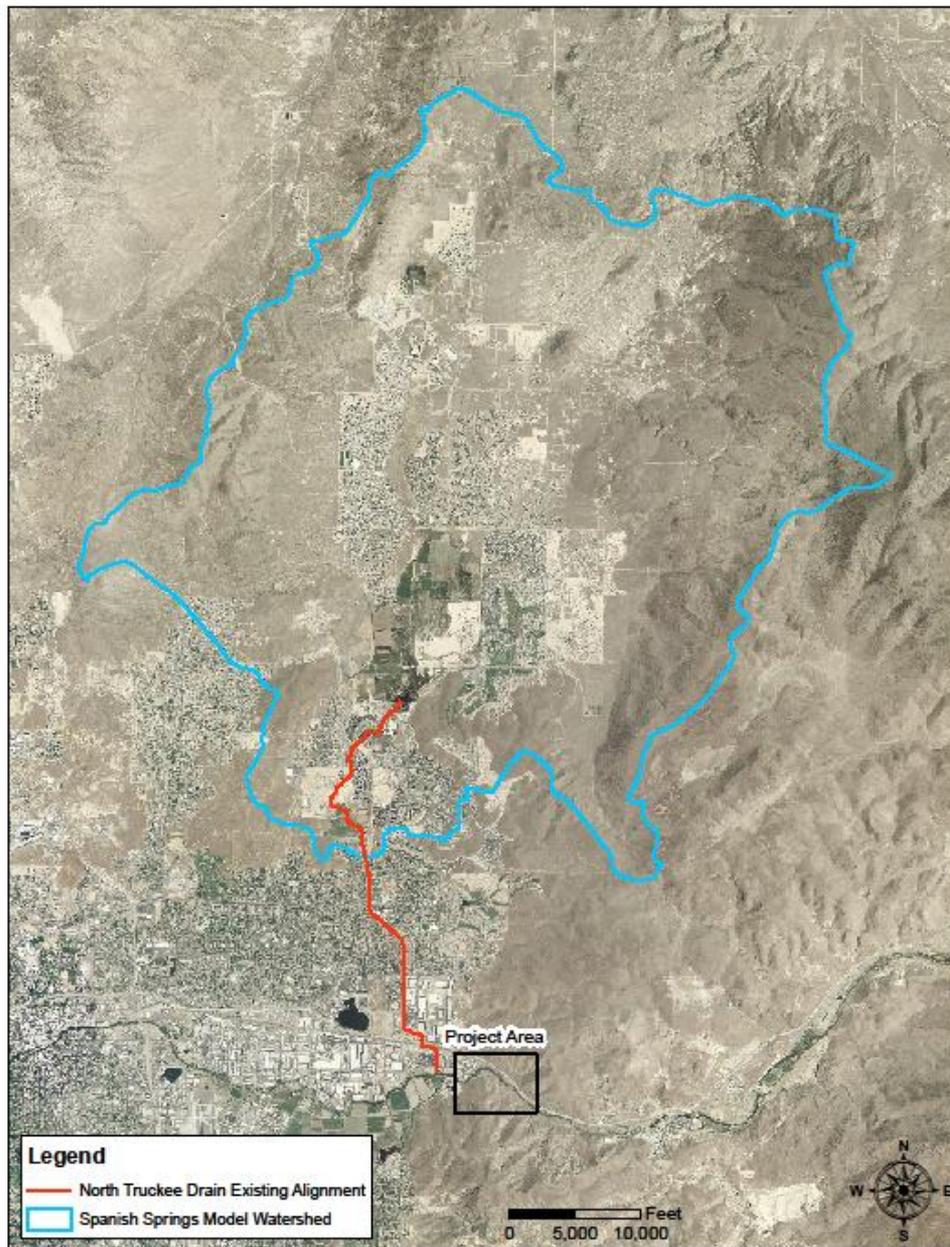
- | | | | |
|---------------------------|--------------------|----------------------|-------------------------|
| Terracing & River Parkway | Setback Floodwall | Detention Facility | City/County Boundaries |
| River Park Lands | Levee | Road Realignment | Pump Station |
| Bridge Replacements | Closed Conduit | Ditch Realignment | Property to be Acquired |
| Bridge Extensions | Erosion Protection | On Adjacent Sheet | Flood Gate |
| New On-Bank Floodwall | Flood Proofing | Reclamation Area | On-Site Spoil Area |
| | | Reclaimed Water Pipe | |



