- What safeguards exist to prevent ruptures in the SDS Pipeline through Pueblo County?
    - The SDS pipeline is designed to meet and exceed the recognized water system industry standards (American Water Works Association) for internal pipeline pressures and pipeline wall thickness.
    - The SDS pipeline is designed to accommodate operating pressures and pressures that occur during unplanned events such as power outages at the pump stations. These short term instantaneous events are called surge events. A surge event is a rapid short term change in pressure or water velocity in the pipeline that creates a wave-like action that osculates inside the pipeline and then dissipates.
    - The SDS conveyance system is equipped with a surge protection system, which includes surge tanks located at the pump stations and combination air vacuum/air relief valves located at high points along the pipeline.
    - The surge tanks act like a shock absorber to dissipate system pressure during a surge event. If a surge event occurs, the surge tank will allow air to rapidly exit and enter the tank reducing the pressure and protecting the pump station and pipeline. The surge tanks are partially filled with water creating a cushion of air at the top of the tank. Water level and air volumes are monitored and controlled through an electronic supervisory control and data acquisition system (SCADA).
    - The combination air vacuum/relief valves allow air to enter and exit the pipeline. During pipeline fill the combination air vacuum/relief valves will release air, and during draining operations or surge events they will allow air to enter the pipeline. This protects the pipeline from rupture during these events by allowing air to move in and out of the pipeline in a controlled and safe manner.
    - The combination air vacuum/relief valve appurtenances were designed with a redundant combination air vacuum/relief valve; therefore, at any appurtenance one valve can be taken offline and the system is still safeguarded against a system surge.
    - Each section of pipeline is hydrostatically tested to a pressure 1.5 times the design working pressure. Therefore, every stick of pipe will have been tested for pressure and inspected for leaks prior to system startup.
    - For the higher pressure sections of pipe (i.e. immediately after the pump station) the pipe joints are welded using a butt-strap joint weld. Each butt-strap weld is inspected radiographically (x-rayed) in accordance with *ASME BPVC SEC VIII, Div. 1, Par. UW-52;* furthermore 100 percent of the welds are examined ultrasonically. As a result, each butt-strap weld is redundantly inspected using two methods to ensure quality control.
- What shutoff valves, blow off vents, emergency drains, leak detection devices and other facilities exist along the pipeline and at what interval?

- The primary shut off valves are located at the inlet and outlet at the Juniper Pump Station. A shutoff valve, also referred to as an isolation valve, is a valve that stops the flow of water through a pipeline. A shutoff valve can also be used to release the flow of water through a pipeline by slowly opening the valve.
- There are 16 blowoff appurtenances along the SDS alignment in Pueblo County, including discharge structures at the Juniper Pump Station. Seven of the 16 blowoffs have discharge piping; the remaining blowoffs would require pumping to release water. The purpose of pipelines blowoffs is to allow for controlled dewatering of localized segments of the pipeline, in the rare event that access to the pipeline is needed for maintenance.
- The blowoff assemblies consist of a small diameter pipeline that is attached to the main SDS pipe, an isolation valve, standpipe, and in some cases a blowoff structure (see Figure 1 and 2). To release water from the main pipe, Utilities is required to obtain a discharge permit from the State of Colorado; once the permit is approved, the operations staff would use the isolation valve to control the volume and rate of water released.
- There are 17 combination air vacuum/air relief valve appurtenances along the SDS alignment in Pueblo County. The combination air vacuum/air relief valves are a part of the surge system.
- The blowoff and combination air vacuum/air relief valve appurtenances are positioned based on the topography of the land. The blowoffs are situated at low points in the alignment, and the combination air vacuum/air relief valves are placed at the high points. Consequently, there is no set interval/distance for the appurtenance spacing. Locations of the appurtenances are shown on the attached figures.
- The combination air vacuum/air relief valves are placed at the high points because as water moves through the pipeline, trapped air will naturally rise to the high points in the alignment. The blowoff appurtenances are placed at the low points because as air enters the pipeline during a draining operation, the water will naturally flow to the lowest points in alignment enabling the water to be released.
- The appurtenances are housed in buried vaults protected by steel bars across the access hatches and secured with Utility issued locks. Each vault has an air vent that extends to the surface to provide ventilation.
- At the Juniper Pump Station there are leak detection sensors in the valve vaults and the pump room. If there were at leak at the pump station, the sensors would send an alarm to the operations staff.

