AMAFCA Comments for Marble-Arno Pump Station & Pond LOMR Submittal dated July 2023

MARBLE ARNO LETTER OF MAP REVISION

PREPARED BY

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PREPARED FOR

ONE ALBUQUERQUE

JULY 2023
RESPEC Project Number 04270.0005

RESPEC

CERTIFICATION

I, Edward C. Naidu, do hereby certify that this report was duly prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the state of New Mexico.

Edward C. Naidu, P.E.
NMPE No. 22997

July 06, 2023
Date

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOGRAPHS

No table of figures entries found.

DEFINITION OF ACRONYMS

CFS – Cubic Feet per Second

LOMR – Letter of Map Revision

DAR – Drainage Analysis Report

DEM – Digital Elevation Model

FEMA – Federal Emergency Management Agency

FIS – Flood Insurance Study

MRCOG – Mid-region Council of Governments

MVDMP – Mid-Valley Drainage Management Plan

SBSDMP – South Broadway Sector Drainage Management Plan

SWMM – Storm Water Management Model

1.0 GENERAL PROJECT INFORMATION

1.1 PROJECT DESCRIPTION AND PURPOSE

The purpose of this report is to document the analysis procedures implemented in support of an application for a Letter of Map Revision (LOMR) for the existing Zone AH in the area surrounding the Broadway and Lomas intersection in downtown Albuquerque as shown in **Figure 1**. This area has been historically prone to flooding due to the lack of capacity in the storm drains and the old age of the original Broadway Pump station, which was built in 1956 and had malfunctioned several times causing flooding in the area. The basis of this application is the construction of the Marble-Arno stormwater pump station, outlined in red, and associated storm drainage improvements.

Figure 1: Vicinity Map

1.2 PREVIOUS STUDIES

The hydrologic, hydraulic analysis, and SWMM model development used for this LOMR is based on the Mid Valley Drainage Master Plan, 2012, and subsequent design analysis reports. Minor basin boundary modifications were made to improve the homogeneity of the basins and to account for post construction. All referenced reports are included in **Appendix 2**.

These reports include:

- *Mid-Valley Drainage Management Plan (MVDMP),* completed by Smith Engineering Company in 2012, is the master plan study in which the original hydrologic and hydraulic analysis for the watershed was developed. The MVDMP's proposed conditions model had to be modified with an addendum to account for surface runoff hydrograph that was predicted by the South Broadway Drainage Master Plan. This hydrograph was expected to impact the Broadway Lomas intersection with an estimated flow of 239 cfs and approximately 11-acre feet of volume. Because this result was made available after the MVDMP was completed, an amendment to the MVDMP proposed conditions model was made so that any ponding/pump station facility at Marble-Arno would have to accommodate this hydrograph referred to as the North Flow Hydrograph. No changes were made to the existing conditions model at that time.
- *South Broadway Drainage Management Plan (SBDMP):* This study was completed by URS in 2013 in conjunction with the Mid-Valley Drainage Management Plan in 2013 for the adjacent southern watershed to the Mid-Valley Drainage Master Plan. This study developed the North Flow Hydrograph that would affect any future project at the Marble Arno location. After the study was completed, there were concerns about the accuracy of the magnitude of the North Flow Hydrograph predicted in this study, however, no further studies were conducted to verify the data after its immediate completion.
- Marble-Arno Storm Drainage Design Conceptual Design Study completed in July 2018 that documents the alternatives considered, selection of the pumps, and final site layout. The construction plans were based on the recommendations of this report and form the primary basis for the LOMR. The original design assumed that the pond, pump station and associated storm drainage system would have to be phased. North Flow Hydrograph created the need for a large ponding and pumps station facility of approximately 33 acre-feet. Additionally, a successive phase would require construction of large diameter storm drains south of Lomas to capture and convey the large flow. However, during the design phase, Smith conducted an impact analysis that performed a detailed review of the source of the North Flow Hydrograph. The study discovered several errors in the SBDM and the size of the North Flow Hydrograph and the final entry points in the Broadway- Lomas system were refined and much reduced. The final design for the facility was refined based on the findings of the South Broadway Impact Analysis Report to the current configuration as constructed.
- *The South Broadway Impact Analysis Report*, conducted by Smith Engineering Company in 2018, was an analysis that was developed during the design of Marble Arno Storm Water Pump station. This study assessed the validity of the North Flow Hydrograph from the SBDMP. This study recognized the fact that there were significant errors made in the development of the North Flow Hydrograph and in the SBDMP model development in general. The SBDMP study had not accounted for the capture capacity of inlets and storm drains in the study area, major obstructions to flow paths formed by urbanization, buildings and roads and incorrect hydrologic modeling assumptions within SWMM. This led to a very large and improbable overland flow that was predicted. Consequently, the South Broadway Impact Analysis factored in the capture capacity of inlets in the tributary area and the conveyance capacity of existing storm drains that was overlooked in the 2013 study.

Based on the excess overland flows, a 2D surface water model was developed to evaluate potential flow paths and flow splits along Broadway Blvd. This refined the locations that the overland flows would drain based on the topography of Broadway between Martin Luther King Jnr Blvd and Lomas. The study concluded that the original overland flows were inaccurate and the design parameters for the Marble-Arno Pump station were modified as reflected in the Marble-Arno Storm Drainage Design Conceptual Design Study. While the study's findings were determined in parallel with the design analysis report for the pump station, the report was finalized and submitted much later in 2019. This was because the funding constraints on the Marble-Arno pumps station project required prioritization of the design analysis report and construction plans.