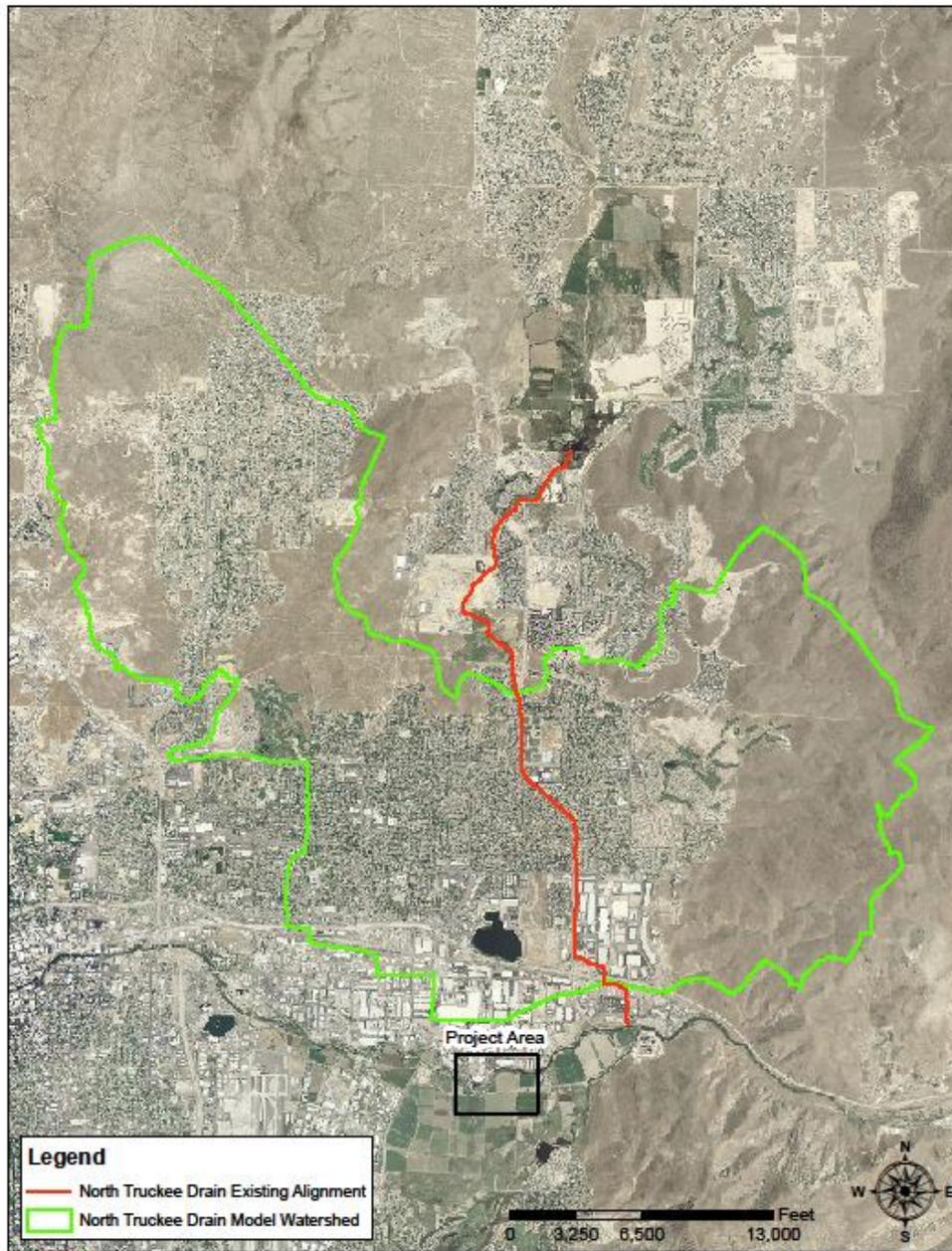
Jan. 29, 2015

HDR

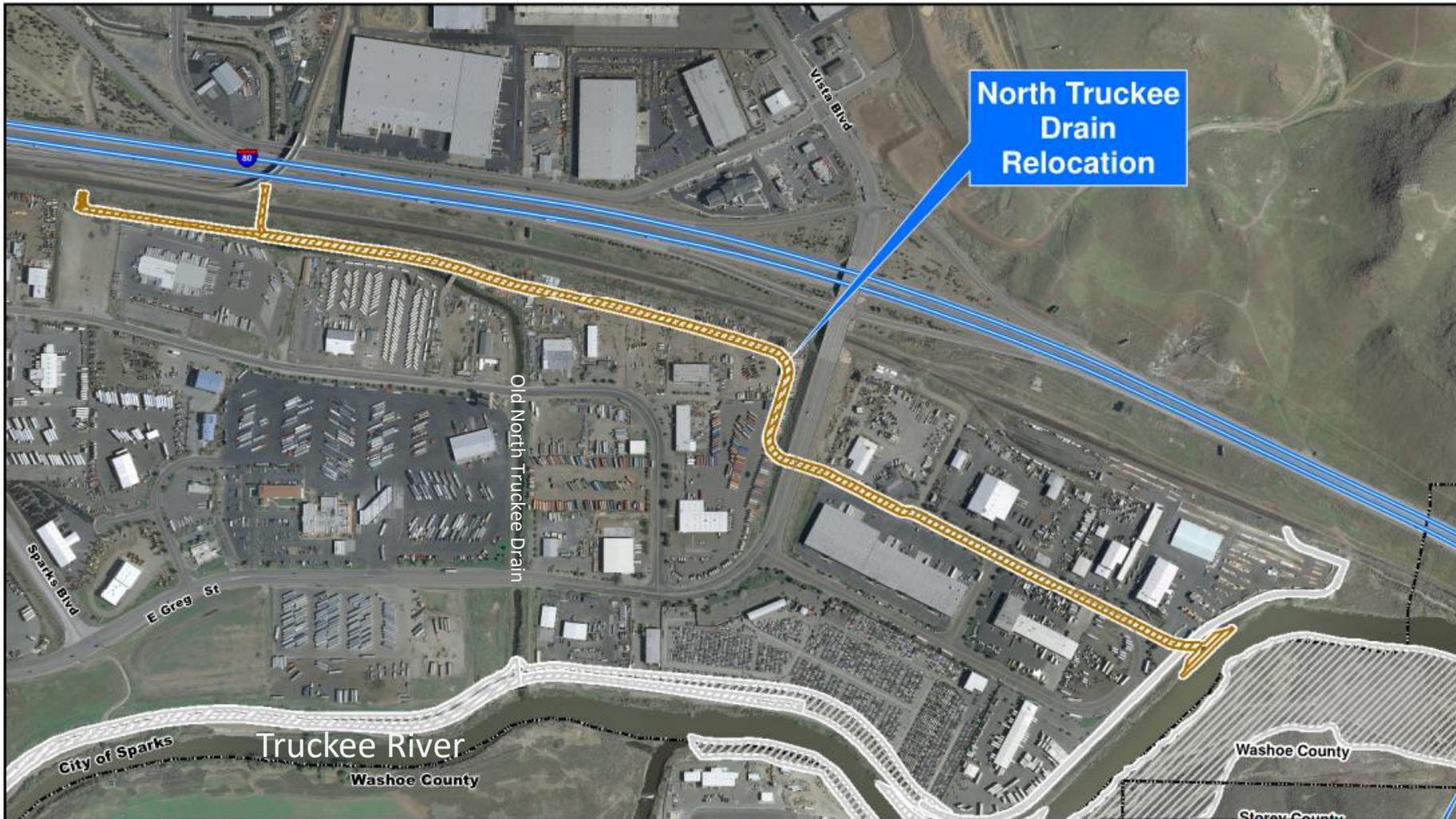
Page: Index ii



Spanish Springs Watershed Map
FIGURE 5



North Truckee Drain Watershed Map
FIGURE 6



LRP (100 YR - Feasibility): North Truckee Drain Relocation



0 500 Feet

MapBook3 (0.mxd) j:\StatePlane_Nevada_West_FPS_2703_Feat\NAD_1983 Printed: October 2013