- What would the timing and protocols for responding to such an emergency?

- In the event of an emergency, the SDS control room, located at the SDS Water Treatment Plant, would execute the appropriate emergency response. The response time is dependent on location, type of emergency and required resources.
- The primary shutoff valves and pumps at Juniper Pump Station are automated; therefore, depending on the situation, the required response and mitigation could be immediate. The approximate "windshield time" to the Juniper Pump Station, the farthest point from Colorado Springs, could be between an hour to an hour and half.

- What volumes and rates of flows might be encountered?
  - The maximum discharge rate for any blowoff appurtenance is limited to the 2-year storm event for the receiving channel as required in the Final EIS for SDS. The 2-year storm event has a 50% chance of happening in any given year. The volume of water that can be released to a given creek depends on the size of the receiving water body. The larger the creek, the more water the water body is capable of receiving during the 2-year storm event. The following table summarizes the maximum flow for the respective blowoff appurtenance, the 2-year Peak Discharge for the receiving water body, and the approximate volume to drain:

	Blowoff Appurtenance	Maximum Flow [1] (cfs)	2-year Peak Discharge (cfs)	Approx. Volume to Drain (ft^3/MG)
1	BO S1-1	4.2	13[3]	136,729/1.02
2	BO S1-2	0.67[2]	8[3]	11,879/0.09
3	BO S1-3	0.67[2]	55[3]	9,622/0.07
4	BO S1-4	0.67[2]	9[3]	19 ,007/0.14
5	BO S1-5	0.67[2]	14[3]	33,262/0.25
6	BO S2-1	16.8	74[3]	532,186/4.00
7	BO S2-2	4.2	126[3]	129,483/1.00
8	BO S2-3	0.67[2]	N/A	33,262/0.25
9	BO S2-4	0.67[2]	N/A	34,450/0.25
10	BO S2-5	0.67[2]	N/A	78,402/0.60
11	BO S2-6	2.1	40[3]	102,161/0.80
12	BO S3-1	4.2	22.37[3]	106,912/0.80
13	BO S3-2	4.2	34.01[3]	79,590/0.60
14	BO S3-3	0.67[2]	13.93[3]	14,730/0.11
15	BO S3-4	4.2	30.31[3]	52,268/0.39
16	BO S4AW-1	16.8	712.6[4]	338,009/2.53

[1] Maximum flow is based on a peak velocity of 12 ft/s and blowoff pipe size

[2] Colorado Springs Utilities operations staff has indicated that the largest pump that can be used for pump out blowoffs is a 4-inch pump with a 0.67 cfs (300 gallon per minute) flow rate.

[3] The channel forming flows for the drainagaes associated with each blowoff structure approximated using the regression question for the 2-year return interval peak discharge developed by the U.S. Geological Survey (USGS). From the USGS Analysis of the Magnitude and Frequency of Floods in Colorado

[4] For the blowoffs located within the S4AW pipeline section, the rational method is used to determine the 2-year peak flow for those basins with a drainage basin less than 100 acres and the U.S. Soil Conservation Service (SCS) hydrograph procedure is used to determine the 2-year peak flow for those basins with a drainage basin greater than 100 acres.