All reports are included in **Appendix 2**.

1.3 DATUM CONVERSIONS

The design limits are in an older part of the city and as such all elevations are reported in the NGVD 29 datum. As such the National Oceanic and Atmospheric Administration (NOAA) NGS Coordinate Conversion and Transformation Tool (NCAT) was used to convert elevations in the old vertical datum of North Geodetic Vertical Datum (NGVD) 29 to the new datum of NAVD 88. After comparing the differences, an average conversion factor of 2.66 feet was applied to all NGVD 29 data points. See Appendix 2 for the datum conversion obtained from the Mid-Valley Drainage Management Plan.

1.4 EXISTING FEMA FLOODPLAINS

According to the flood insurance study (FIS) from Federal Emergency Management Agency (FEMA), there is an existing flood zone AH in the Marble-Arno Area. The flood zone was obtained from the FIS numbers:

- 35001C0332G
- 35001C0334G

See effective Flood Insurance Rate Map (FIRM), in **Appendix 2**. An overview of the existing floodplains is provided in **Figure 2.** The FIRMS are included in **Appendix 2**.

1.5 FIELD OBSERVATIONS

RESPEC conducted field observations around the Marble Arno Pump Station and the contributing area. This field work consisted of verifying storm drain inlet locations and types, basin boundaries, and the old Post Office Pond.

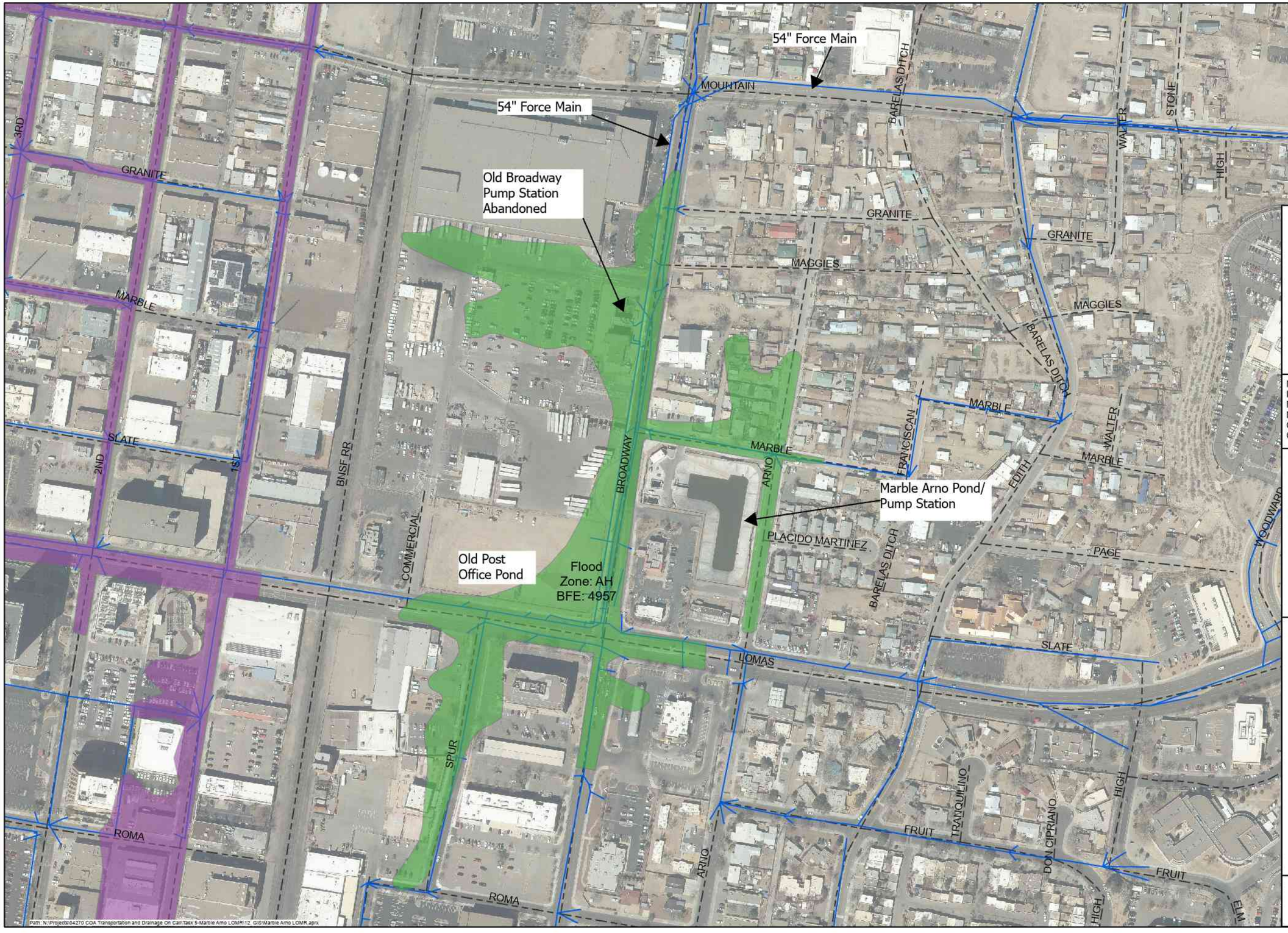
Observed in the field were standard COA type inlets, and curb heights for the intersection of Broadway and Lomas, which are provided as a reference in **Appendix 2**. The documentation of the fieldwork and photos are provided in **Appendix 2**.

