

Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado

PROJECT: WESTMINSTER SURVEY CONTROL MODERNIZATION

This survey was prepared for the City of Westminster, Colorado. The project was to modernize the survey control network (both horizontal and vertical components) from previous surveys. The vertical control for the City of Westminster (prior to this survey) was based upon NAD 83. This survey establishes the horizontal to be based upon the North American Datum of 1983/92 (HARN) and the vertical is based upon the North American Vertical Datum of 1988. The project has a Primary Control Network and a Secondary Control Network. The Primary Control Network is the monuments set by Bohannon Huston, Inc. to perpetuate the control network. The Secondary Control are the Section and Quarter Section Corners found and utilized for this survey. Since the Section and Quarter Section Corners are primary located within roadways, turning lanes or in areas of traveled ways, Bohannon Huston, Inc. set what is now referred to as the Primary Control for this project, which are located on City of Westminster property and easily accessible to the general public.

PRIMARY CONTROL

Bohannon Huston, Inc. set fourteen (14) primary control monuments in areas that would be less likely to be disturbed and on City of Westminster owned property. These monuments were set to perpetuate the control network into the future, as well as have a primary control network that could be utilized for GPS observations. The primary control monuments were spaced at approximately three mile intervals from each other.

The monuments consist of the following:
2 - 1/2" Brass Cap stamped "City of Westminster" set in concrete and covered with a aluminum monument box cover stamped "City of Westminster". The following is a standard cap and stamping:



SURVEY OF SECTION AND QUARTER SECTION CORNERS

This survey included the location of section and quarter section corners in the area depicted on this map. This survey did not address the search or location of lesser aliquot corners, or points on aliquot lines in these sections, although some of these monuments may exist and further control the location of aliquot section lines. Existing monuments recorded with the State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors were used for the section and quarter section corners in this survey. Neither the City of Westminster nor Bohannon Huston, Inc. make any warranties, either expressed or implied, as to the accuracy of the record monuments. This survey was done as a Geographic Information System (GIS) Land Positions and therefore all section and quarter section locations and published positions on this map are done under C.R.S. 38-51-109.3

HORIZONTAL CONTROL

Geodetic Coordinates shown hereon are based on the North American Datum of 1983 (NAD 83/92)

Plane Coordinates shown hereon are based on the Colorado State Plane Coordinate System, North Zone (0501), North American Datum of 1983/92 (HARN), ellipsoid GRS 80. All plane coordinates are expressed in U.S. Survey Feet (C.R.S. 38-52-103.2).

The State Plane (Grid) Coordinates as published and retrieved from the National Geodetic Survey (NGS) on July 17, 2007, of the following points were used as the basis of introduction of the Colorado State Plane Coordinate System, North Zone (0501) and were held fixed in the final adjustment of the control network:

Station Name	Latitude	Longitude	State Plane Northing	State Plane Easting	Description
BIG DRY	39°59'22.40590"N	104°56'25.76065"W	1239537.37	3156770.40	Horiz. 1st. ELLP 4th Class II
ROTELLA	39°50'21.84997"N	104°57'58.13992"W	1184797.09	3149911.29	Horiz. 1st. ELLP 4th Class II
DOVER	39°49'17.96157"N	105°05'42.59838"W	1178142.62	3113711.98	Horiz. 1st. Vert. 1st Class II
BARBARA	39°51'05.58504"N	105°10'43.39354"W	1188634.62	3090203.35	Horiz. 1st. ELLP 4th Class II, Vert. 3rd
H 413	39°56'35.49034"N	105°04'18.51428"W	1222442.99	3120058.56	Horiz. 1st. ELLP 5th Class II, Vert. 1st Class II
S 411	39°54'34.93467"N	105°01'30.66158"W	1210311.11	3133195.40	Horiz. 1st. ELLP 4th Class II, Vert. 1st Class II

Note: State Plane values listed are Colorado State Plane Coordinates, North Zone

Modified Project Coordinates (ground coordinates are based on the Colorado State Plane Coordinate System of 1983/92, North Zone (0501) were modified with the following factors:

Average Project Horizontal Location:
Project Coordinates were modified to ground at:
Primary Control Number 6
Latitude = 39° 53' 11.262996" North
Longitude = 105° 03' 25.176095" West
Scale Factor = 0.99997694

Average Project Height and Elevation:
Project Ellipsoid Height = 5324.44 sft
Project Elevation (AMSL) = 5380.00 sft
Elevation Scale Factor = 0.999742724

Project Scale Factors:
Project Combined Factor = 0.999719670
Calculation of Project Combined Factor:
(Scale Factor) x (Elevation Factor) = Project Combined Factor

Project Coordinates were not truncated for this project.

Conversion Example of State Plane Coordinates to Modified Project Coordinates:

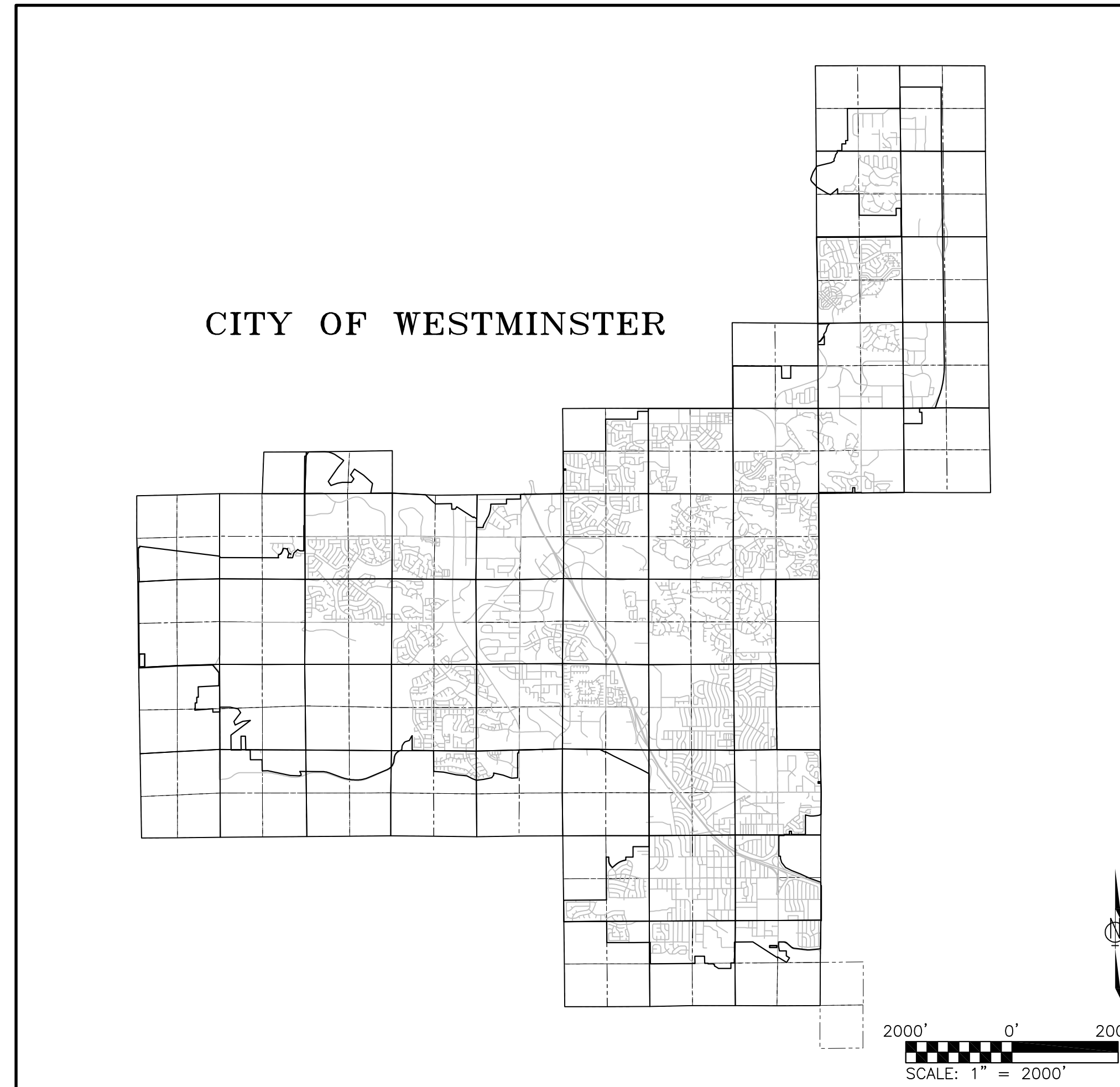
State Plane Northing / Project Combined Factor = Modified Project Northing
State Plane Easting / Project Combined Factor = Modified Project Easting

VERTICAL CONTROL

Orthometric Heights (Elevations) are based on North American Vertical Datum 1988 (NAVD 88). The orthometric heights (elevations) as published and retrieved from the National Geodetic Survey (NGS) on July 17, 2007, of the following points were used as vertical benchmarks and held fixed in the final level circuit adjustments:

Station Name	NAVD88 Elevation	Description
U 412	5359.66	Vert. 1st Class II
Y 411	5294.42	Vert. 1st Class II
B 412	5261.98	Vert. 1st Class II
V 412	5430.04	Vert. 1st Class II
R 411	5360.97	Vert. 1st Class II
B4 AZ MK	5484.39	Vert. 1st Class II

A total of 25 level circuits (level loops) were performed on this project. The level circuits originated from established NGS vertical monuments and were leveled to each of the fourteen (14) primary control monuments. The level circuits were performed with a Leica DNA 10 (digital level) and fiberglass bar coded level rod. The final vertical values for all fourteen (14) primary control points are published on this map.



VICINITY MAP

SHEET INDEX:

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14	SECTION AND QUARTER SECTION VALUES UTILITY POINT VALUES

LEGACY CONTROL:

Within this Geodetic Control plan set, we make reference to legacy data in several locations (pages 4 - 12) on the legend. This section covers the explanation of what legacy data is and from what sources it came from.

Bohannon Huston, Inc. did not observe or develop values for the legacy data, during our inventory process we identified monuments that were either not located or those within a heavy traffic area, from previous surveys. We have listed hereon descriptions of what we found or did not find (in cases we did not find the monument), based on the original legacy control system for the City of Westminster. The legacy monuments are shown graphically, however does not represent a surveyed position. Bohannon Huston, Inc. makes no warranties, either expressed or implied, as to the accuracy of the monument description or any associated values for legacy data, monuments and/or values from previous surveys, consultants should verify any monuments and/or values listed for legacy data prior to use.

