

TYLI Project No. 370156.00

TY·LIN INTERNATIONAL

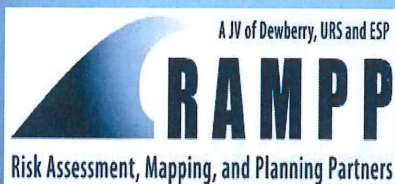
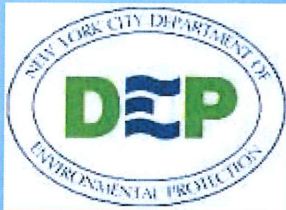
PROJECT CONTROL SURVEY REPORT

FOR
AZIMUTH PAIR SURVEY
CONTROL STATIONS

DELAWARE, SULLIVAN, AND ULSTER COUNTIES,
NEW YORK
(ASHOKAN, EAST BRANCH DELAWARE RIVER, NEVERSINK, RONDOUT AND
WEST BRANCH DELAWARE RIVER WATERSHEDS)

November 30, 2012
Revised October 03, 2013
Revised January 14, 2014

Prepared for:
New York City Department of Environmental Protection



Prepared by: AHS

Reviewed by: RJK

Michael W. King, PLS
Professional Land Surveyor
NY License No. 050626

Date: 10/03/2013

Prepared by:

T.Y. Lin International

One Edgeview Drive, Hackettstown, NJ 07840

Project Control Survey Report
Azimuth Pair Survey Control Stations
NYC DEP West of the Hudson Watershed Supply
November 30, 2012, Revised October 03, 2013

Introduction

T.Y. Lin International Engineering, Architectural and Surveying, P.C. (TYLI) has entered into an agreement dated August 23, 2010 with ESP Associates, P.A. and RAMPP to provide surveying services within the New York City Department of Environmental Protection (NYC DEP) West of the Hudson Watershed Supply Areas in the Catskill Region of New York State. The Scope of Work for TYLI included setting inter-visible pairs of survey control stations for use by NYC DEP and local surveyors performing survey in the region. This work was performed in conjunction with stream cross section and structure surveys by TYLI throughout the watershed areas.

Guidelines & Specifications

Monuments set for the azimuth pairs consist of ¾" diameter iron bars 4' long with aluminum caps or aluminum disks set in concrete structures. Aluminum disks and caps were stamped with "NYC DEP Control" and also stamped with the abbreviation for the watershed and the station number. Materials and identification methods for the azimuth pairs were approved by NYC DEP prior to the setting of the azimuth pairs.

The approximate locations for the azimuth pairs were selected by TYLI and submitted to NYC DEP for approval. NYC DEP reviewed the proposed locations and with input from local surveyors, returned revised general locations for the azimuth pairs. The final locations were selected by TYLI in the field to account for line of site between the stations, access to the stations, and the location of stable ground or structure in which to place the monument.

The Horizontal Datum specified for this project is the New York State Plane Coordinate System East Zone (Zone 3101) NAD83/CORS96 Epoch 2002.0000. The Vertical Datum specified is the North American Vertical Datum of 1988 (NAVD88). Elevations were computed using GEOID09. The unit of measure specified is the U.S. Survey Foot. Survey control established for this project meets a 2 cm (0.07 feet) or better horizontal and vertical accuracy, with a 95% confidence level, relative to the primary control stations detailed below (TYLI Primary Bases, CORS).

Primary GPS Control & Survey Procedures

To establish the stated azimuth pair monuments, TYLI established a project control network consisting of twelve (12) Primary Base Stations using rapid static GPS procedures. The published control used to establish the network consisted of five (5) National Geodetic Survey (NGS) Continuously Operating Reference Stations (CORS), three (3) Cooperative Base Network Control Stations (CBNCS) and a National Geodetic Survey (NGS) Station with a vertical accuracy of Second Order Class II.

The GPS observations were performed with four (4) Leica Series 1200 dual frequency receivers and five (5) Leica Series 500 dual frequency receivers. Four (4) GPS receivers were set on the CBNCS and NGS Stations while other GPS receivers occupied the Primary Base Stations. In all instances the occupation times exceeded the manufacturers recommended occupation time of 5 minutes plus 1 minute for each kilometer separation between simultaneously operating receivers. The occupations were repeated later on the same day or on subsequent days to collect data with varying satellite configurations.