1041 2008-002

BLOWOFF- PUMP OUT ONLY

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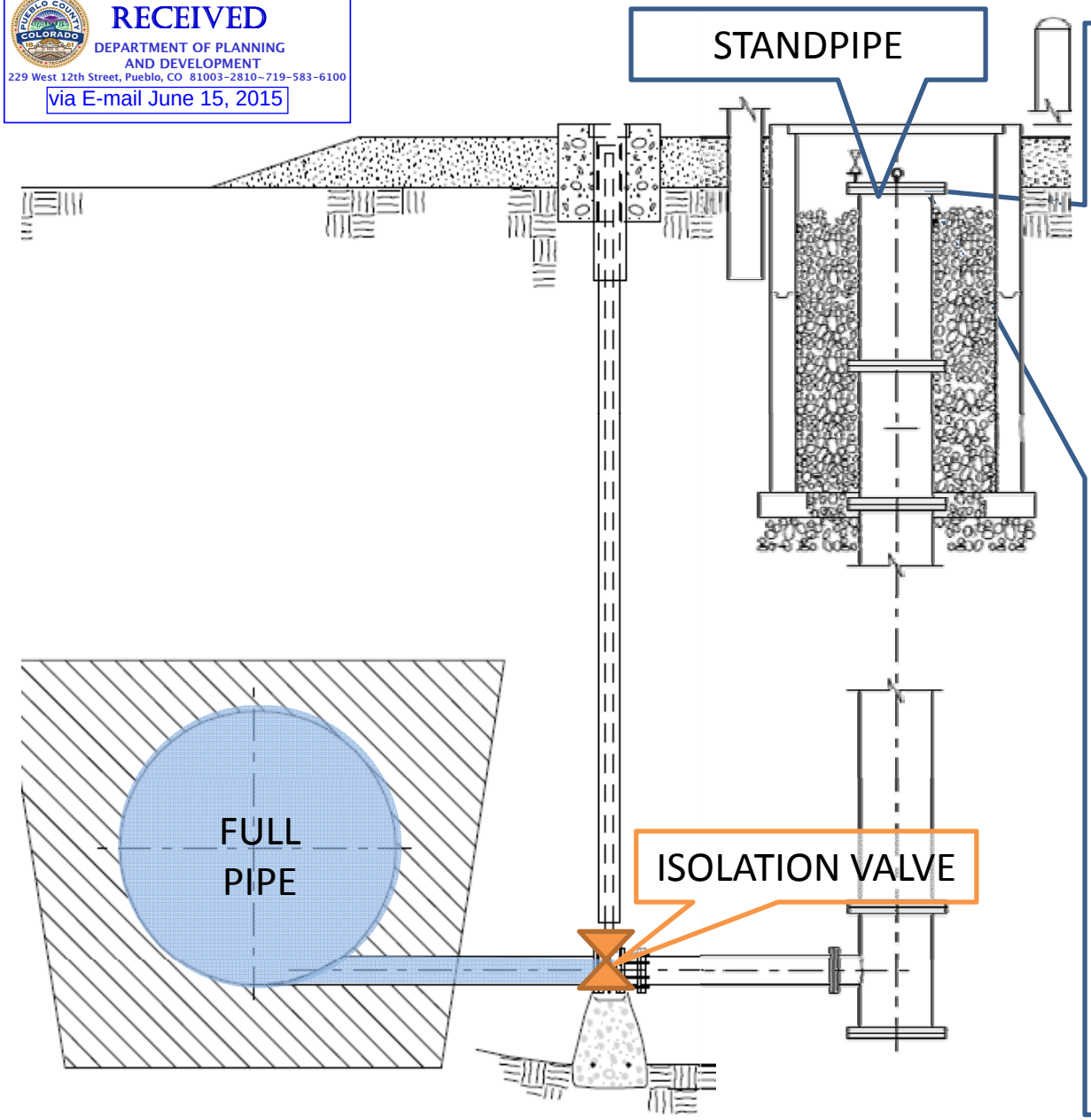