The legacy control refers to the following previous surveys:

1. Western States Surveying Inc. - Phase 1 (1991)
2. Merrick & Company - Phase II (1992)
3. Merrick & Company - Phase III (1995)

SURVEY NOTES:

1. Published NAD 1983/92 (HARN) geodetic values for NGS HARN stations BIG DRY, ROTELLA, DOVER, BARBARA, H 413 and S 411 were held fixed in the final fully constrained adjustment.
2. Horizontal positions for both the primary control and secondary control stations resulting from this GPS network were surveyed to second order, class 1 (1:50,000) standards per FCCC publication "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" Version 5.0, May 11, 1988, reprinted with corrections August 1, 1989.
3. GPS observations were conducted in August, September and October of 2007 utilizing six Trimble dual frequency receivers.
4. Level Circuits were conducted in June and July of 2007 utilizing a Leica DNA 10 digital level.
5. Locations of apparent section and quarter section corner monuments were not verified by Bohannon Huston, Inc. or by the City of Westminster.
6. All coordinates and distances shown hereon are U.S. Survey Feet.
7. Station Names were taken from previous surveys. Bohannon Huston utilized point names that were previously in place.

DISCLAIMER:

Existing monuments recorded with the State Board of Licensure for Architects, Professional Engineers and Professional Land Surveyors were used for the section and quarter section corners in this survey. Neither the City of Westminster nor Bohannon Huston, Inc. make any warranties, either expressed or implied, as to the accuracy of the record monuments.

NOTICE:

According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event, may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

SURVEYORS CERTIFICATION:

I, Mathew J. Barr, a duly Registered Professional Land Surveyor in the State of Colorado, do hereby certify that this map reflects the results of a GPS survey completed October 2007, made under my direct supervision and is true and correct to the best of my knowledge and belief.

Mathew J. Barr
Colorado Professional Land Surveyor
Registration No. 37967

Date: _____

CLERK AND RECORDER'S CERTIFICATE:

I HEREBY CERTIFY THAT THIS CONDOMINIUM MAP WAS FILED IN MY OFFICE ON THIS DAY OF _____, 2008 A.D., AT _____ A.M. / P.M.
AND WAS RECORDED AT RECEPTION NUMBER _____.

COUNTY CLERK AND RECORDER

DEPUTY

REV	REVISION DESCRIPTION	DATE	CHANGED BY	CHECKED BY	APPROVED BY

Bohannon Huston
Meridian One 9785 Maroon Circle, Suite 140
Englewood, CO 80112 (303) 799-5103
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CAD FILE NAME	080036-SHT01	

GEODETIC CONTROL NETWORK
SECTION AND QUARTER SECTION MAPS
WESTMINSTER, COLORADO

CLIENT PROJECT NO. _____

BHI PROJECT NO. 080036

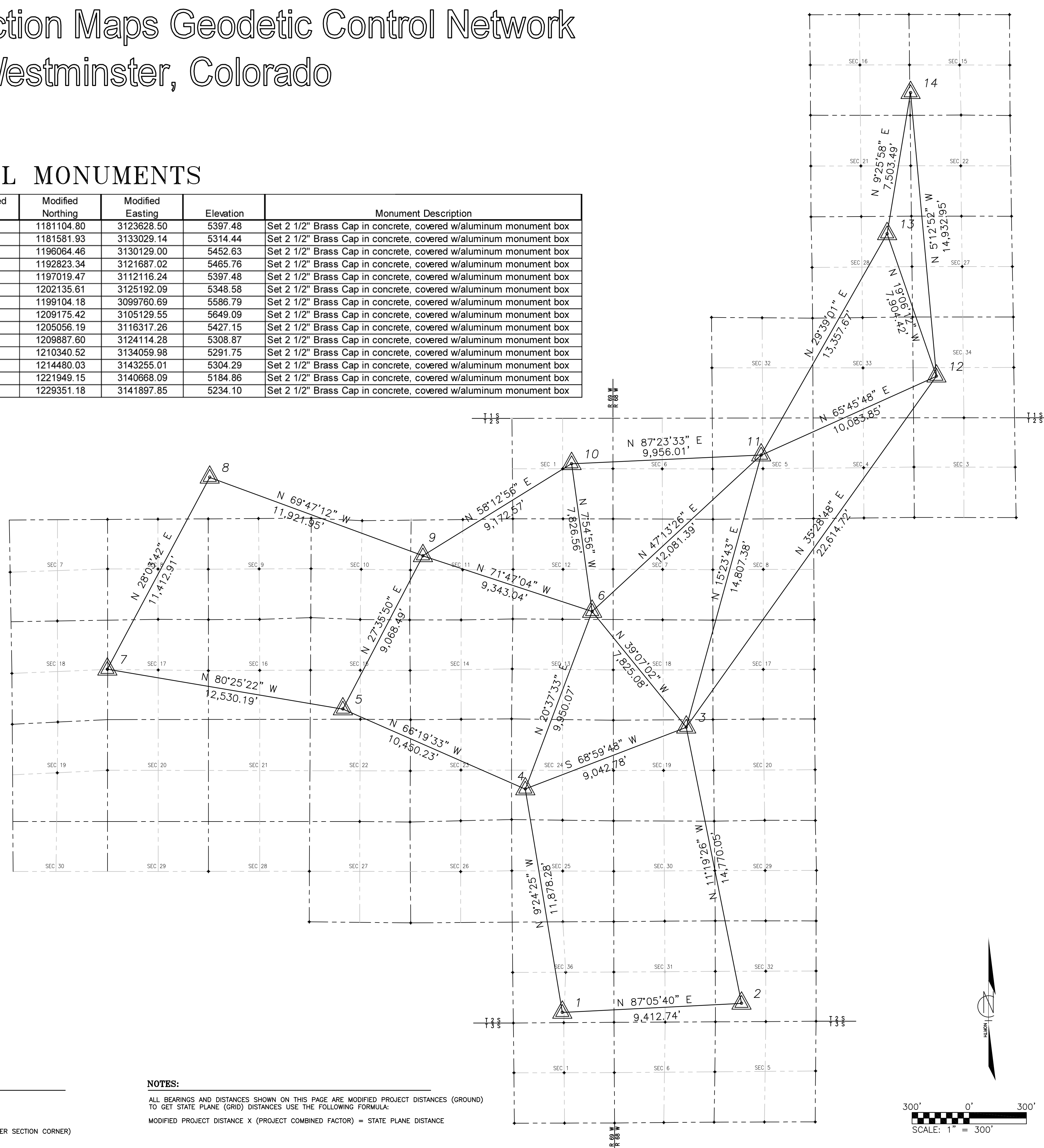
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GEODETIC CONTROL NETWORK TITLE SHEET		
REVISION:	DRAWING NO.:	SHEET NO.:
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Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado

PRIMARY CONTROL MONUMENTS

Station Name	Latitude	Longitude	Ellipsoid Height	State Plane Northing	State Plane Easting	Modified Combined Factor	Modified Northing	Modified Easting	Elevation	Monument Description
1	39°49'43.557619"N	105°03'46.558589"W	5342.29	1180773.70	3122752.85	0.99971967	1181104.80	3123628.50	5397.48	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
2	39°49'47.796295"N	105°01'46.065083"W	5258.66	1181250.70	3132150.85	0.99971967	1181581.93	3133029.14	5314.44	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
3	39°52'11.032329"N	105°02'22.264814"W	5396.85	1195729.17	3129251.53	0.99971967	1196064.46	3130129.00	5452.63	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
4	39°51'39.429440"N	105°04'10.708261"W	5410.53	1192488.96	3120811.91	0.99971967	1192823.34	3121687.02	5465.76	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
5	39°52'21.327555"N	105°06'13.167351"W	5342.80	1196683.91	3111243.82	0.99971967	1197019.47	3112116.24	5397.48	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
6	39°53'11.262996"N	105°03'25.176095"W	5293.03	1201798.62	3124316.01	0.99971967	1202135.61	3125192.09	5348.58	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
7	39°52'42.439587"N	105°08'51.489322"W	5532.91	1198768.03	3098891.74	0.99971967	1199104.18	3099760.69	5586.79	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
8	39°54'21.725983"N	105°07'42.100355"W	5594.70	1208836.45	3104259.09	0.99971967	1209175.42	3105129.55	5649.09	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
9	39°53'40.540349"N	105°05'18.822073"W	5372.09	1204718.37	3115443.66	0.99971967	1205056.19	3116317.26	5427.15	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
10	39°54'27.904535"N	105°03'38.506436"W	5253.27	1209548.43	3123238.50	0.99971967	1209887.60	3124114.28	5308.87	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
11	39°54'31.872925"N	105°01'30.882422"W	5235.56	1210001.23	3133181.41	0.99971967	1210340.52	3134059.98	5291.75	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
12	39°55'12.267294"N	104°59'32.614152"W	5247.53	1214139.57	3142373.86	0.99971967	1214480.03	3143255.01	5304.29	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
13	39°56'26.205742"N	105°00'05.268716"W	5128.08	1221606.60	3139787.67	0.99971967	1221949.15	3140668.09	5184.86	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box
14	39°57'39.267660"N	104°59'48.945622"W	5177.20	1229006.56	3141017.08	0.99971967	1229351.18	3141897.85	5234.10	Set 2 1/2" Brass Cap in concrete, covered w/aluminum monument box



PROJECT DATUM

Geodetic coordinates are based on NAD 83/92
 Orthometric Heights are based on the NAVD 88 VERTICAL DATUM
 State Plane coordinates are based on the NAD 83 (HARN) Colorado North Zone (0501)
 Units are US Survey Feet (sft)

AVERAGE PROJECT HORIZONTAL LOCATION:

Project coordinates were modified to ground at:
 Primary Control Number 6
 Latitude = 39° 53' 11.262996" North
 Longitude = 105° 03' 25.176095" West
 Scale Factor = 0.9997694

AVERAGE PROJECT HEIGHT AND ELEVATION:

Project Ellipsoid Height = 5324.44 survey feet
 Project Elevation (AMSL) = 5380.00 survey feet
 Elevation Scale Factor = 0.999742724

PROJECT SCALE FACTORS:

Project (Ground) coordinates are Modified State Plane
 Project Combined factor = 0.999719670
 Reciprocal = 1.000280409
 Calculation of Project Combined Factor:
 Scale Factor x Elevation Factor = Project Combined Factor

Project coordinates were not truncated for this project.

Orthometric Heights (Elevations) for the Primary Control were established by Level Circuits.

PRIMARY CONTROL

Bohannon Huston, Inc. set fourteen (14) primary control monuments in areas that would be less likely to be disturbed and on City of Westminster owned property. These monuments were set to perpetuate the control network into the future, as well as have a primary control network that could be utilized for GPS observations. The primary control monuments were spaced at approximately three mile intervals from each other.