In the network adjustment, horizontal and vertical published positions were fixed for the CORS sites and the CBNCS sites. Only the vertical position of the Second Order Class II NGS station was held fixed. The following tables detail the CORS, CBNCS and NGS Stations used in the project control network and the Primary Base Stations established by TYLI:

CORS ID	PID	Northing	Easting	Elevation (Published)
NYCS	DK7175	1396760.42	495789.33	988.75
NYHC	DI0460	1139354.28	276522.14	954.75
NYHS	DI0466	1246359.10	693120.10	175.78
NYKT	DI0468	1130911.22	619674.82	203.46
NYON	DI0608	1314550.46	326991.04	1109.10

NGS ID	TYPE	PID	Northing	Easting	Elevation
DELHI	CBNCS	AA7906	1263592.87	384594.17	1417.14
MARGARET	CBNCS	AA7928	1201392.52	447730.48	1317.62
SHANDAKEN	CBNCS	AB3881	1162751.04	554470.01	657.42
CARP	NGS	DH3545	N/A	N/A	834.78

The following are contained in appendix A.

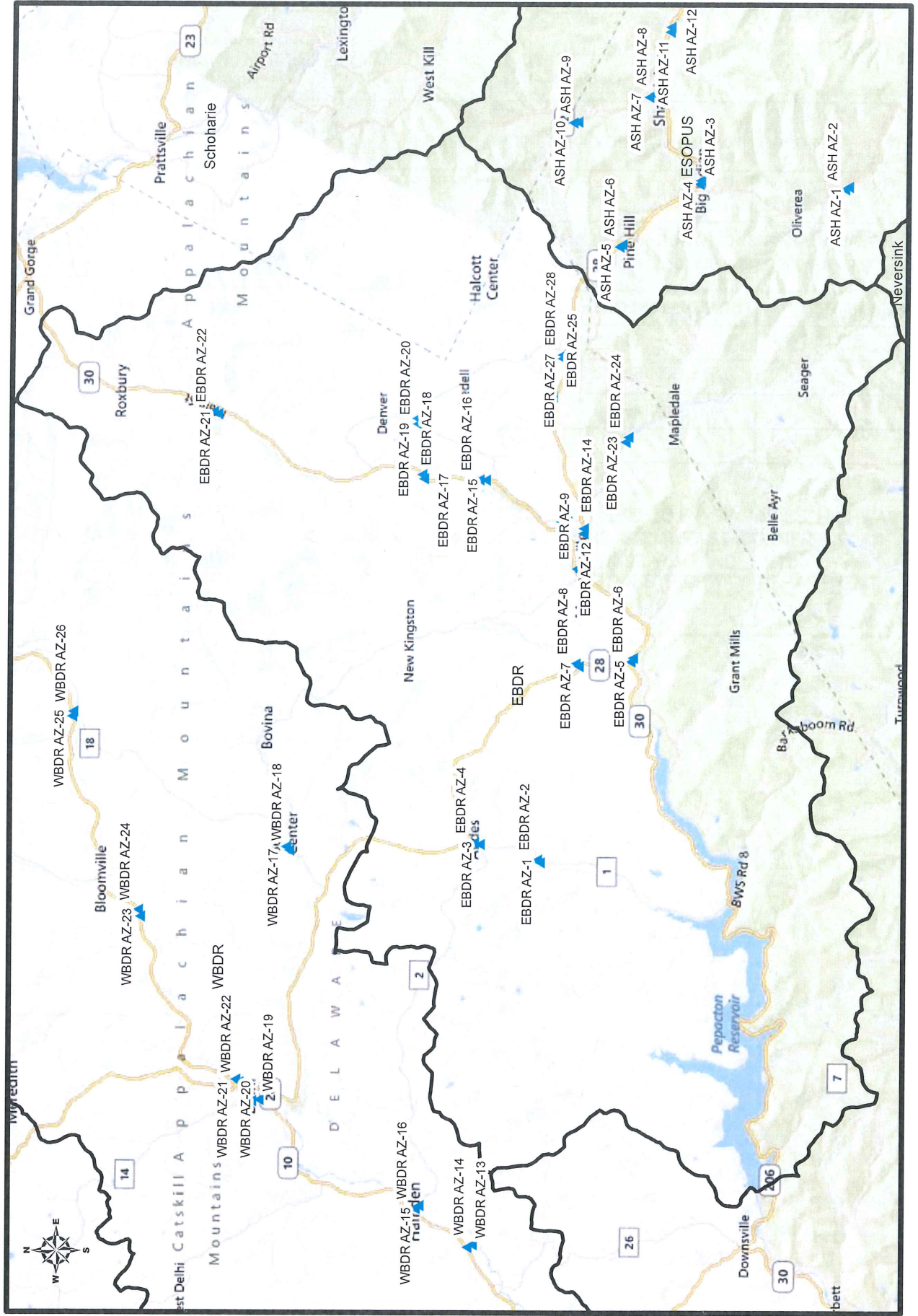
- A map showing the TYLI Primary Control Network, referenced NGS and CORS stations
- NGS Data Sheets for the referenced NGS and CORS stations
- Survey Control Data sheets for the TYLI Primary Base Stations