1.6 OVERVIEW OF CONSTRUCTION PROJECT

Construction for the Marble – Arno Storm Pump Station and Pond project (COA Project # 5958.92) was completed, and record drawings were provided on February 24th, 2023. The key components of the project were the construction of a 21 acre-ft pond that would act as a wet well for a brand new 47,628 gallons per minute capacity pump station. Large diameter storms were also constructed in Broadway Blvd, Marble Ave,

Arno St, and Lomas Blvd. A new array of inlets on both the north and south side of Lomas Blvd. A full street width transverse inlet was installed on Marble Ave just west of Arno St.

The original Broadway Pump Station was demolished and abandoned, and the Post Office Pond was backfilled as well. The scope of construction is shown in **Figure 3**.



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Notes:
Horizontal Datum:
Name: NAD 1983 HARN StatePlane New Mexico Central FIPS 3002 Feet
Orthophoto Source: MRCOG 2022 Orthophotography Mosaic

Legend

FEMA Flood Zone

- A
- AE
- AH
- AO
- D
- X
- COA Storm Pipes
- COA Streets

Figure 2
Existing FEMA Floodplains
Marble Arno LOMR
July 2023

N

0 125 250
Feet

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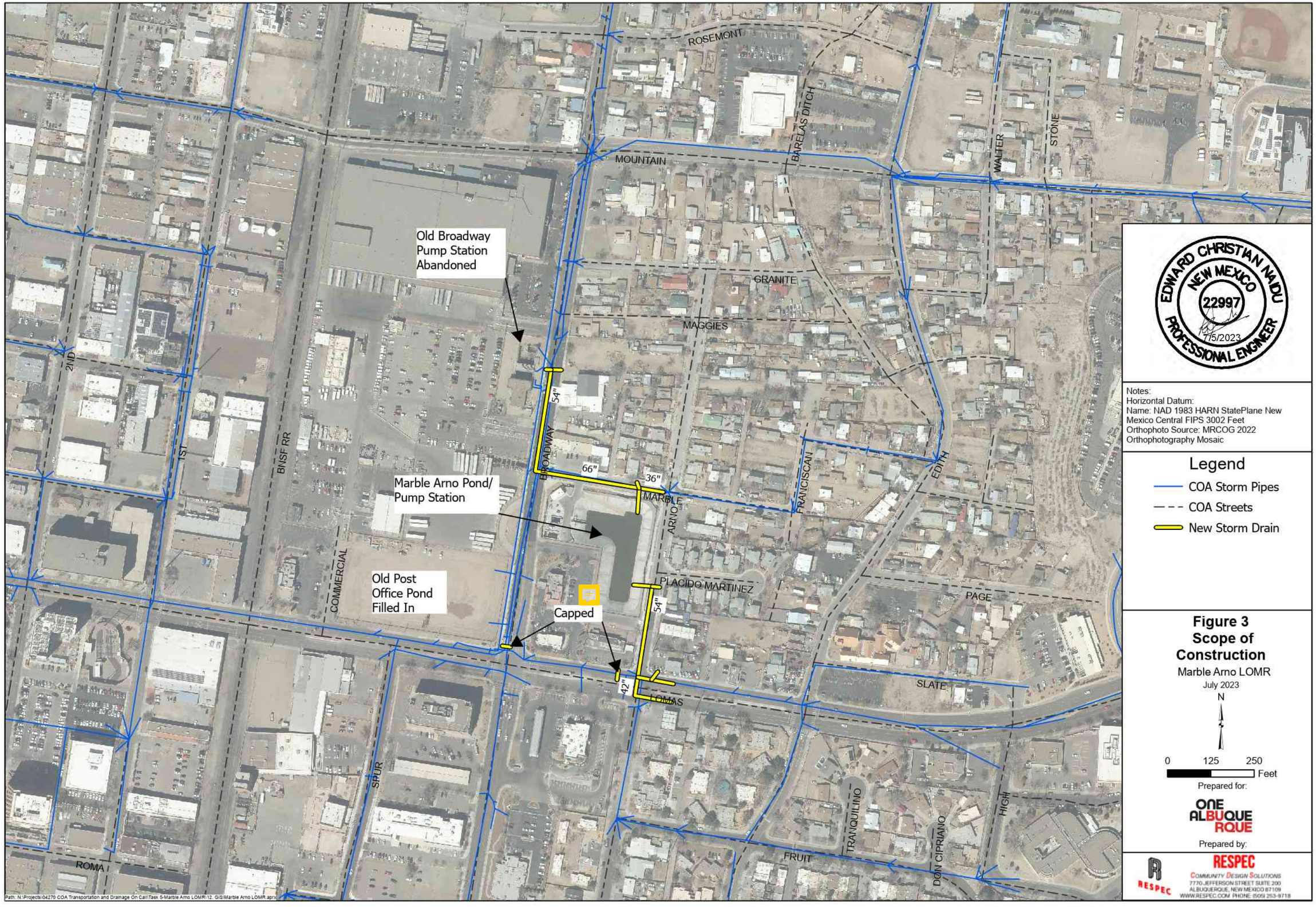