The monuments consist of the following:
 2 - 1/2" Brass Cap, stamped "City of Westminster" set in concrete and covered with a aluminum monument box cover stamped "City of Westminster". The following is a standard cap and stamping:



LEGEND

- PRIMARY CONTROL MONUMENT (AS NOTED IN TABLE)
- SECONDARY CONTROL MONUMENT (SECTION OR QUARTER SECTION CORNER)

NOTES:

ALL BEARINGS AND DISTANCES SHOWN ON THIS PAGE ARE MODIFIED PROJECT DISTANCES (GROUND) TO GET STATE PLANE (GRID) DISTANCES USE THE FOLLOWING FORMULA:
 MODIFIED PROJECT DISTANCE X (PROJECT COMBINED FACTOR) = STATE PLANE DISTANCE

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APPROVED		
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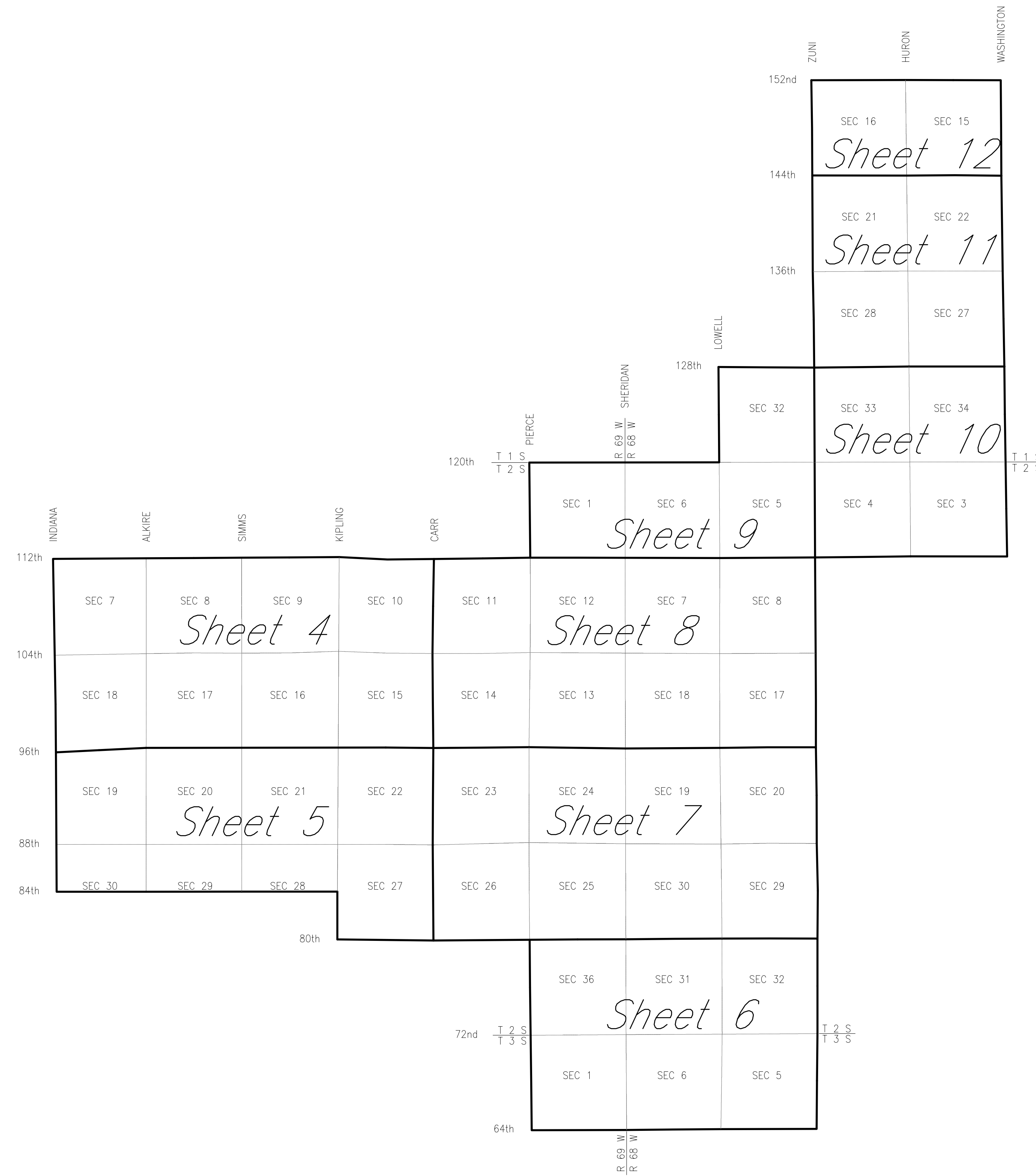
GEODETIC CONTROL NETWORK
 SECTION AND QUARTER SECTION MAPS
 WESTMINSTER, COLORADO

CLIENT PROJECT NO. _____
 BHI PROJECT NO. 080036
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**GEODETIC CONTROL NETWORK
 PRIMARY CONTROL**

REVISION: 00 DRAWING NO: 080036-SHT02 SHEET NO: 2 OF 14

Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



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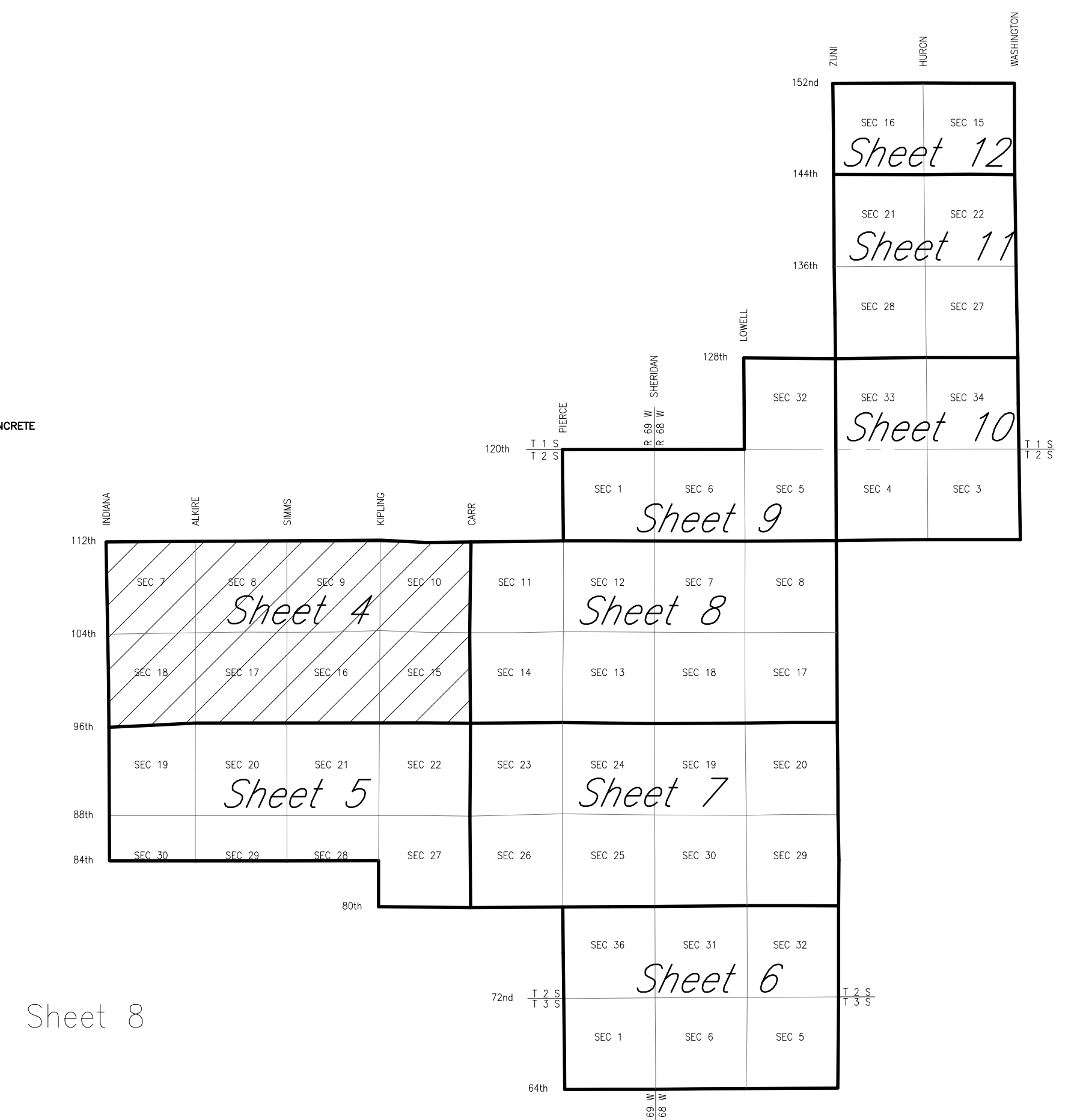
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SECTION AND QUARTER SECTION MAPS WESTMINSTER, COLORADO	
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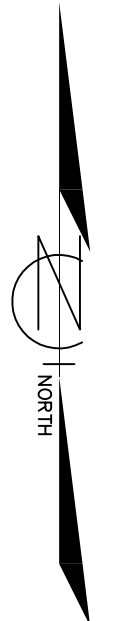
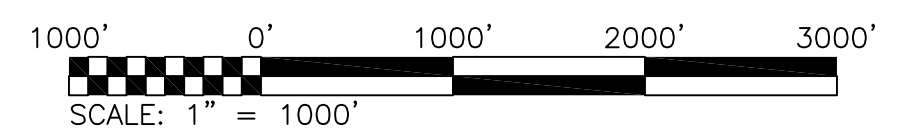
Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



Sheet 5

- LEGEND**
- ◆ SECTION OR QUARTER SECTION CORNER FOUND OR SET AS NOTED
 - ⊠ SECTION OR QUARTER SECTION CORNER FOUND AS NOTED; OBSERVATIONS WERE NOT PERFORMED BY BHI, DATA FROM PREVIOUS SURVEYS (LEGACY DATA) UTILIZED.
 - SECTION OR QUARTER SECTION CORNER NOT FOUND DURING INVENTORY PERFORMED BY BHI; OBSERVATIONS WERE NOT PERFORMED BY BHI, DATA FROM PREVIOUS SURVEYS (LEGACY DATA) UTILIZED.