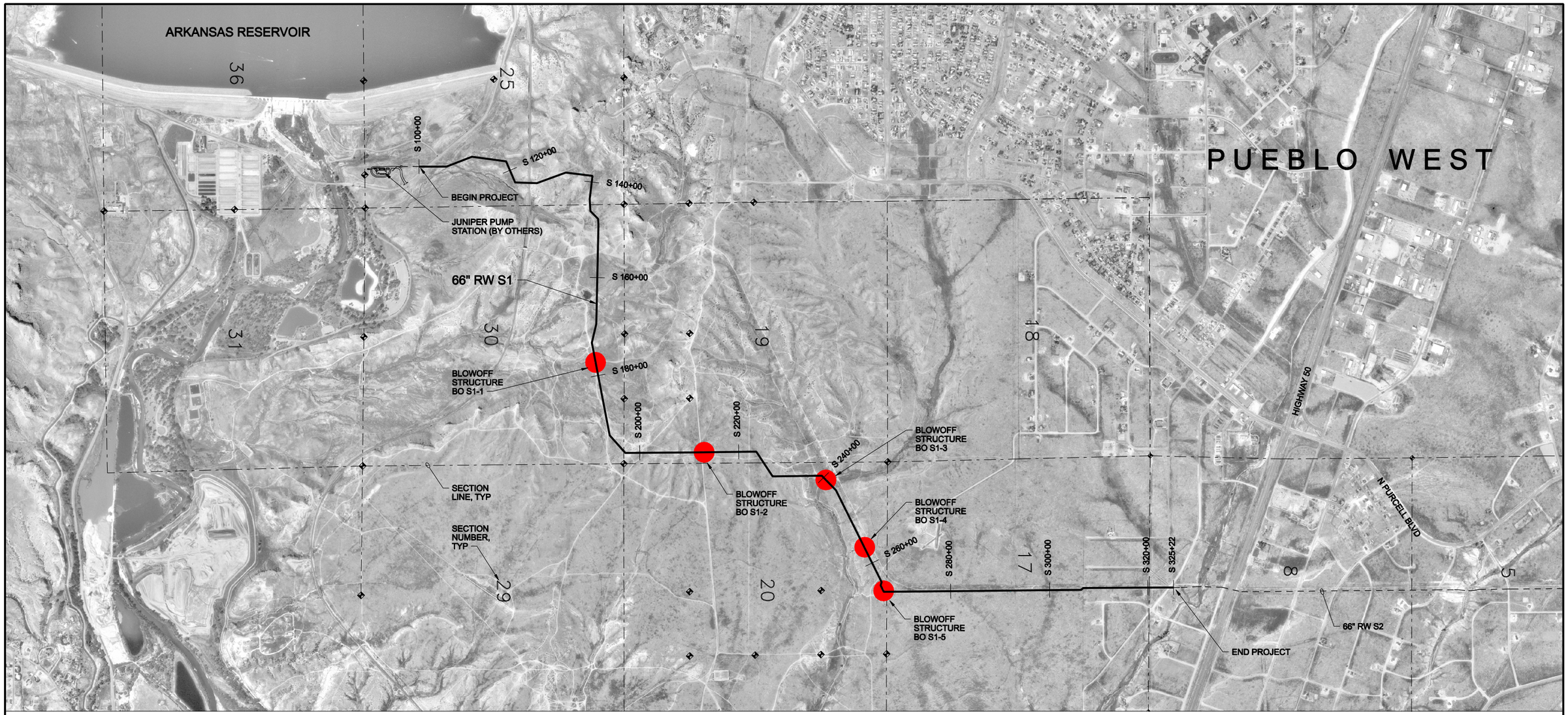
DEPARTMENT OF PLANNING
AND DEVELOPMENT
229 West 12th Street, Pueblo, CO 81003-2810~719-583-6100
via E-mail June 15, 2015