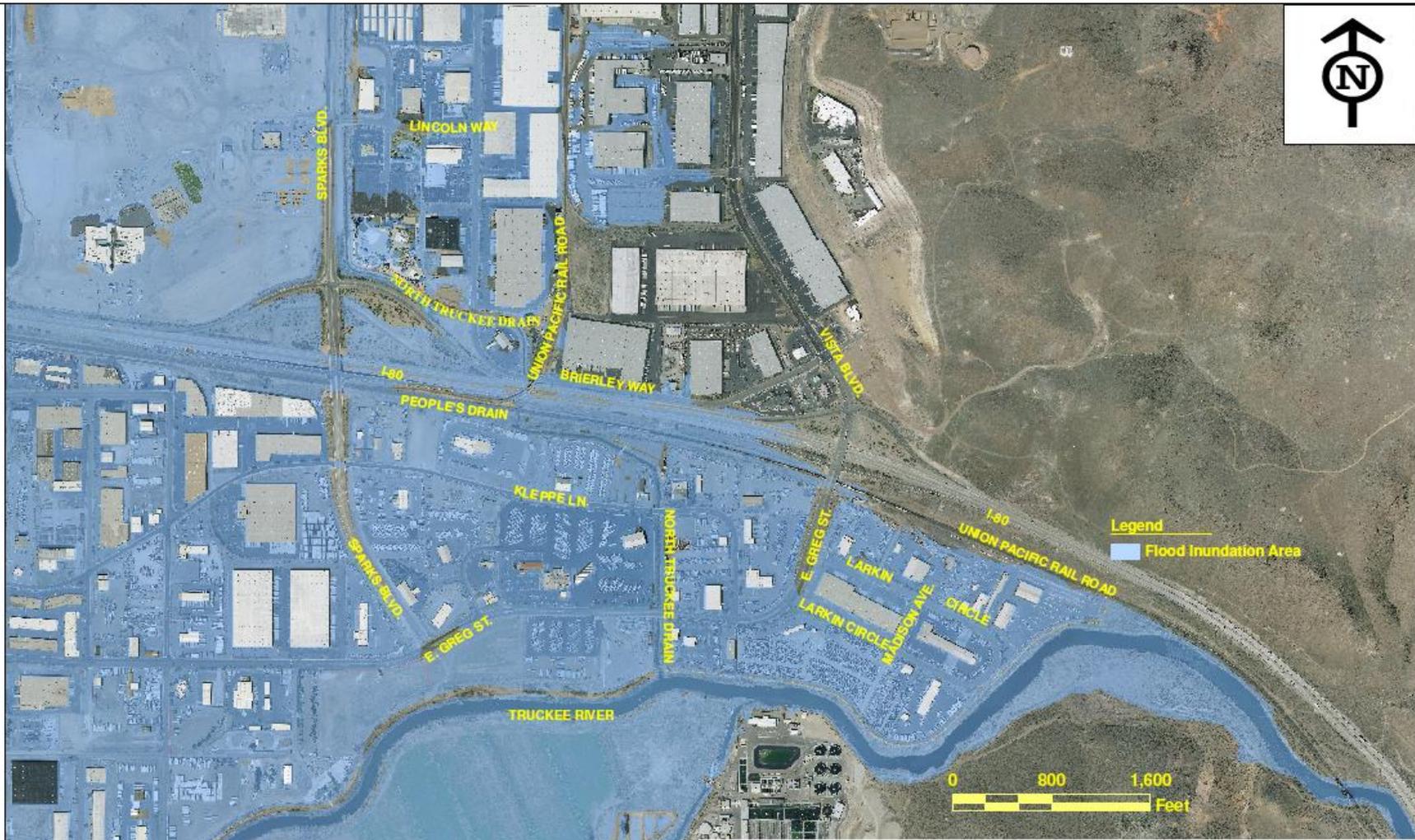
Projects

- | | | | | |
|---------------------------|-----------------------|------------------------|--------------------|-------------------------|
| Terracing & River Parkway | Setback Floodwall | Replaced In-Channel FW | Detention Facility | City/County Boundaries |
| River Park Lands | Levees | Closed Conduit | Road Realignment | Pump Station |
| Bridge Replacements | Erosion Protection | Flood Proofing | Ditch Realignment | Property to be Acquired |
| Bridge Extensions | New On-Bank Floodwall | Reclaimed Water Pipe | On Adjacent Sheet | Flood Gate |



Oct. 11, 2013





HDR
HDR Engineering Inc.
9805 Double R. Blvd.
Suite 101
Reno, NV 89521
Phone: 775-337-4700

**FLOOD INNUNDATION AREAS FROM
117YR EXISTING CONDITIONS FOR
NORTH TRUCKEE DRAIN REALIGNMENT**

Preliminary Design Report

DATE	Oct 07, 2009
FIGURE	30



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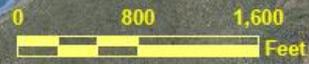
**FLOOD INNUNDATION AREAS FROM 117-YR
STAND ALONE MODEL FOR
NORTH TRUCKEE DRAIN REALIGNMENT**

Preliminary Design Report

DATE	Oct 07, 2009
FIGURE	31



Legend
Flood Inundation Area



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Suite 101
Reno, NV 89621
Phone: 775-337-4700