TYLI Primary Base	Northing	Easting	Elevation	Description
ANDES	1221171.93	410601.27	1815.48	Iron Bar and Cap marked "Medina Control"
BOICEVILLE	1155600.58	555590.98	624.21	
CLARYVILLE	1122994.59	472310.71	1617.20	
DELHI	1252952.49	376626.39	1555.41	Iron Bar and Cap Found
FLEISHMANN'S	1210475.36	482605.00	1488.67	Iron Bar and Cap marked "Medina Control"
HUNTER	1231139.96	567156.55	1596.76	
MARGARETVILLE	1207773.59	452750.08	1317.49	
PHOENICIA	1183216.96	541632.63	836.33	
SOUTH KORTRIGHT	1278322.68	433154.73	1519.59	Iron Spike Set in Concrete Sidewalk
STAMFORD	1302218.19	460345.26	1829.55	
SUNDOWN	1100055.96	488459.78	858.05	Iron Bar and Cap marked "Medina Control"
WALTON	1215202.37	320460.35	1207.77	Survey Spike

- Network Adjustments of the TYLI Primary Control Network

Survey of Azimuth Pairs

Azimuth Pair Locations - EBDR Watershed



One Edgeview Drive
 Hackettstown, NJ 07840
 Tel. 908.850.3366

PROJECT : 370156
 PROJECT AREA : FEMA - NYCDEP
 CHIEF OF PARTY : RG
 ORDER OF SURVEY : 2cm

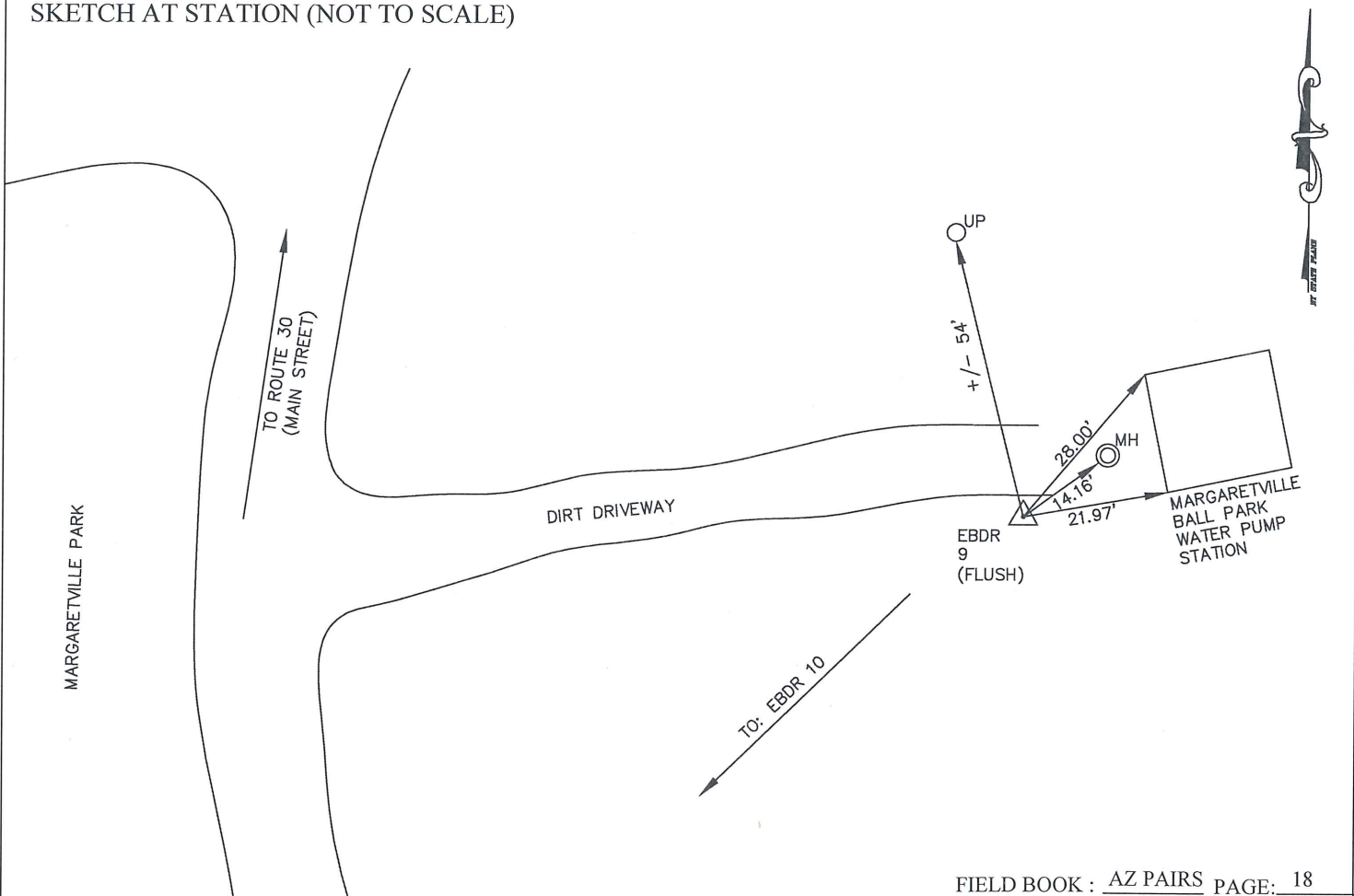
AZ PAIRS SURVEY DATA BASED ON THE NEW YORK STATE EAST COORDINATE SYSTEM

CITY/TOWN OR County, Middletown - Delaware County, NY		NAME OF STATION EBDR 9	MONUMENT TYPE Bar & Cap
NORTH : 1207965.8108 EAST : 452927.5005	US FOOT	DISTANCES AND DIRECTIONS TO BACKSIGHTS, FORESIGHTS, AND PROMINENT OBJECTS	
VERT. DATUM: NAVD88 (Geoid09) HORIZ. DATUM: NAD83(CORS96 Epoch2002.0000)		OBJECT EBDR 10	GRID DISTANCE (FT) 550.42' COMBINED S.F. 0.999843020
ELEVATION : 1326.18 US FOOT			GRID BEARING S 47°44'36" W
ESTABLISHED BY: T.Y. Lin International Medina	YEAR 2012		