1041 2008-002

BLOWOFF - DISCHARGE PIPE

DISCHARGE STRUCTURE



LEGEND

- SECTION CORNER
- BLOWOFF
- RW RAW WATER

0 1000 2000 3000
SCALE IN FEET

FIGURE 20-A-3.6.2-1
BLOWOFF STRUCTURE LOCATIONS
SOUTH SECTION ONE
SOUTHERN DELIVERY SYSTEM
RAW WATER PIPELINE

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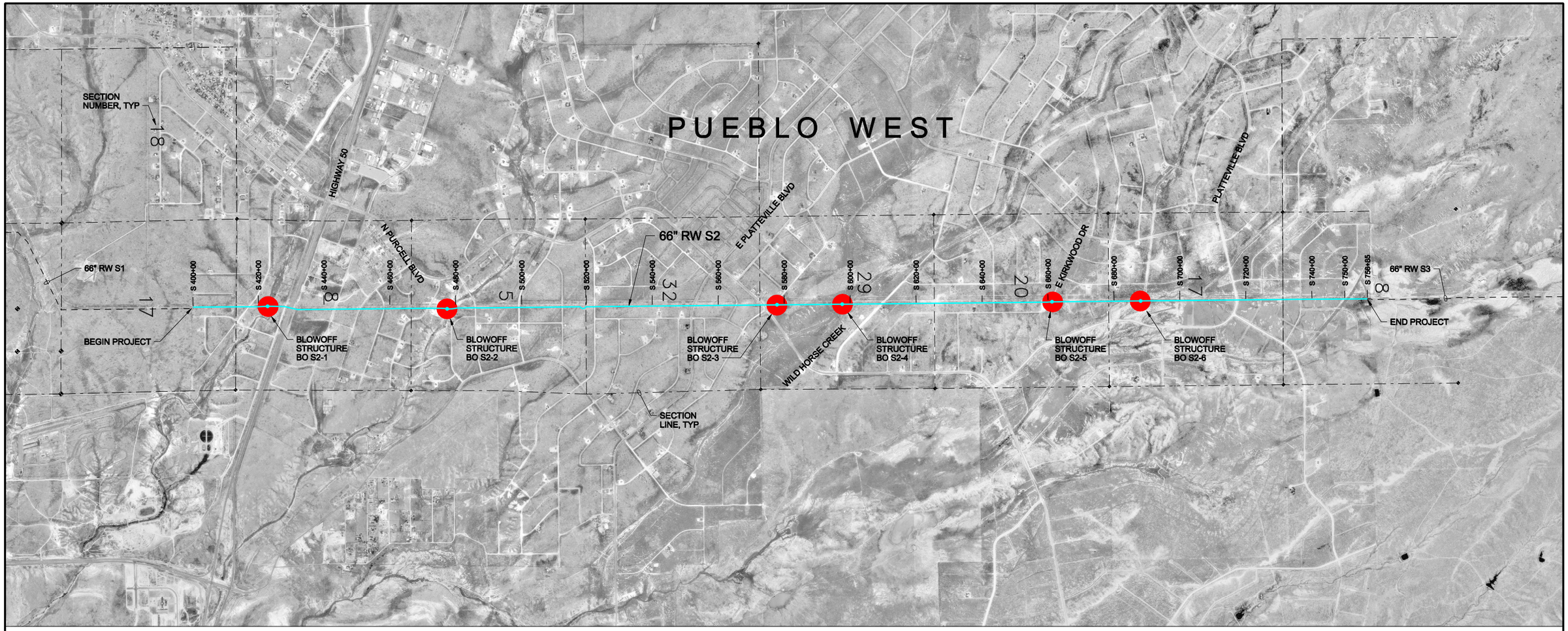