**FLOOD INNUNDATION AREAS FROM
117 YR LPP PROJECT BUILDOUT FOR
NORTH TRUCKEE DRAIN REALIGNMENT**

Preliminary Design Report

DATE
Oct 07, 2009

FIGURE
32

North Truckee Drain Major Components

- Culvert Replacement for Sparks Blvd Offramp
- Wetlands Mitigation
- 4,700 LF of Double 14' X 10' RCB
- 930 LF of 14' X 8' RCB
- 3,000 LF of Parallel Storm Drain
- Reconstruction of Greg Street from Larkin Circle to the I-80/Vista Blvd. Interchange



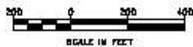
I-80 Culvert Replacement

South Larkin Circle Storm Drain Replacement



- LEGEND**
- PARCEL BOUNDARY
 - PERMANENT EASEMENT
 - CONSTRUCTION EASEMENT
 - UPPER-MOIST RIGHT OF WAY

**DRAFT
NOT FOR CONSTRUCTION**



**NORTH TRUCKEE DRAIN
LARKIN CIRCLE ALIGNMENT**

SPARKS, NV

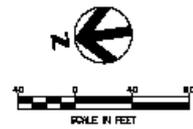
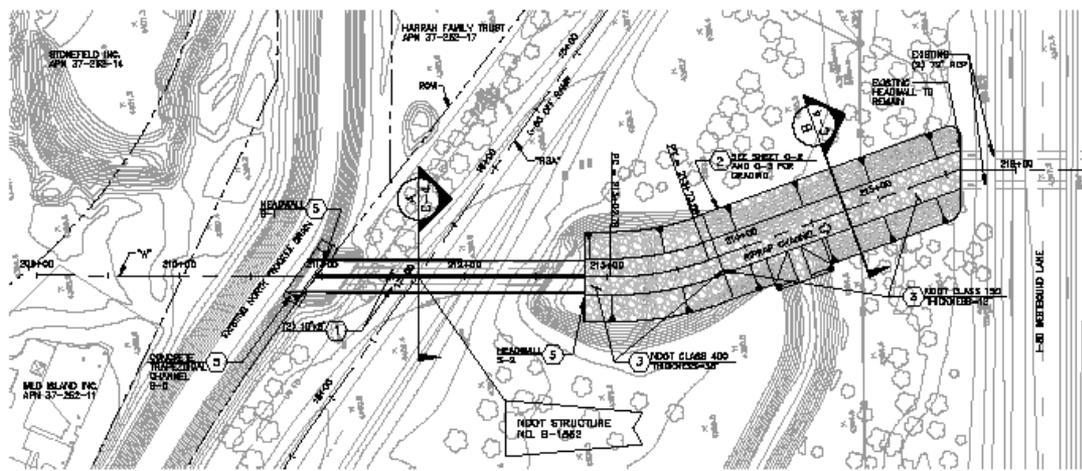
DATE: 12/14/2009

TITLE:

I-80/Sparks Blvd Offramp Culvert Major Components

- 191 LF of Double 10' X 6' RCB
- 1,200 CY of Riprap Channel Lining
- New Tie Into the NTD Channel
- New Outlet Headwall





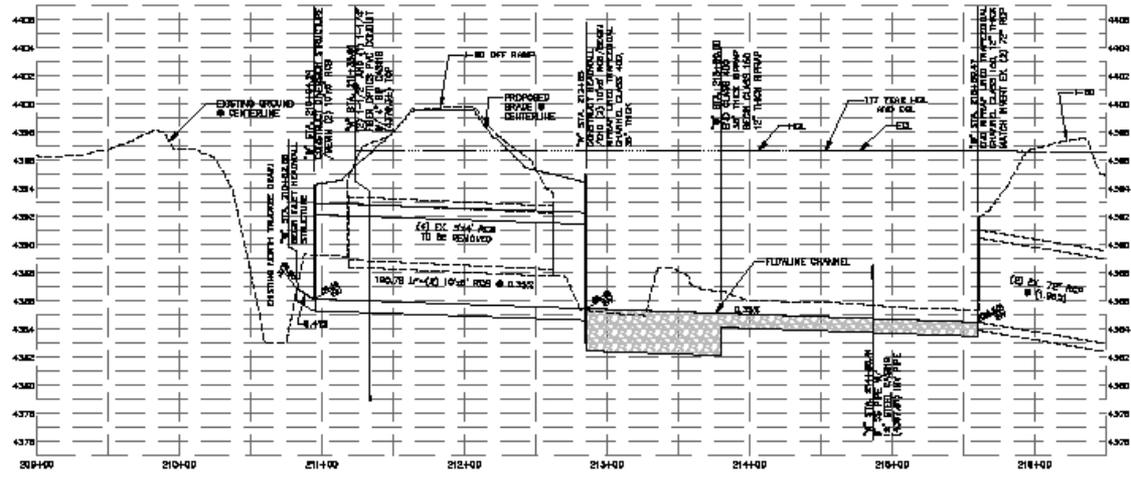
DRAINAGE NOTES:

- 1. INSTALL STORM DRAIN RCP, SIZE AS SHOWN ON PLAN PER DETAIL 1, SEE SHEET C-2.
- 2. CONSTRUCT TRAPEZOIDAL CHANNEL, SEE DETAIL 2, SHEET C-5.
- 3. INSTALL REBAR, SIZE AND THICKNESS AS SHOWN ON PLAN.
- 4. CONSTRUCT STRUCTURE PER "A" SHEET AS NOTED.
- 5. CONSTRUCT CONFLUENCE STRUCTURE PER "B" SHEET AS NOTED.

THIS IS A GENERAL LIST. NOT ALL ACTIVITIES ARE LISTED.

NOTES:

- 1. PROTECT EXISTING FEATURES IN PLACE UNLESS NOTED OTHERWISE.
- 2. SEE SHEETS HD-1 AND HD-2 FOR HORIZONTAL CONTROL.
- 3. SEE SHEETS C-2 AND C-3 FOR SURFACE GRADING AND DRAINAGE.



1-800-271-2930

CITY ALERT

775-834-7590

11 Denny Construction Inc
When Your Utility Needs

SHEET NO	5			SHEET OF	15		
NOTICE - CHANGE ORDER # TO MOIST CONTRACT SUMMARY							
PLAN AND PROFILE W/ STA. 209+00 TO STA. 218+00 CITY OF SPARKS, NEVADA, PUBLIC WORKS DEPARTMENT							
DESIGNED BY	E.C.	CHECKED BY	J.L.	SCALE	1"=40'	DATE	11/10/10
APPROVED BY	 J.R. HARRIS CIVIL ENGINEER STATE LICENSE # 10000			FIELD BOOK			



PETRO

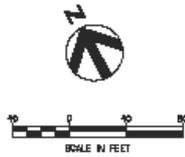
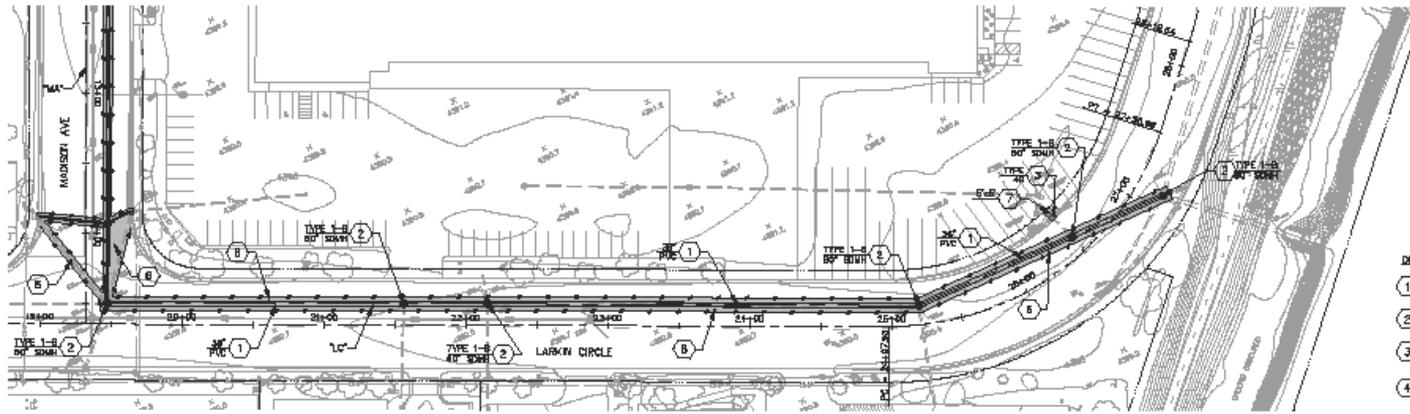
DEERE