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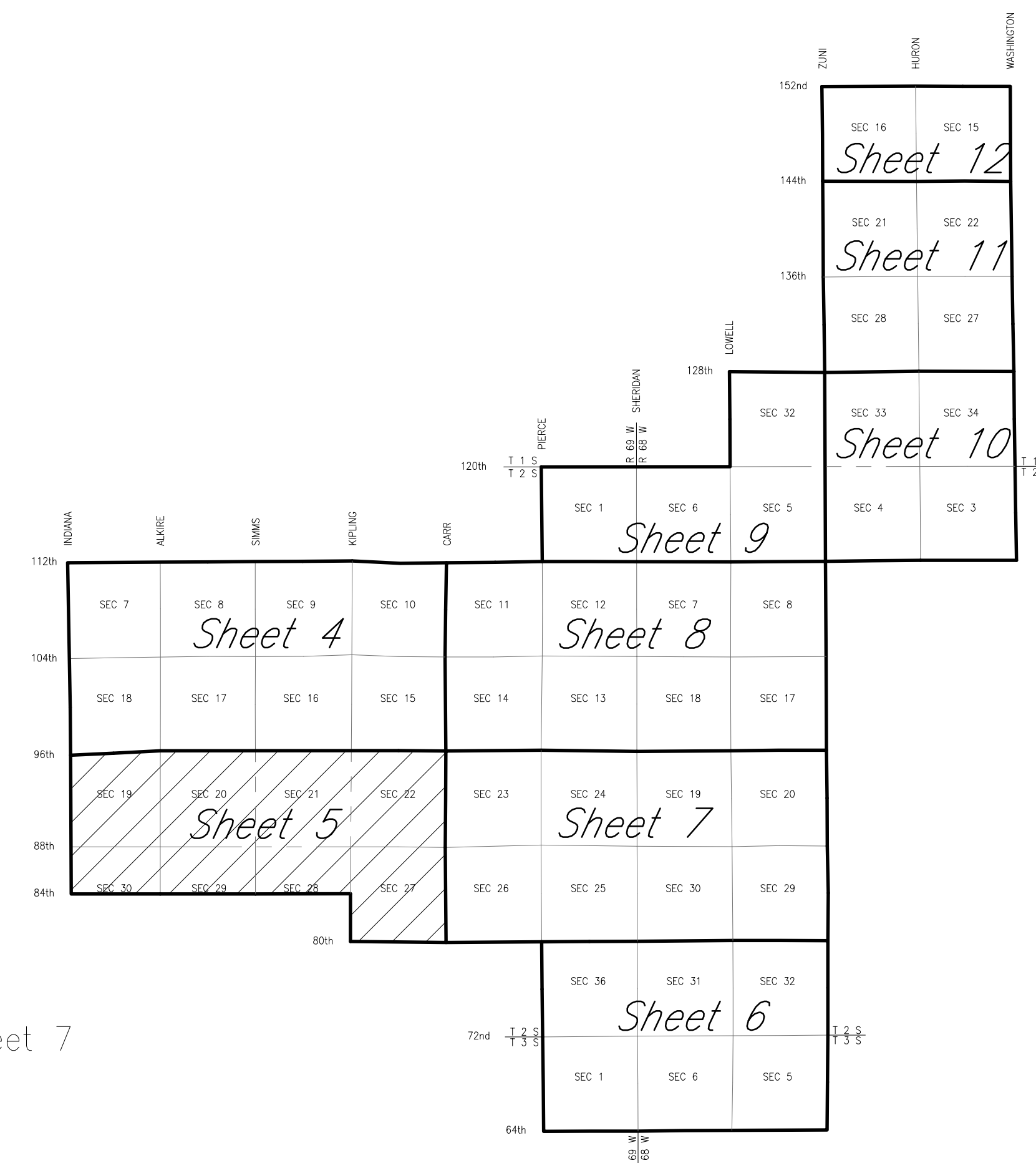
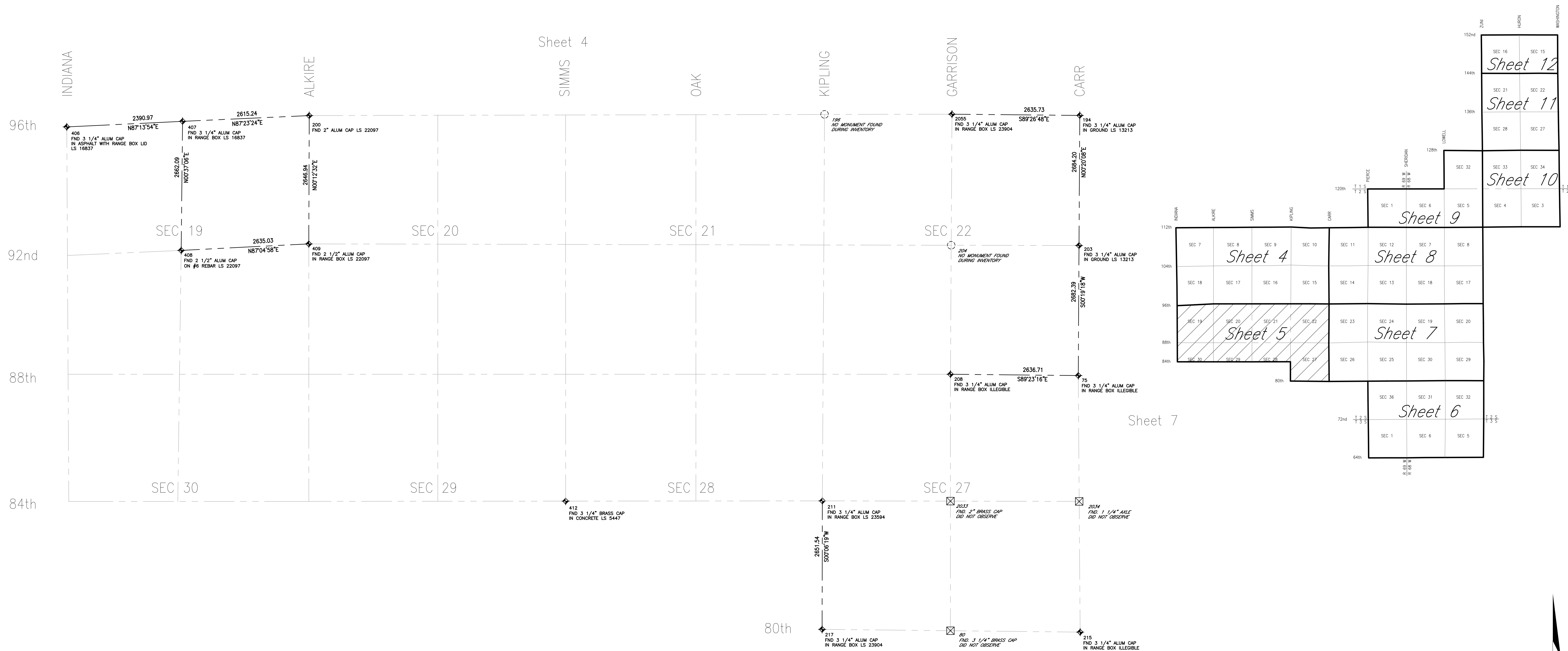
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APPROVED	MJB	12/20/07
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APPROVED		
CAD FILE NAME	080036-SHT04	

GEODETIC CONTROL NETWORK	
SECTION AND QUARTER SECTION MAPS WESTMINSTER, COLORADO	
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BHI PROJECT NO.	080036
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GEODETIC CONTROL NETWORK SECTION AND QUARTER SECTION		
REVISION: 00	DRAWING NO. 080036-SHT04	SHEET NO. 4 OF 14

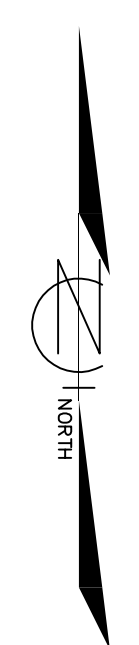
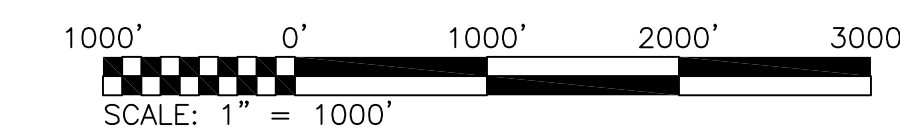
Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



LEGEND

- ◆ SECTION OR QUARTER SECTION CORNER FOUND OR SET AS NOTED
- ⊠ SECTION OR QUARTER SECTION CORNER FOUND AS NOTED; OBSERVATIONS WERE NOT PERFORMED BY BHI, DATA FROM PREVIOUS SURVEYS (LEGACY DATA) UTILIZED.
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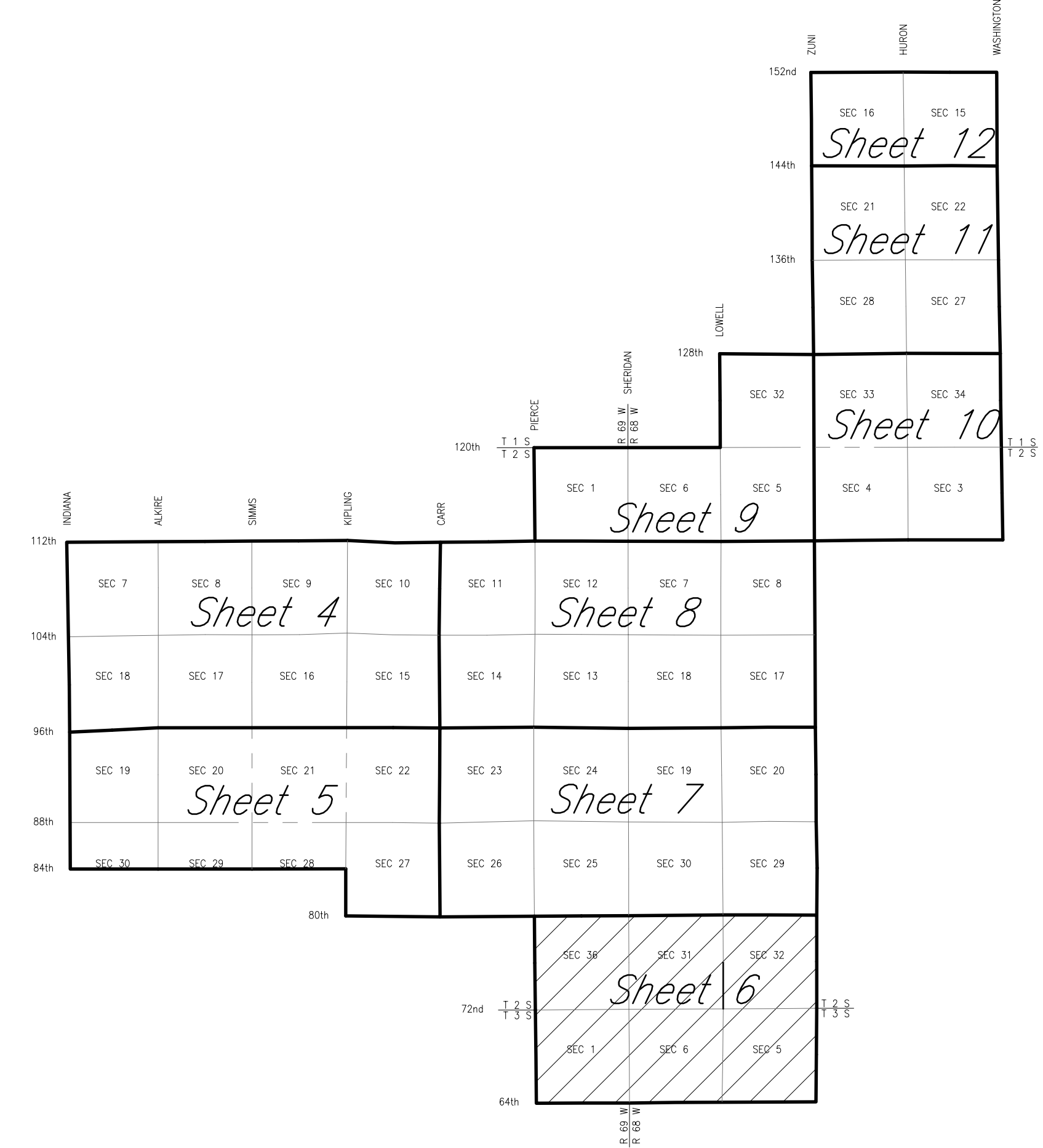
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APPROVED	MJB	12/20/07
CLIENT	SIGNATURE	DATE
REVIEW		
APPROVED		
CAD FILE NAME	080036-SHT05	