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Orthophoto Source: MRCOG 2022
Orthophotography Mosaic

Legend

- COA Storm Pipes
- COA Streets
- New Storm Drain

Figure 3
Scope of Construction
Marble Arno LOMR
July 2023

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Feet

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2.0 HYDROLOGIC PARAMETERS

2.1 HYDROLOGIC CONDITIONS

The overall watershed delineation, and input parameters for SWMM were computed in the MVDMP in 2013 and were adopted completely for this LOMR. There was no georeferenced digital vector data available for the subbasin boundaries. RESPEC reproduced the subbasins shapes by digitizing data available only in PDF format from the 2013 report. The procedures for input parameter computations are documented in that report which is included in **Appendix 2**. The tributary area has remained the same and most of the subbasin boundaries delineated remained unchanged for the design of the Marble-Arno Pump Station and storm drains with minor exceptions. **Figure 4** shows the preconstruction subbasins affecting the Marble – Arno Pumpstation and Pond as delineated in the MVDMP.

Because of the storm drain construction, a few changes were made to the subbasins which are described below. Post construction modifications are also documented in **Figure 5**.

The modifications to subbasins BR6 and BR19 were largely to account for the construction of the pond, pump station and storm drains. The area for subbasin BR21 was reduced from 23.8 acres to 6.2 acres to account for the transverse grate inlet and storm drain that diverts 40 cfs from the subbasin at the intersection of Medical Arts and Lomas Blvd. Record drawings for the design of the cattle grate inlet is provided in **Appendix 2**. Subbasin BR2 used be the old Post Office Pond along with some commercial development to the west. This was subdivided to make the subbasins more homogenous. There are slight area differences between the MVDMP, and the modifications made in this study. This is because the original boundaries were drawn in AutoCAD and the modifications were drawn in ArcGIS. CAD drawings, once scaled for line weights can change the areas slightly.

Table 1: Summary of Hydrologic Parameters

Original Mid Valley DMP Conditions						Post Construction Conditions					
Basin Name	Area (ac)	Curve Number	Percent Impervious (%)	Peak Discharge (cfs)	Runoff Volume* (ac-ft)	Basin Name	Area (ac)	Curve Number	Percent Impervious (%)	Peak Discharge (cfs)	Runoff Volume* (ac-ft)
BR2	5.67	73	50	13.3	0.8	BR2.1	3	73	0	0.54	0.18
						BR2.2	2.71	73	82	10.91	0.49
BR6	28.6	71	82	42.9	5.2	BR6.1	9.9	71	82	26.9	1.8
						BR6.2	6.1	71	82	19.7	1.1
						BR6.3	11.5	71	82	29.22	2.1
BR21	23.8	79	80	64.21	4.5	BR21	6.2	79	80	24.3	1.2
BR19	26.2	71	75	42.7	4.6	BR19.1	13.1	71	75	31.1	2.36
						BR19.2	13.4	71	75	31.1	2.36

*SWMM reports in MG (million gallons) which equals to ~3.07 ac-ft/1MG.

NAME	AREA	CURVENO	IMPERV
BR1	28.93	74	75
BR10	36.43	73	31
BR11	9.74	73	65
BR12	22.29	73	10
BR13	29.14	73	70
BR14	19.8	73	89
BR16	25.89	70	13
BR17	49.17	73	59
BR18	33.13	73	75
BR19	26.21	71	75
BR2	5.67	73	90
BR20	24.15	73	90
BR21	12	77	70
BR3	37.23	73	66
BR4	39.56	77	75
BR5	10.73	83	59
BR6	28.63	71	82
BR9	55.23	73	86

Air Quality Pond

Post Office Pond

Old Broadway Pump Station discharges to North Diversion Channel

54" Force Main from Broadway pump station

54" Force Main outfall

Closed

BR 15-C

BR 7-H2

Hydrographs computed externally

BR 7-H1

40 CFS from BR21 goes out of system through transverse inlet at Medical Arts and Lomas

Subbasins designated BR are contributing to the Marble Arno Project

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Legend

- BR Basin Boundaries
- Non-Tributary Basins
- COA Streets
- COA Storm Pipes
- Existing Flow Arrows
- Post Office Detention Pond
- Contour

Figure 4
Pre-Construction Basin Map
Marble Arno LOMR
July 2023

N

0 175 350 Feet

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NAME	AREA	CURVENO	IMPERV
BR1	31.58	74	75
BR10	36.95	73	31
BR11	9.41	73	65
BR12	21.27	73	10
BR13	27.74	73	70
BR14	18.64	73	89
BR16	25.57	70	13
BR17	51.22	73	59
BR18	32.28	73	75
BR19.1	13.42	71	75
BR2.1	3.04	73	90
BR20	22.75	73	90
BR21	5.5	77	70
BR3	37.4	73	66
BR4	40.31	77	75
BR5	12.16	83	59
BR6.1	9.95	71	82
BR9	54.97	73	86
BR2.2	2.72	73	90
BR6.3	11.51	71	82
BR6.2	6.14	71	82
BR19.2	13.42	71	75