South Larkin Circle Storm Drain Major Components

- 762 LF of 36-inch RCP
- 365 LF of 24-inch RCP
- 5 Drop Inlet Replacements





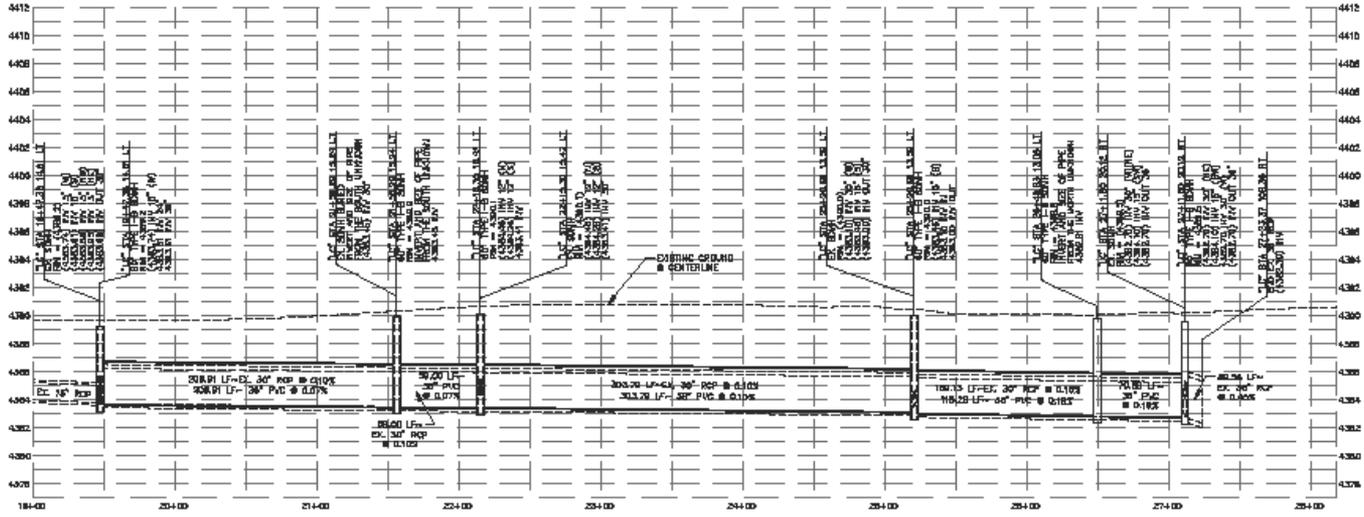
DRAINAGE NOTES :

- ① INSTALL STORM DRAIN PIPE, SIZE AND TYPE AS SHOWN ON PLAN.
- ② CONSTRUCT MANHOLE, SIZE AND TYPE AS SHOWN ON PLAN.
- ③ CONSTRUCT DRAIN INLET, SIZE AND TYPE AS SHOWN ON PLAN.
- ④ CONSTRUCT TYPE 3 P.C.C. BOLL CURB AND GUTTER PER DETAIL 1, SHEET C-3. LOCATION AND LENGTH PER SHEET 1E-1.
- ⑤ LATERAL CONNECTION PER DETAIL 14, SHEET C-4.
- ⑥ CONSTRUCT AC PAVEMENT PATCH PER DETAIL 2, SHEET C-3.
- ⑦ CONSTRUCT CONCRETE PATCH SIZE AS SHOWN ON PLAN PER DETAIL 16, SHEET C-4.

THIS IS A GENERAL LIST. NOT ALL ACTIVITIES ARE USED.

NOTES

- 1. PROTECT EXISTING FEATURES IN PLACE UNLESS NOTED OTHERWISE.
- 2. MANHOLE INVERT ELEVATIONS SHOWN ARE TO CENTER OF MANHOLE.
- 3. STORM DRAIN LENGTHS SHOWN ON PROFILES ARE FROM CENTER OF MANHOLE/DRAIN INLET TO CENTER OF MANHOLE/DRAIN INLET.



MANHOLE AVENUE AND SOUTH LARKIN CIRCLE STORM DRAIN REPLACEMENT STORM DRAIN PLAN AND PROFILE SOUTH LARKIN CIRCLE	
CITY OF SPARKS, NEVADA, PUBLIC WORKS DEPARTMENT	
765 ESSENTIAL MET FOR CONSTRUCTION MARCH 2008	SHEET NO C-2
DIVISION: P.W. DIVISION DRAWN BY: J.E. COLE CHECKED BY: J.E. COLE APPROVED BY: [Signature] SCALE: AS SHOWN PLOT DATE: 7-26-07 PLOT SCALE: 1"=40' PLOT DATE: 7-26-07	
REV: 10	DATE: 11/20/07
REV: 09	DATE: 11/20/07
REV: 08	DATE: 11/20/07
REV: 07	DATE: 11/20/07
REV: 06	DATE: 11/20/07
REV: 05	DATE: 11/20/07
REV: 04	DATE: 11/20/07
REV: 03	DATE: 11/20/07
REV: 02	DATE: 11/20/07
REV: 01	DATE: 11/20/07