GEODETIC CONTROL NETWORK	
SECTION AND QUARTER SECTION MAPS WESTMINSTER, COLORADO	
CLIENT PROJECT NO.	
BHI PROJECT NO.	080036
SCALE:	SCALE AS SHOWN

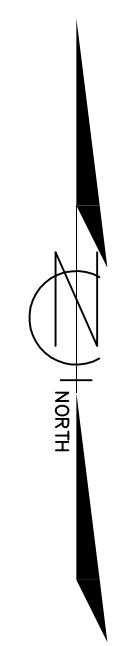
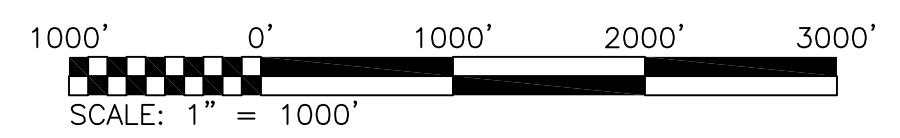
GEODETIC CONTROL NETWORK SECTION AND QUARTER SECTION		
REVISION: 00	DRAWING NO. 080036-SHT05	SHEET NO. 5 OF 14

Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



- LEGEND**
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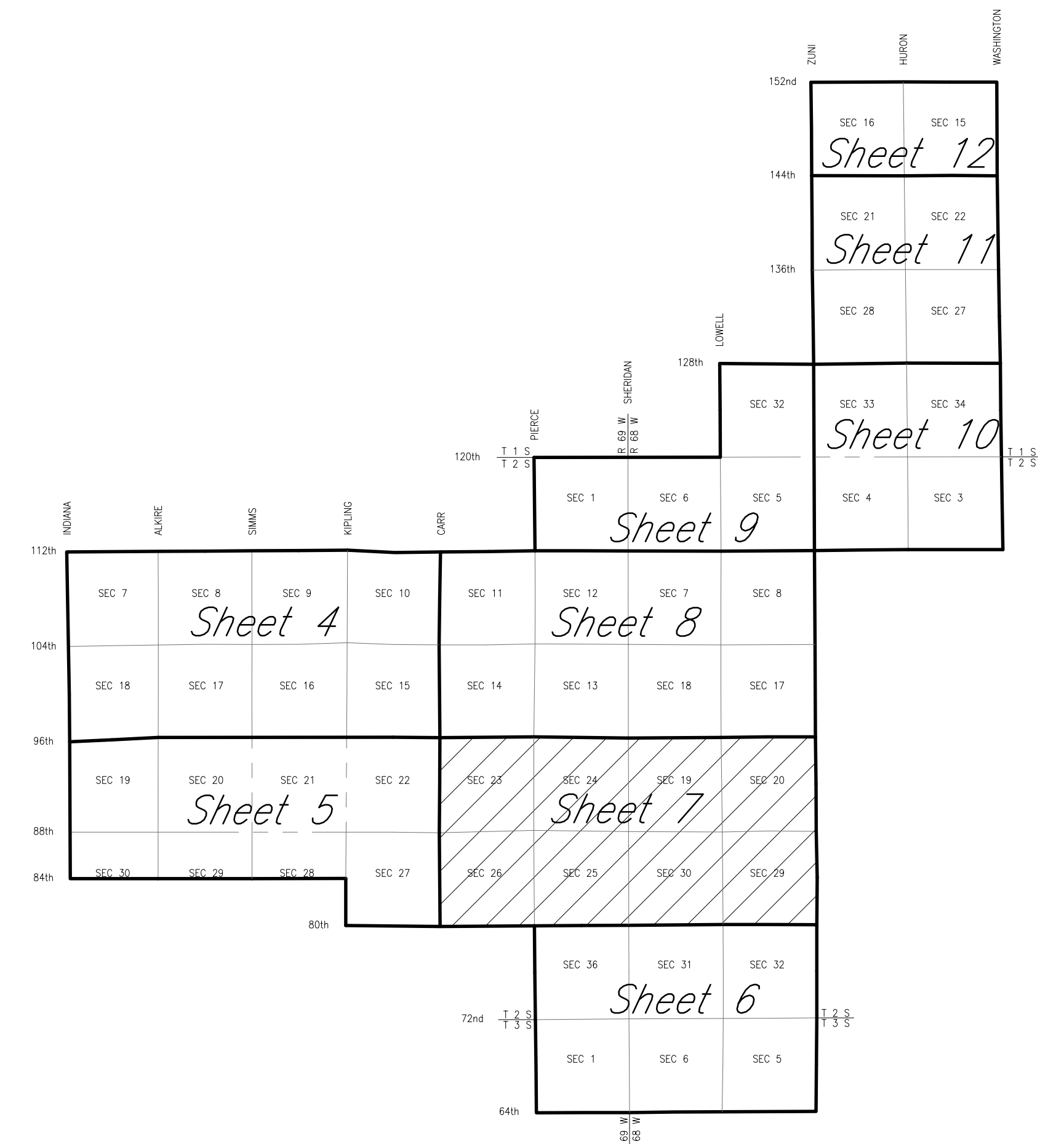
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REVISION: 00	DRAWING NO. 080036-SHT06	SHEET NO. 6 OF 14

Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado

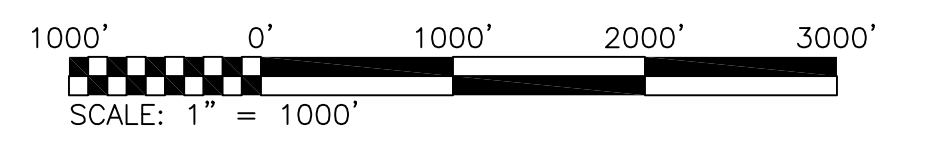
Sheet 8

Sheet 6



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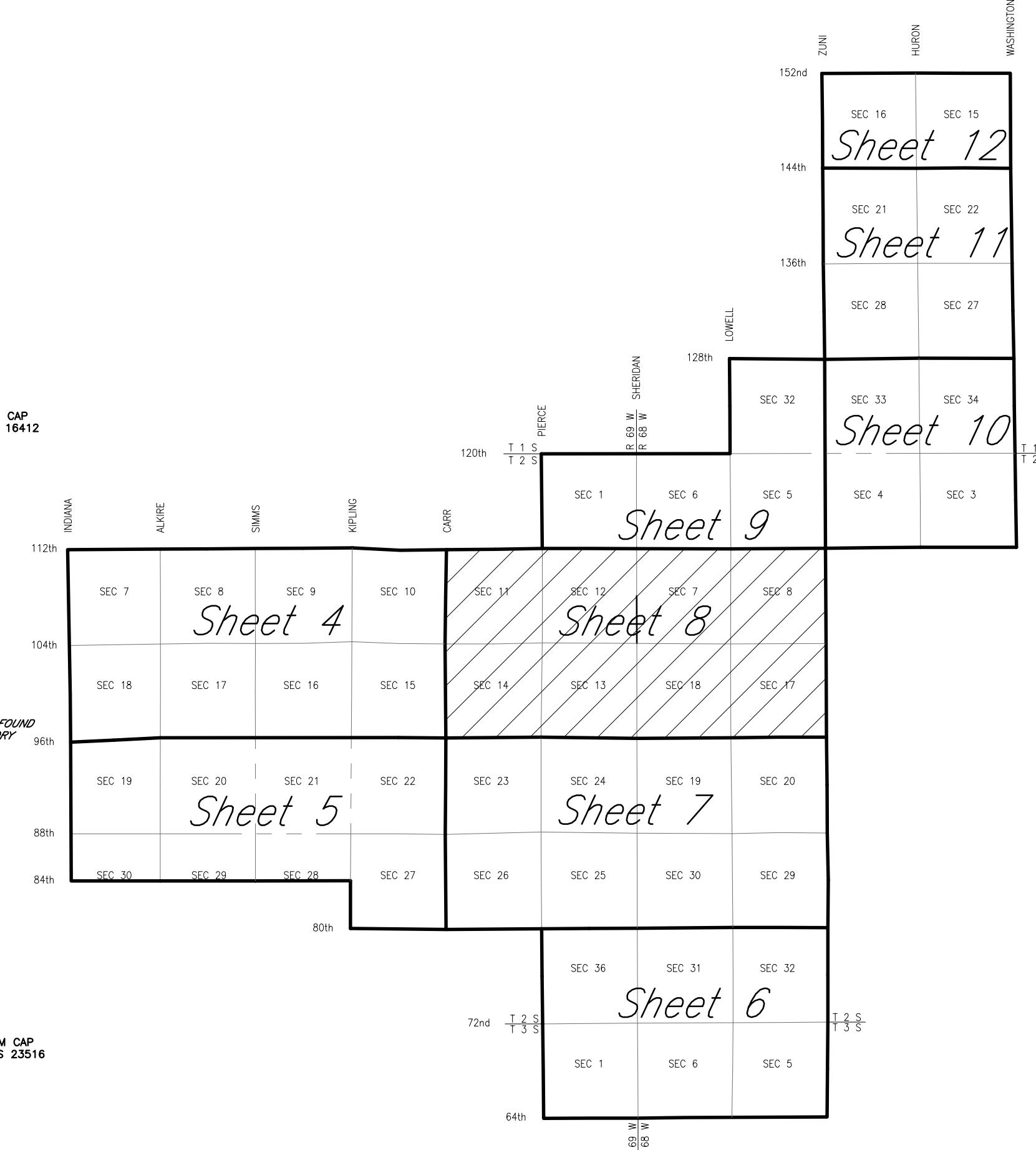
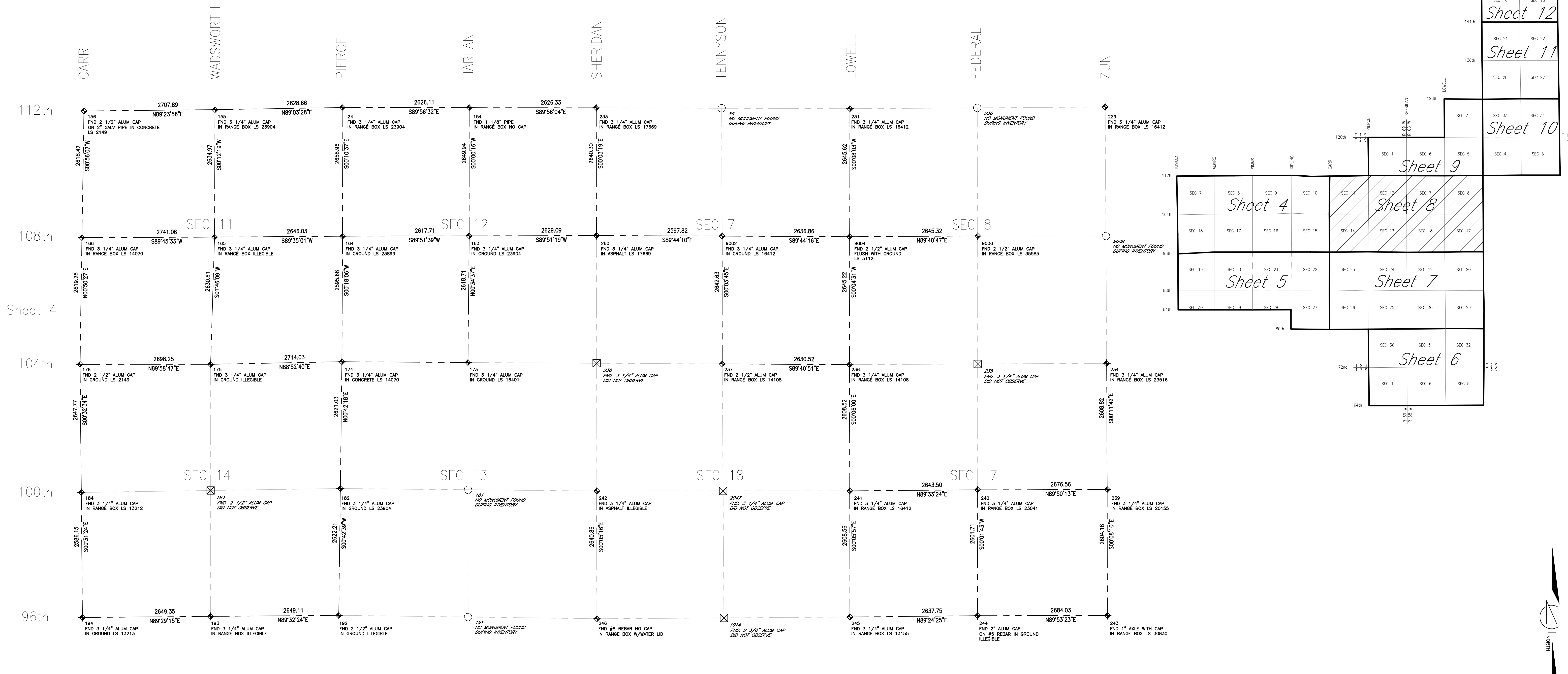
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BHI PROJECT NO.	080036
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Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado

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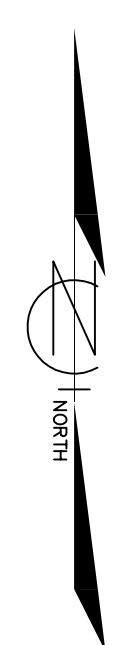
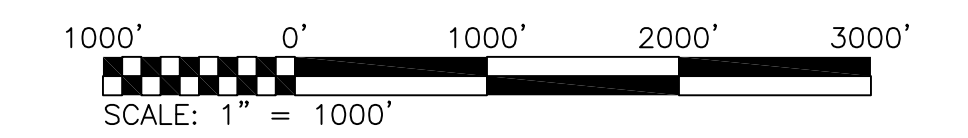


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GEODETIC CONTROL NETWORK
 SECTION AND QUARTER SECTION MAPS
 WESTMINSTER, COLORADO

CLIENT PROJECT NO. _____

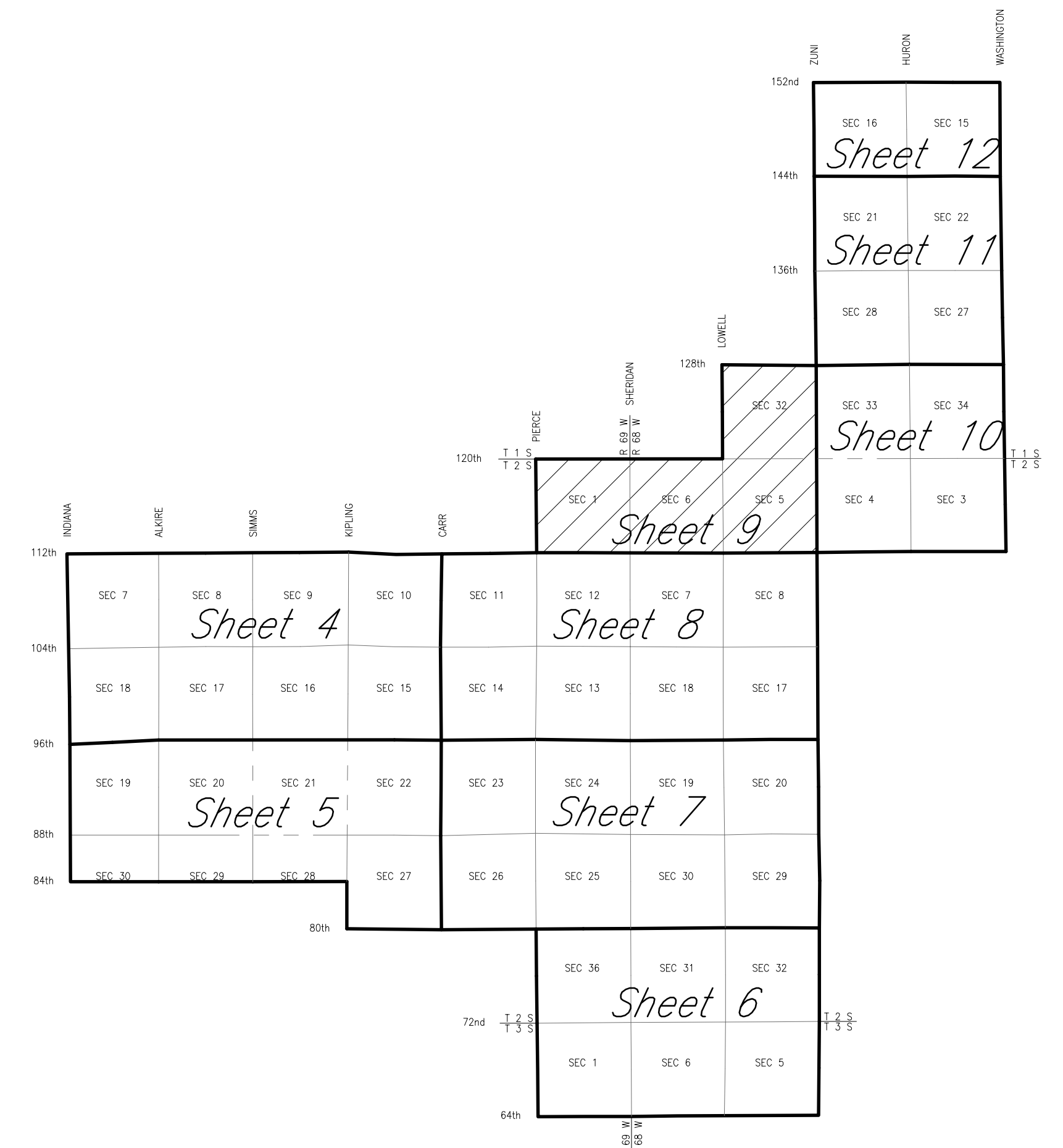
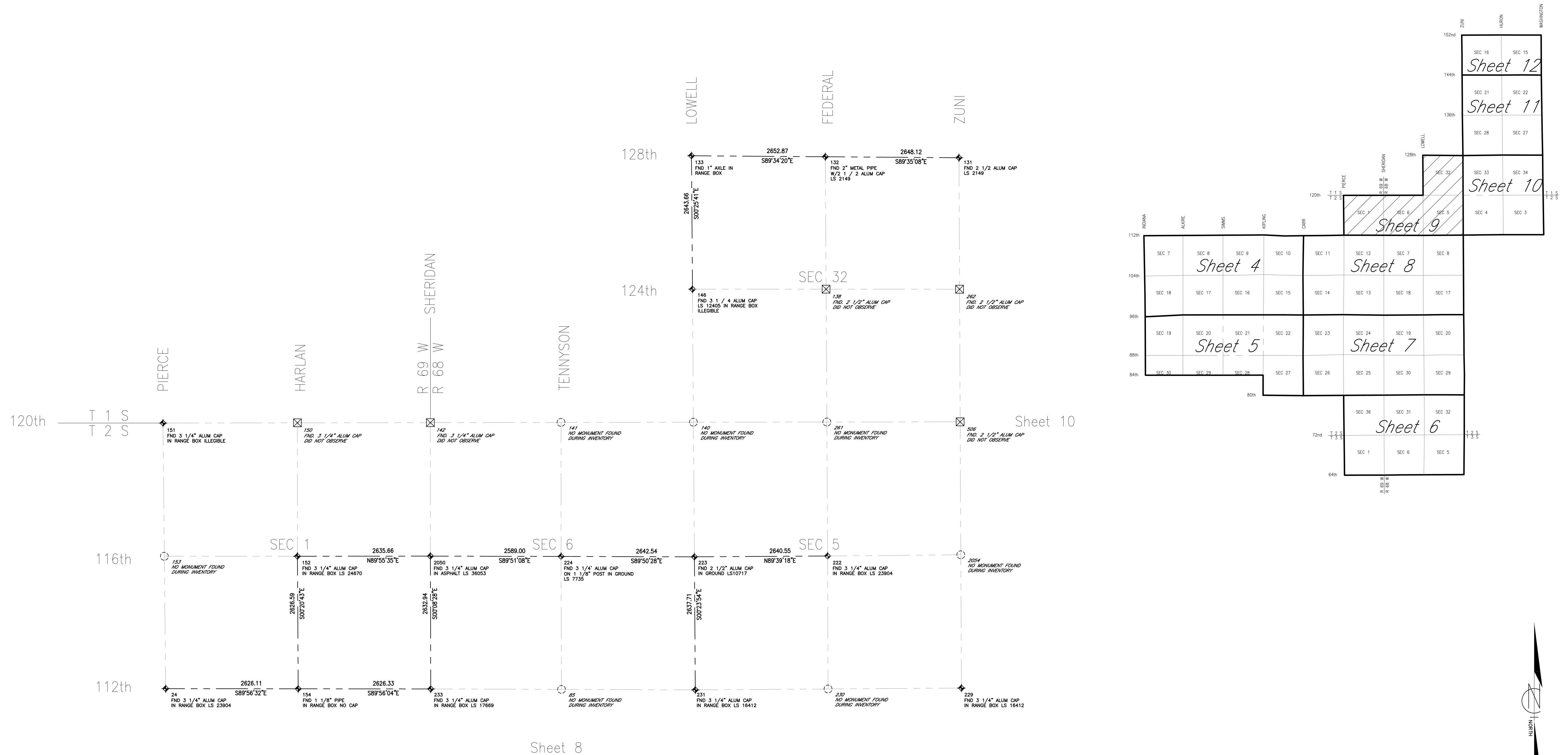
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**GEODETIC CONTROL NETWORK
SECTION AND QUARTER SECTION**