Air Quality Pond

Old Broadway Pump Station abandoned as part of this construction project

Post Office Pond filled in as part of this construction project

New Marble Arno Pond Pump Station

Hydrographs computed externally

54" Force Main from Broadway Pump Station

54" Force Main outfall

40 CFS from BR21 goes out of system through transverse inlet at Medical Arts and Lomas

Subbasins designated BR are contributing to the Marble Arno Project

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Legend
- BR Basin Post Const
- Non-Tributary Basins
- Post Office Detention Pond
- Marble Arno Pump Station
- COA Streets
- Contour
- New Flow Arrows
- New Storm Drain

Figure 5
Post-Construction Basin Map
Marble Arno LOMR
July 2023

N

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3.0 HYDRAULIC ANALYSIS

3.1 MARBLE – ARNO PUMP STATION

RESPEC updated the SWMM model from Smith Engineering Company to match all parameters in the model to the record drawing information provided after construction was completed. RESPEC acquired the post construction surveyed pond surface to extract contours for a depth-area curve to input into the model. The pump rating curve was determined from record drawings for the design flow for each pump. The pumps station has 5 pumps in total including a low flow pump. The pumps will turn on at different water surface elevations in the pond. The summary of pumps start up elevations from as-builts are shown in **Figure 6**. There is 1 low flow pump for the smaller storms which has a design flow of 1.53 cfs. In addition, there are 4 main pumps and have a design flow of 26.75 cfs each, a combined peak flow rate of all 5 pumps operating is 108.53 cfs. The pump equipment schedule from as-builts is shown in **Figure 7.** The pump station discharges into a 54-inch force main that discharges into the existing AMAFCA North Diversion Channel.

INITIAL (ELEVATION) SETTINGS		
	ON	OFF
PUMP #1	28.00	27.25
PUMP #2	35.00	34.50
PUMP #3	36.00	35.50
PUMP #4	36.75	36.25
PUMP #5	37.50	37.00
BARSCREEN	34.25	34.00

Figure 6: Pump Elevation Settings

PUMP EQUIPMENT SCHEDULE				
ID	DESIGN TDH	DESIGN FLOW	DISCHARGE Ø	TYPE
PUMP #1	18.6 FT.	1.53 CFS	6"	SUBMERSIBLE
PUMP #2	200 FT.	26.75 CFS	14"	SUBMERSIBLE
PUMP #3	200 FT.	26.75 CFS	14"	SUBMERSIBLE
PUMP #4	200 FT.	26.75 CFS	14"	SUBMERSIBLE
PUMP #5	200 FT.	26.75 CFS	14"	SUBMERSIBLE

Figure 7: Pump Elevation Settings

3.2 STORM DRAIN HYDRAULICS

The storm drain network was modified to reflect final construction. Record drawings were used as the basis for all elevations, pipe slopes and diameters. The construction of the Marble Arno Pump Station included new high-capacity inlets and storm drain infrastructure in the surrounding areas ~~to the pump station~~ on Broadway Boulevard, Lomas Boulevard, Marble Avenue and Arno Street as shown in **Figure 8**. The goal was to capture and divert all the runoff from the subbasins from east into the pond/pump station so that the intersection of Broadway and Lomas does not get inundated. The preconstruction storm drainage system is shown in **Figure 9**. The post construction storm drainage infrastructure is shown in **Figure 10**.

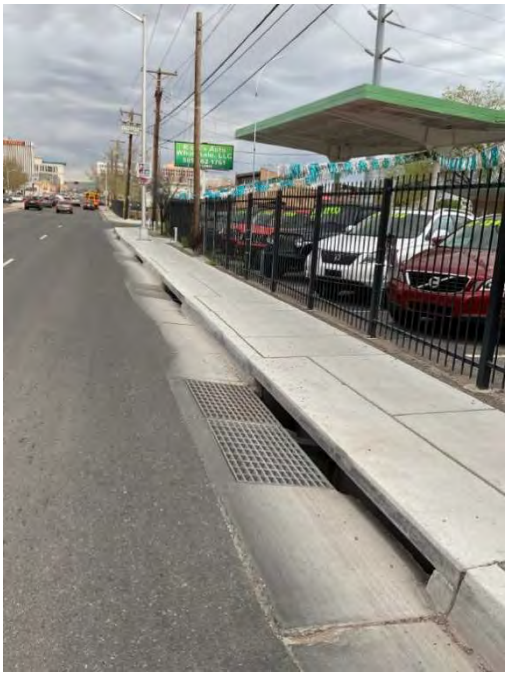

Figure 8: High-Capacity Inlets in Broadway

Hydrographs were introduced from the subcatchments in SWMM into the hydraulic network as a point discharge through junctions that represent manholes. For junctions where inflow hydrographs are introduced into the system, a surcharge depth was assigned to ensure that there was no volume loss due to large flowrates entering the system. A modeling schematic is shown in **Figure 11**. Apart from the subbasin changes due to post construction effects, all modeling assumptions for hydraulics analysis in SWMM were adopted from the MVDMP study. The MVDMP existing conditions model did not simulate the parallel 36-inch storm drain on the south side of Lomas, nor the 36-inch storm drain in John St. These were added in the South Broadway Impact Analysis, and in this LOMR to add a higher level of detail with regards to the existing infrastructure in the area. As-builts for these storm drains are provided i