DETAILED DESCRIPTION AT STATION

EBDR 9 IS A BAR AND CAP SET IN GRASS ON THE PROPERTIES OF MARGARETVILLE BALL PARK. THE STATION IS LOCATED 21.97' SW FROM THE SW CORNER OF BUILDING (MARGARETVILLE BALL PARK WATER PUMP STATION), 14.16' SW FROM A X-CUT SET ON A LATERAL PIPE SLEEVE AND 28.00' SW FROM THE NW CORNER OF BUILDING (MARGARETVILLE BALL PARK WATER PUMP STATION).

SKETCH AT STATION (NOT TO SCALE)



One Edgeview Drive
 Hackettstown, NJ 07840
 Tel. 908.850.3366

PROJECT : 370156
 PROJECT AREA : FEMA - NYCDEP
 CHIEF OF PARTY : RG
 ORDER OF SURVEY : 2cm

AZ PAIRS SURVEY DATA BASED ON THE NEW YORK STATE EAST COORDINATE SYSTEM

CITY/TOWN OR County, Margaretville - Delaware County, NY		NAME OF STATION EBDR 10	MONUMENT TYPE Bar & Cap
NORTH : 1207595.6798 EAST : 452520.1139	US FOOT	DISTANCES AND DIRECTIONS TO BACKSIGHTS, FORESIGHTS, AND PROMINENT OBJECTS	
VERT. DATUM: NAVD88 (Geoid09)		OBJECT	GRID DISTANCE (FT)
HORIZ. DATUM: NAD83(CORS96 Epoch2002.0000)		EBDR 9	550.42'
ELEVATION : 1316.07	US FOOT	-	COMBINED S.F.
ESTABLISHED BY: T.Y. Lin International Medina	YEAR 2012	-	0.999843540
		-	-

DETAILED DESCRIPTION AT STATION

EBDR 10 IS A BAR AND CAP SET IN GRASS ON THE PROPERTIES OF MARGARETVILLE BALL PARK, +/- 350' NORTHEAST FROM THE INTERSECTION OF STATE HIGHWAY 28 AND BRIDGE STREET. THE STATION IS LOCATED 42.50' SOUTHEASTERLY FROM A "PK" NAIL SET IN A 8" BIRCH TREE, 80.00' NORTHWESTERLY FROM A "PK" NAIL SET IN A UTILITY POLE AND 77.35' NORTHERLY FROM A "PK" NAIL SET IN A UTILITY POLE (#2-4).

SKETCH AT STATION (NOT TO SCALE)