LEGEND

- SECTION CORNER
- BLOWOFF
- RW RAW WATER

N

0 1500 3000 4500

SCALE IN FEET

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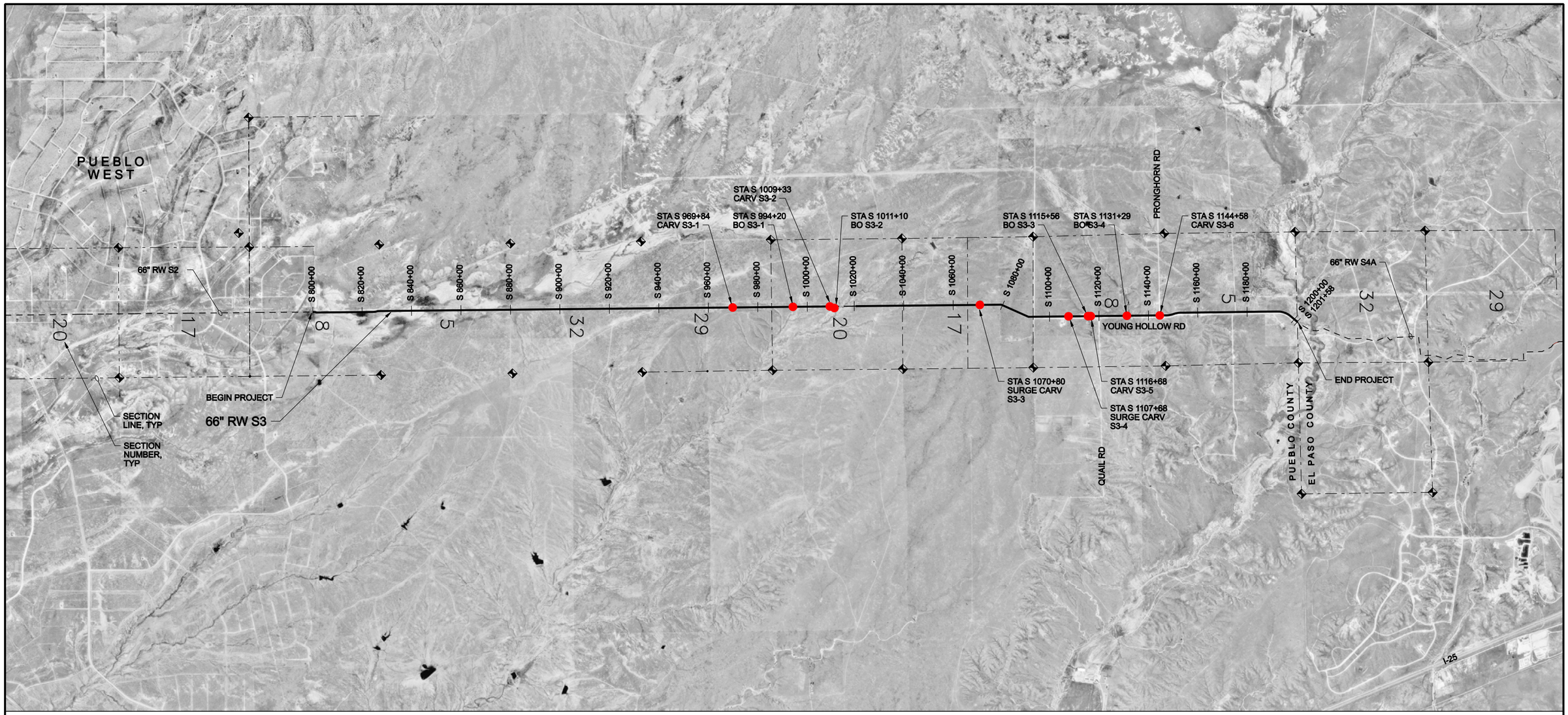
FIGURE 20-B-3.6.2-1
BLOWOFF STRUCTURE LOCATIONS
SOUTH SECTION TWO
SOUTHERN DELIVERY SYSTEM
RAW WATER PIPELINE