Inlet capacities were computed to validate if there is sufficient interception capacity to capture the surface runoff effectively. The inlet capacities were computed using COA standard nominal graphs provided in the design process manual (DPM 2020). These graphs use a curb height with an average street slope to calculate the approximate flow rate for the grate. A 15% clogging factor was applied to the grate capacity of the new inlets since trash, weeds and other debris can build up in the grates. The DPM indicates that the clogging factor may be reduced for banks of inlets as the first inlet usually sweeps most of the trash and debris, however, to be conservative, all inlets were assumed to be 15% clogged. The total capacity of the new inlets installed on Lomas is 154 cfs including the 15% clogging factor. Upstream on Lomas, east of the new construction, there are a total of 48 inlets. The maximum flow in the 54-inch storm drain at the Lomas and Arno intersection is 186 cfs indicating that there are more than adequate inlets to capture all the surface runoff from the basins to the east and south of Lomas. To deal with surges in the system, the MVDMP discusses the usage of ponding areas assigned to manholes in flat areas that allows the storm drains to surge and recede in and out of the hydraulic network and onto the roads. This allows the roads to provide excess storage during the peak of the storm. The junctions with ponded areas then use the excess surge volume to determine flooding depth. All assumptions and storage areas from the MVDMP were used for this study.

As part of this analysis, storm drain hydraulic grade lines were checked to make sure they were contained in the system and were not floodin[illegible]he design and analysis of the M[illegible]ble Arno Pump Station and Pond was based on existing conditions in the tributary watershed. The master plan does propose facilities at Sunset Park and a small pond at Medical Arts however for the design of Marble – Arno Pump station and pond, these were assumed to be not in place.

Air Quality Pond

Old Broadway Pump Station discharges to North Diversion Channel

Post Office Pond

Location for future Marble Arno Pond Pump Station

54" Force Main from Broadway Pump Station

54" Force Main outfall

Hydrographs computed externally

40 CFS from BR21 goes out of system through transverse inlet at Medical Arts and Lomas

Subbasins designated BR are contributing to the Marble Arno Project

BR 15-C Closed

BR 7-H2

BR 7-H1

B40 B35 B31 B30 B27 B25 B19.1 B19.2 B16

BR18 BR17 BR16 BR14 BR13 BR12 BR11 BR10 BR9 BR6 BR5 BR4 BR3 BR2 BR21 BR20 BR19 BR1

CLAREMONT CANDELARIA PHOENIX LA POBLANA WOODLAND LAMBERTON BROADBENT PAN AMERICAN MENAUL NORTH TOWNER CANNA ROSE LOMBARDY NEW FAIRFIELD ALAMEDA LATERAL COMMERCIAL PROSPECT CUTLER SUNSET FLORAL TULIP ARVADA FREEDOM I40 FRONTAGE I40 WESTBOUND I40 EASTBOUND I40 RAMP BIGI RAMP S-W BIGI RAMP N-W BIGI RAMP E-N BIGI RAMP E-S BIGI RAMP W-S BIGI RAMP S-E BIGI RAMP N-E I25 FRONTAGE BIGI RAMP W-N 1ST 2ND 3RD 4TH 5TH HAINES MCKNIGHT HANNETT MARTINEZ ASPEN GOMEZ ODELIA BACA BROADWAY SAN IGNACIO CRESPIN CORDERO SPRUNK FRANCISCAN KINLEY EDITH ROSEMONT BARELAS DITCH STONE MOUNTAIN GRANITE MAGGIES MARBLE 36 PLACIDO MARTINEZ PAGE SLATE FRUIT 30 TRANQUILINO DON CIPRIANO SUMMER CONSTITUTION BNSF RR SPUR LOCUST I25 SOUTHBOUND I25 NORTHBOUND I25 RAMP UNIVERSITY INDIAN SCHOOL CAMINO DE SALUD LEGION TUCKER MEDICAL ARTS LOMAS N DIVERSION CHANNEL CAMINO SERENO WOODWARD ELM ARNO BEL VEDERE WALTER MARTIN LUTHER KING MULBERRY CEDAR MARQUETTE SYCAMORE MAPLE ASH TIJERAS ROMA RIDGE SPRUCE LAS LOMAS ENCINO SIGMA CHI GRAND GRANITE COPPER HIGH CENTRAL

Notes:
Horizontal Datum:
Name: NAD 1983 HARN StatePlane New Mexico Central FIPS 3002 Feet
Orthophoto Source: MRCOG 2022
Orthophotography Mosaic

Legend

- BR Basin Boundaries
- Non-Tributary Basins
- Marble Arno Pump Station
- COA Streets
- COA Storm Pipes
- Post Office Detention Pond
- StormInlets

Figure 9
Pre-Construction Hydraulic Map
Marble Arno LOMR
July 2023

N

0 175 350 Feet

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Legend
- Non-Tributary Basins
- BR Basin Post Const
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- Marble Arno Pump Station
- COA Storm Pipes
- COA Streets
- New Storm Drain

Figure 10
Post-Construction Hydraulic Map
Marble Arno LOMR
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N

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1 Inflow hydrograph for subbasins BR7-H1 and BR7-H2 were computed externally in the Mid Valley DMP and added into junction COA 7870

2 Revised north flow hydrograph computed externally in South Broadway Impact Analysis added at junction SDMH1006

3 Revised north flow hydrograph computed externally in South Broadway Impact Analysis added at junction 3

4 Revised north flow hydrograph computed externally in South Broadway Impact Analysis added at junction 2

5 Modeled as closed basin in Mid Valley DMP

Is there more to the model schematic that isn't shown?