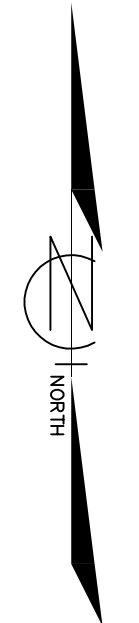
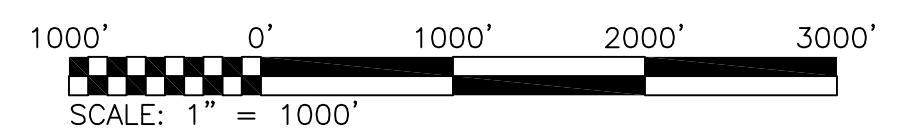
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Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



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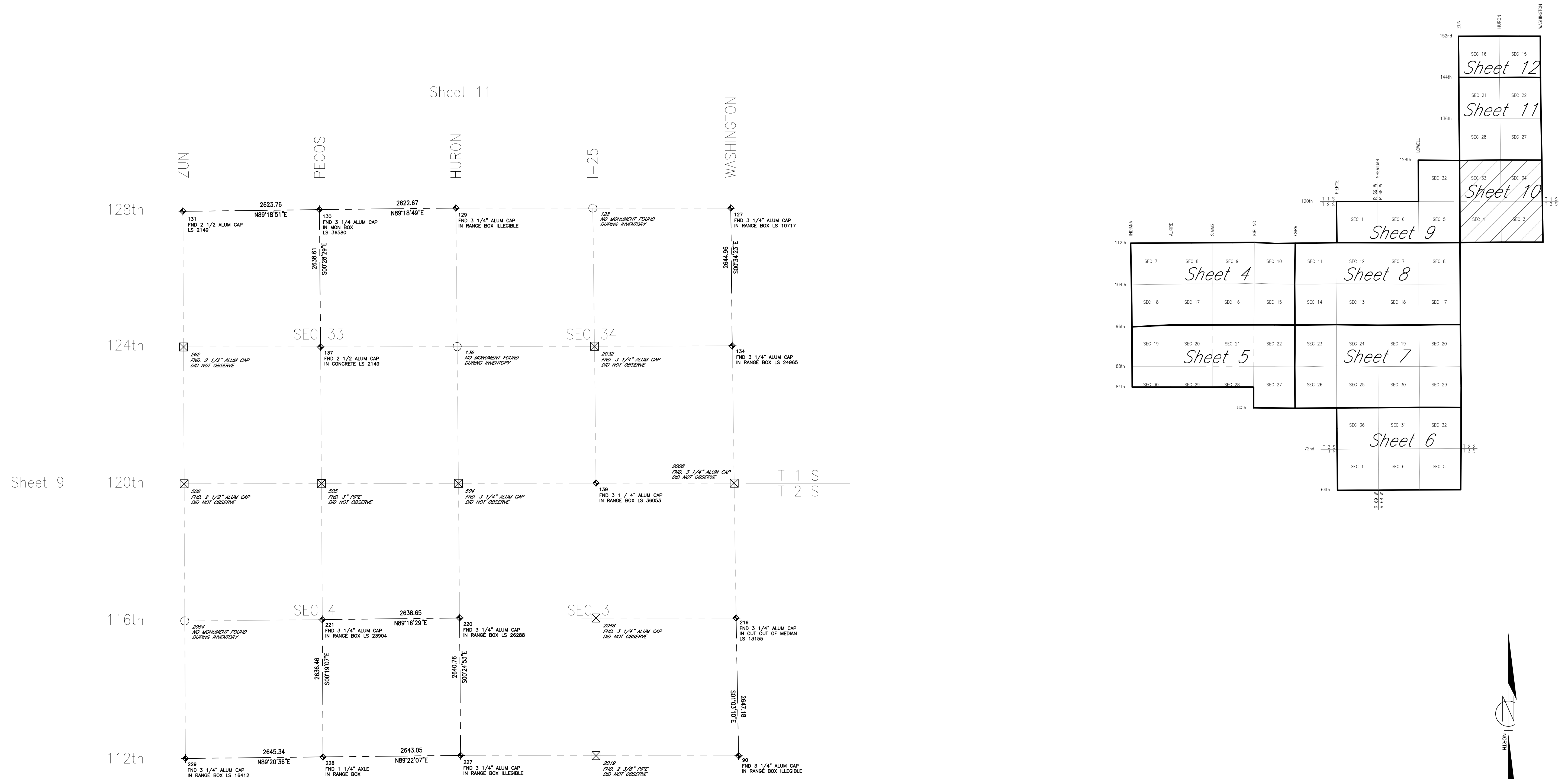
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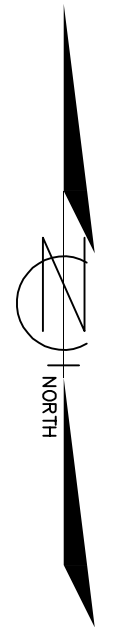
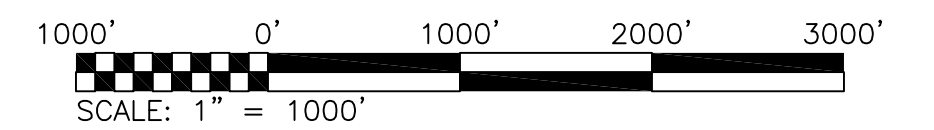
Section and Quarter Section Maps Geodetic Control Network City of Westminster, Colorado