sds2bostructs_171473.dgn



LEGEND

- SECTION CORNER
- BLOWOFF, CARV, SURGE CARV
- RW RAW WATER

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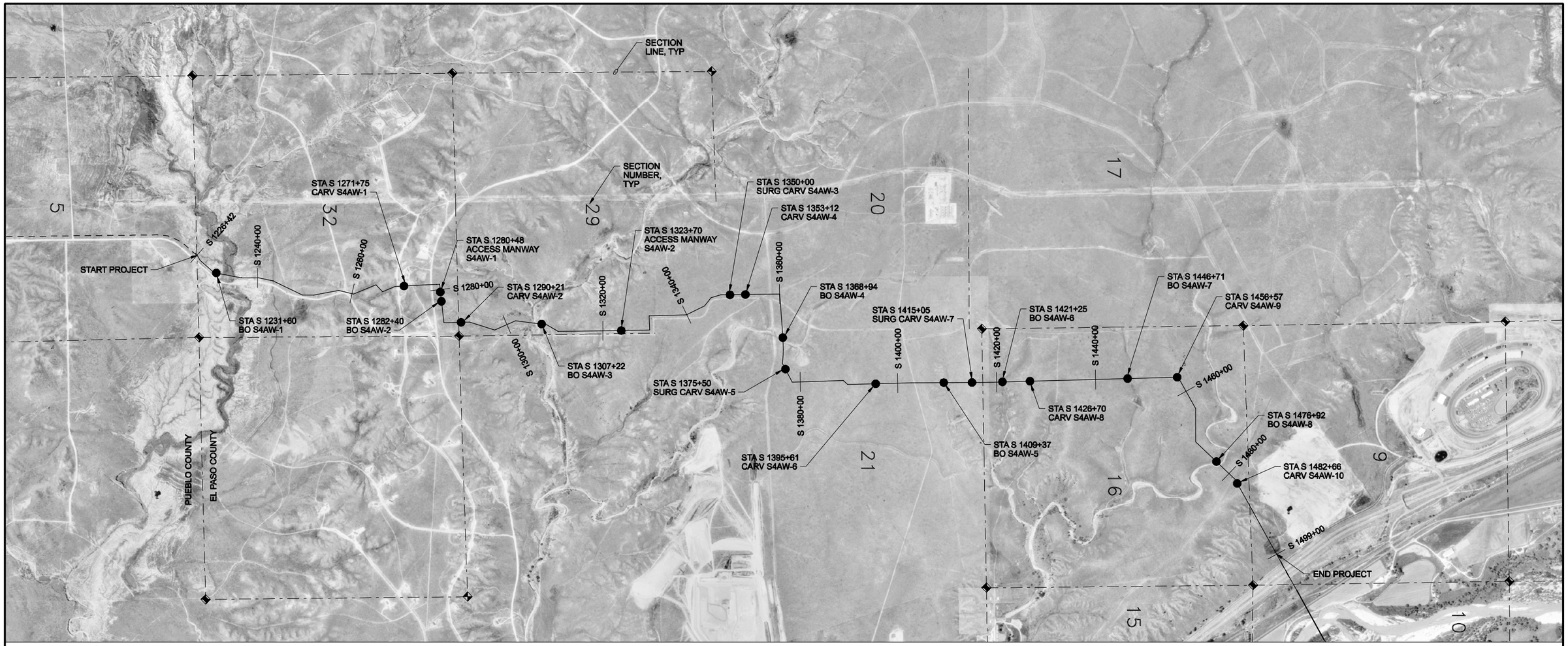
N

0 1000 2000 3000
SCALE IN FEET

FIGURE S3-7.1.8.3-1
BLOWOFF DISCHARGE & RECOMMENDED APPURTENANCE LOCATIONS
SOUTH SECTION THREE
SOUTHERN DELIVERY SYSTEM
RAW WATER PIPELINE

sdS3AppurtLocs_



LEGEND

- SECTION CORNER
- BLOWOFF, CARV, SURGE CARV, ACCESS MANWAYS
- RW RAW WATER

FIGURE S4A-8.2.4-1
BLOWOFF DISCHARGE & RECOMMENDED APPURTENANCE LOCATIONS
SOUTH SECTION FOUR A WEST
SOUTHERN DELIVERY SYSTEM
RAW WATER PIPELINE

sdS3AppurtLocs_