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Orthophoto Source: MRCOG 2022
Orthophotography Mosaic

Legend

- BR Basin Post Const
- Non-Tributary Basins
- Post Office Detention Pond
- Marble Arno Pump Station
- COA Streets
- Junctions
- Storages
- Outfalls
- Conduits

FEMA Floodplains
FLD_ZONE
- A
- AE
- AH
- AO
- D
- X

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Figure 11
Modeling Schematic

Marble Arno LOMR
July 2023

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0 400 800 Feet

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4.0 CONCLUSION

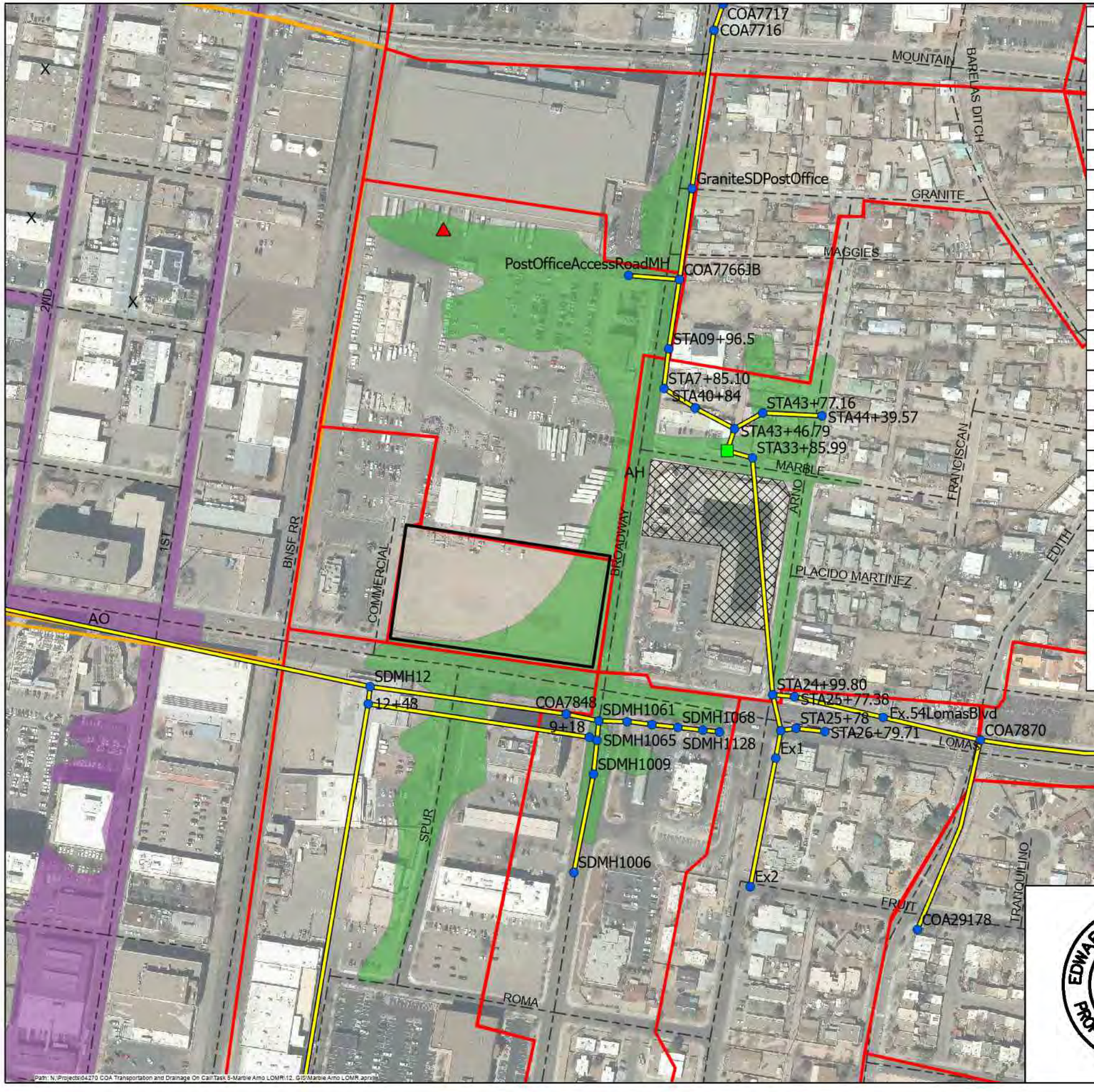
The construction of Marble – Arno Pump station and pond diverts 89.3 acres of heavily impervious drainage area east of the Broadway - Lomas intersection north into the new pond/pump station facility through the new storm drains in Arno St. This dramatically reduces the stress on the hydraulic network at the intersection of Broadway and Lomas. The construction of the storm drainage system at the intersection of Broadway and Lomas is old with some storm drains having adverse slopes to account for the original configuration of inline weirs that were built with the original Post Office Pond. As such, the manholes in this area show minor flooding but all nodes have flooding depths less than 1 ft. The same is true for the 30-inch storm drain that collects runoff from Broadway and Marquette. This storm drain was deemed to be under capacity in the MVDMP. The storm drains north of the original abandoned Broadway Pump station show some flooding but the depths are below 1 ft. This is due to the lack of system capacity going north on Broadway towards I-40.