Call before you Dig

1-800-227-2800

SAFETY ALERT

Call before you Overhead

775-834-7590

RV Energy Services, Inc.
6665 Pkwy. (at Lake Blvd)
Sparks, NV 89414

Wetlands Mitigation

- Regraded and Realigned 3,150 ft of channel
- Construction Completed in 2013 by RTC Construction for \$447K
- Wetlands Mitigation Design



Wetlands Mitigation

NTD Channel @ Los Altos



NTD Wetlands Mitigation



Construction

- Construction in 3 Phases
- Q&D Awarded \$9.1M Contract for Phase 1
- Phase 1 Given NTP on January 12, 2014
- Phase 2 Was Constructed as Part of a \$3.4M Change Order
- Phase 3 Was Awarded to Q&D for \$14.1M in January 2017 and was completed in 2018



Construction

- Cast in Place Construction
- Completing 40 ft Every Other Day
- High-Early Concrete
- Pre-tied Reinforcing Mats
- Slide Rail Shoring System
- Traveling Form System



Slide Rail Shoring System



Slide Rail Shoring System



Slide Rail Shoring System



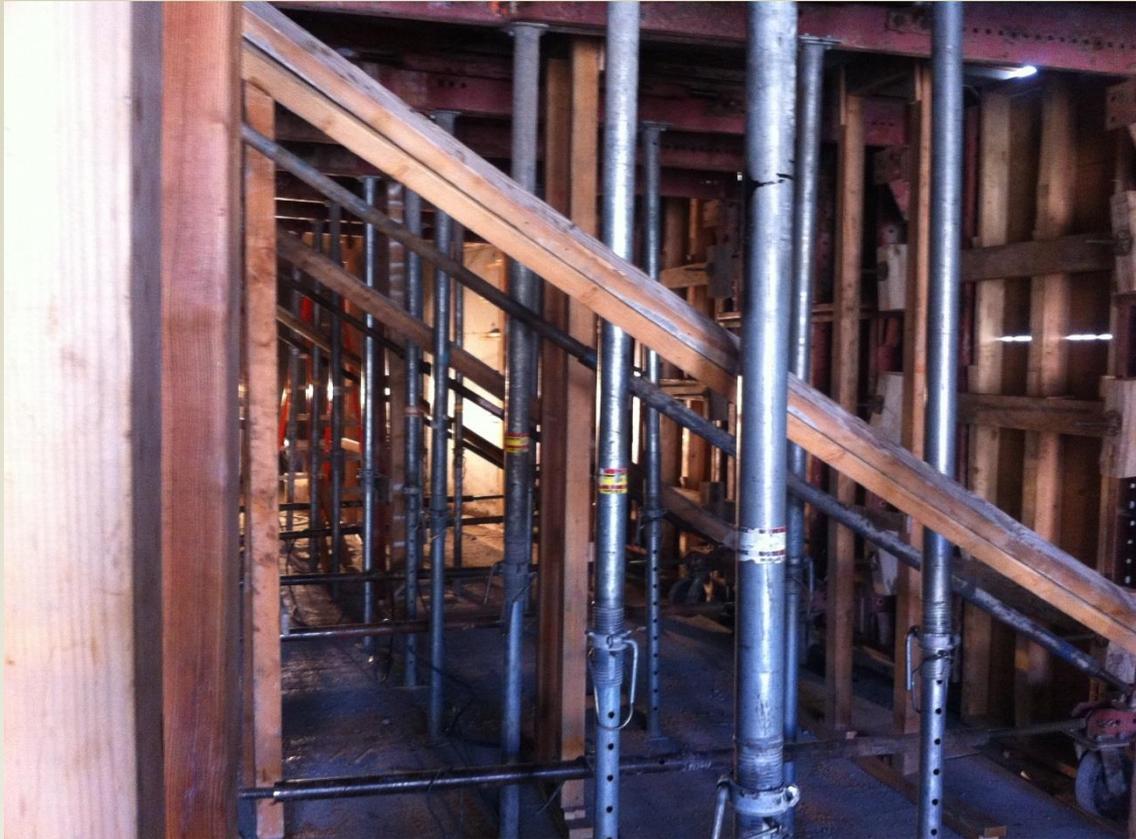
Slide Rail Shoring System



Traveling Form System



Traveling Form System



Traveling Form System



Gantry System



Traveling Form System

- Curved Alignment



Greg Street Crossing



Truckee River Outlet



Questions