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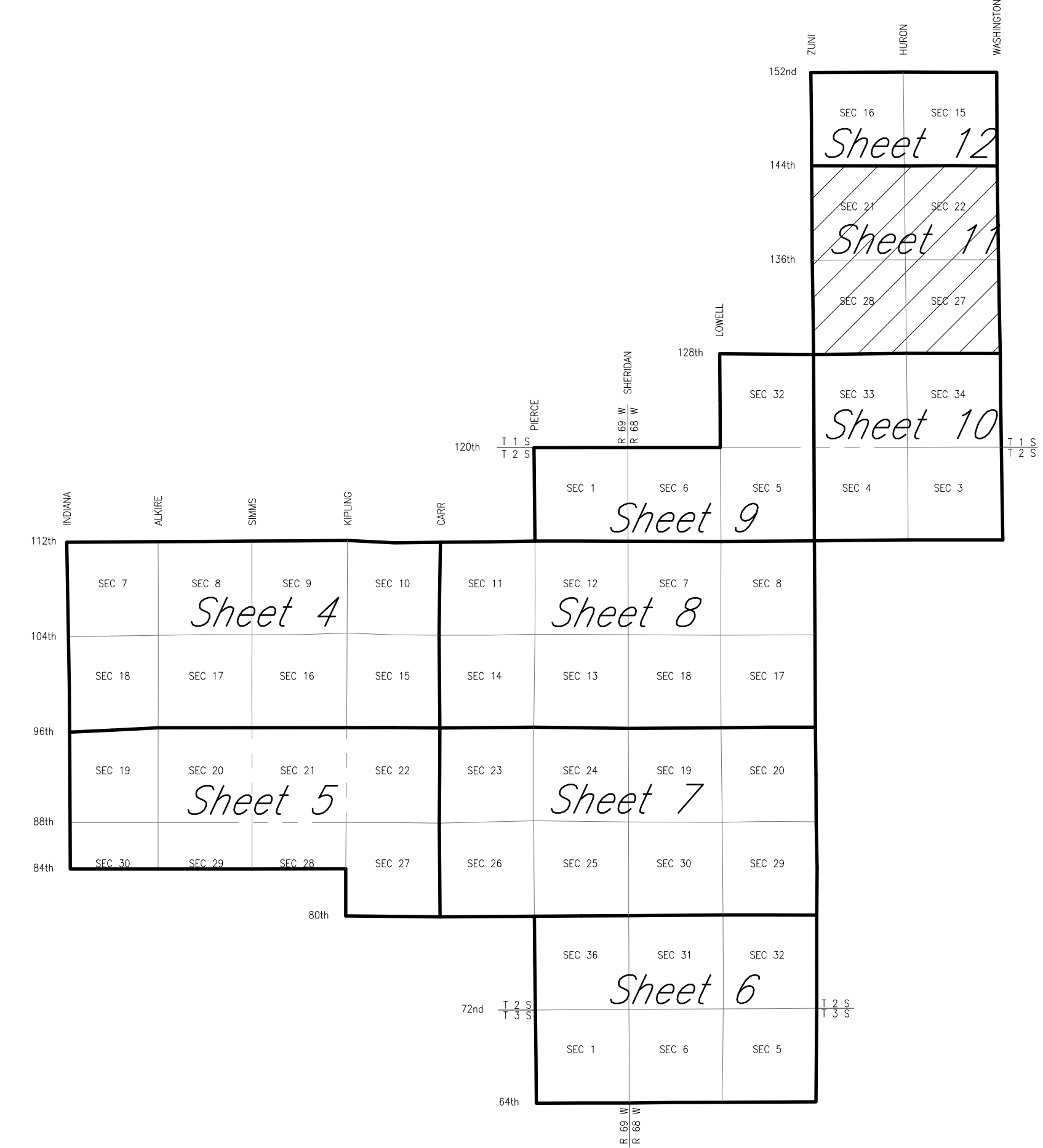
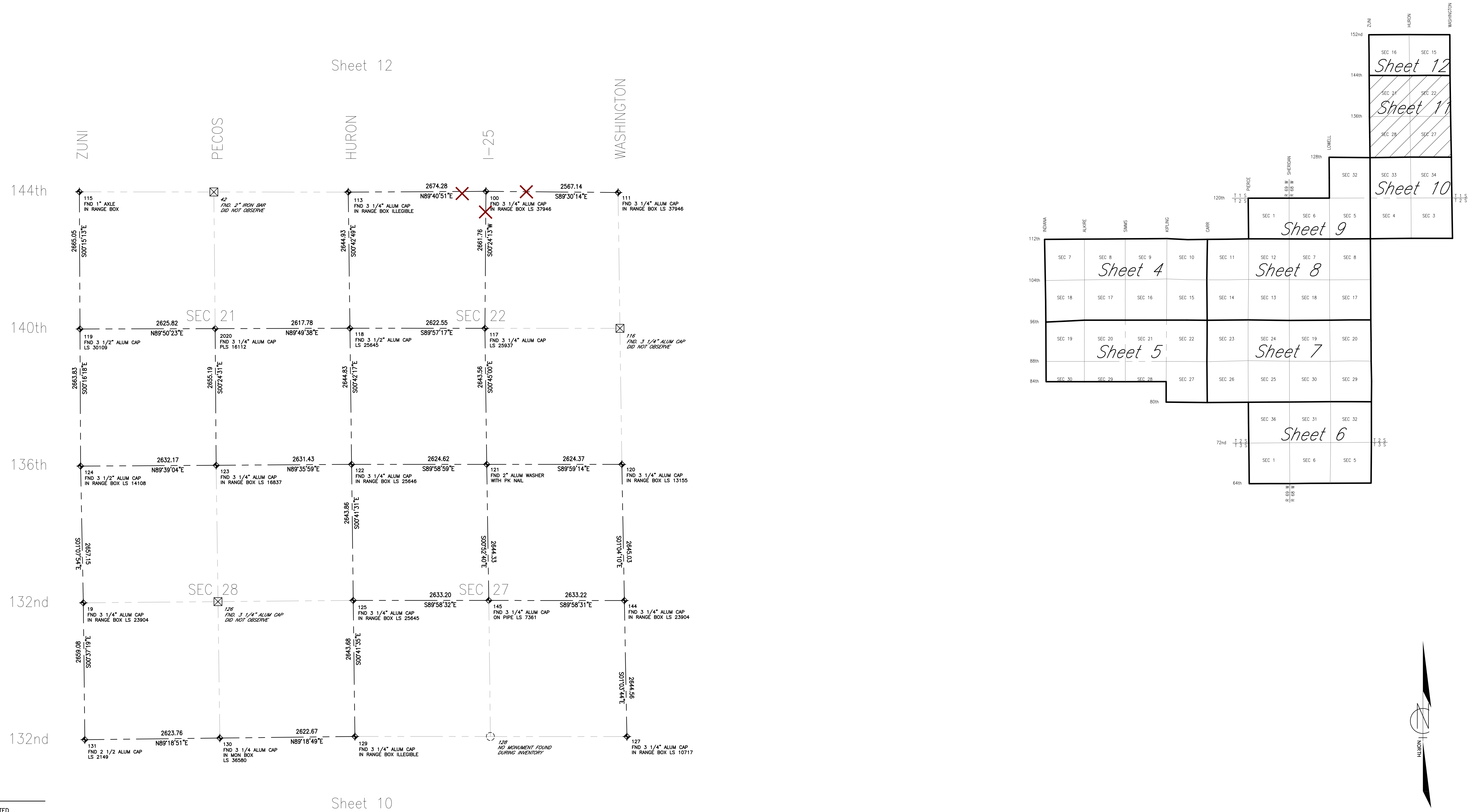
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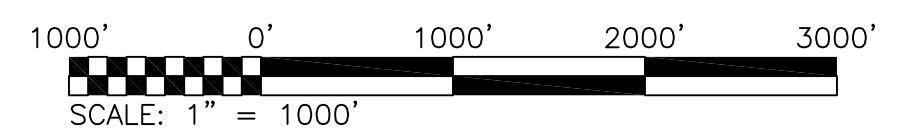
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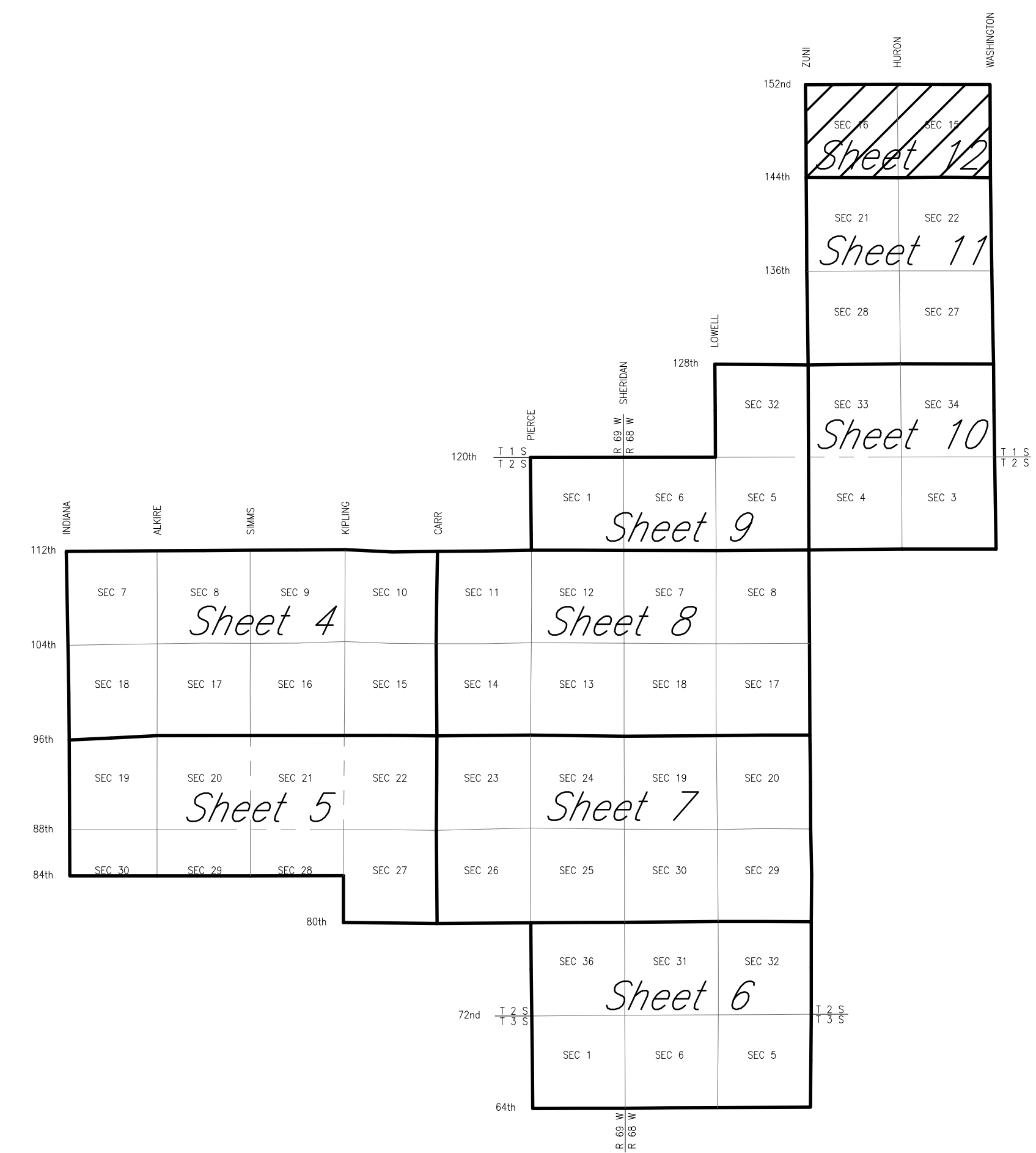
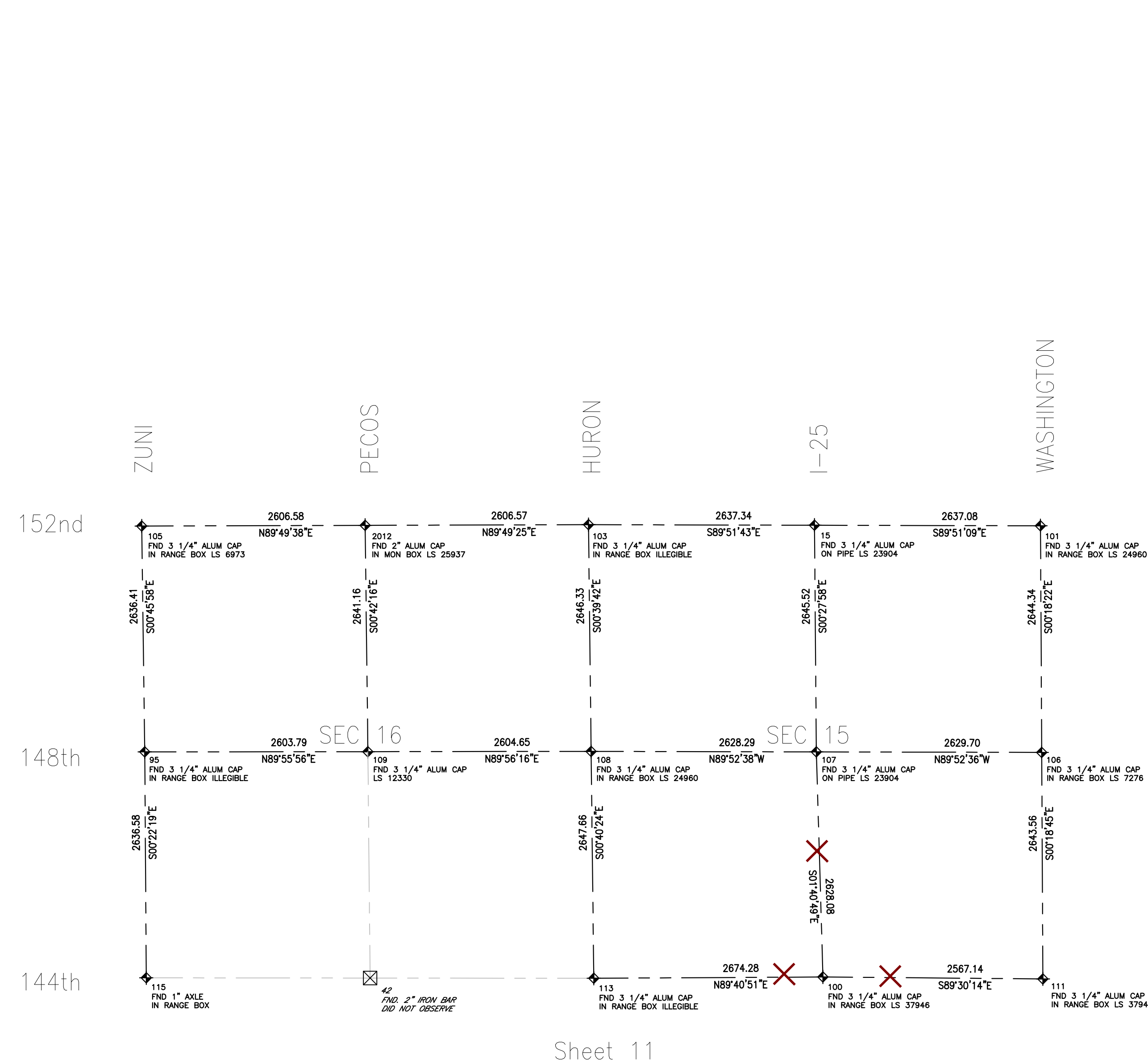
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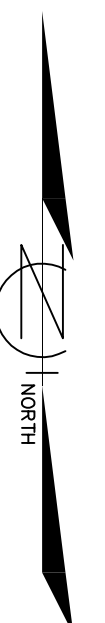
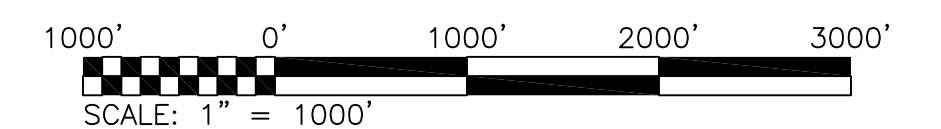
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