~~In the MVDMP, another future pond was proposed at Sunset Park, along with storm drain improvements in to address the capacity issues demonstrated in this model. However, since the depths are below 1 ft, making the LOMR request feasible.~~

Figure 12 provides a summary of the junctions (manholes) in the vicinity of the floodplain being analyzed along with the maximum computed hydraulic grade line (HGL).

The intersection of Broadway and Lomas is constructed with standard City of Albuquerque 8-inch-tall curb and gutter. The surcharge depths will be below 1 ft in depth and will be completely contained in the streets by the 8-inch curb and gutter until the system (HGL) recedes once the peak of the storm has passed. The excess flows will then drain back into the system through the inlets.

The analysis confirms that the current flood plains delineated in the project area can be safely removed.



HGL Summary for Critical Junctions In the Existing Zone AH

Junction ID	Rim Elevation (ft)	HGL Elevation (ft)	Max Ponded Depth [1] (ft)	Max Ponded Depth [1] (inches)	Depth Above Rim (ft)	Ponded Area Assigned	Curb Height (ft)	Is Depth > 1 ft
3	4957	4957.03	0.025	0.30	0.03	Yes	0.66	No
2	4957	4957	0.003	0.04	0	Yes	0.66	No
12+48	4957.4	4957.4	0	0.00	0	No	0.66	No
SDMH 12	4957.4	4957.43	0	0.00	0.03	No	0.66	No
SDMH 1006	4958.4	4958.42	0.025	0.30	0.02	Yes	0.66	No
SDMH 1009	4957.4	4957.37	0	0.00	-0.03	Yes	0.66	No
SDMH 1065	4956.1	4956.08	0	0.00	-0.02	Yes	0.66	No
9+18	4956	4956.05	0.052	0.62	0.05	Yes	0.66	No
SDMH 1062	4955.9	4955.99	0.14	1.68	0.09	Yes	0.66	No
COA 7848	4955.8	4955.99	0.16	1.92	0.19	Yes	0.66	No
SDMH 1061	4955.9	4955.98	0.064	0.77	0.08	No	0.66	No
SDMH 1064	4955.9	4955.93	0	0.00	0.03	No	0.66	No
SDMH 1068	4956.5	4956.38	0	0.00	-0.12	No	0.66	No
SDMH 1134	4957.2	4957.2	0	0.00	0	No	0.66	No
Sta24+99.80	4958.5	4957.02	0	0.00	-1.48	No	0.66	No
Sta33+85.99	4956.8	4953.26	0	0.00	-3.54	No	0.66	No
Sta44+39.57	4955.7	4954	0	0.00	-1.7	Yes	0.66	No
Sta43+77.16	4955.2	4953.92	0	0.00	-1.28	Yes	0.66	No
Sta43+46.79	4955.5	4953.84	0	0.00	-1.66	Yes	0.66	No
Sta40+84	4956.3	4954.42	0	0.00	-1.88	yes	0.66	No
Sta17+85.10	4956.6	4954.88	0	0.00	-1.72	Yes	0.66	No
Sta09+96.5	4956.3	4956.11	0	0.00	-0.19	Yes	0.66	No
COA7766JB	4956.3	4957.23	0.93	11.16	0.93	Yes	0.66	No
GraniteSD Post Office	4957	4957.76	0.79	9.48	0.76	Yes	0.66	No

1 SWMM uses a combination of the maximum HGL, surge volume and the allocated ponded area to compute the flood depth above each junction

Subbasins designated BR are contributing to the Marble Arno Project

Legend

- BR Basin Post Const
- Non-Tributary Basins
- Post Office Detention Pond
- Marble Arno Pump Station
- COA Streets
- Junctions
- Storages
- Outfalls
- Conduits

FLD_ZONE
- A
- AE
- AH
- AO
- D
- X

Notes:
Horizontal Datum:
Name: NAD 1983 HARN StatePlane New Mexico Central FIPS 3002 Feet
Orthophoto Source: MRCOG 2022
Orthophotography Mosaic

Figure 12
Hydraulic Grade Line Summary of Junctions
Marble Arno LOMR
July 2023

N

0 125 250 Feet

Prepared for:

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5.0 REFERENCES

- *Flood Insurance Rate Map* Numbers 35001C0332G & 35001C0334G, Federal Emergency Management Agency Floodplain Data, September 26, 2008.
- *Flood Insurance Study*, Bernalillo County, New Mexico, Federal Emergency Management Agency, 2008.
- *Mid-Valley Drainage Management Plan,* Smith Engineering Company, April 2012.
- *South Broadway Impact Analysis Report,* Smith Engineering Company, March 2019.

APPENDIX 1

MT 2 FORMS

APPENDIX 2

BACKGROUND INFORMATION

APPENDIX 3
MODELS

APPENDIX 4

MAPS