

**ENGINEERING DIVISION - DEPARTMENT OF PUBLIC WORKS**  
**DIVISION GOALS / PROGRESS AND ACCOMPLISHMENTS:**  
**Undated November 17, 2020**

In order to understand the function of the Engineering Division today, its existing purpose and functions, and its role within the Department of Public Works, it is important to understand where the Division has been and to look at the evolution of the Division's purpose and functions over time. During its peak 30 years ago, the Engineering Division consisted of 28 engineers, technicians and surveyors (there were also additional engineers and landscape architects as part of the Parks Department). During that time virtually all of the County's survey, design, and construction inspection work was being done by in-house engineering/surveying staff. Almost 100% of the County's capital improvement project budget was managed by engineering division staff, including all capital projects at the Airport as well as at SUNY-Broome.

Through attrition over the years, the Department has continued to decrease in size, and today consists of 8 full-time engineers (with one additional funded but currently vacant assistant engineering position). Now all of our survey, and a large percentage of the design and construction inspection services are outsourced to consultants. Capital improvement projects are handled by individual departments and many of these projects do not even come through the department until it is time for them to go out to bid. The jobs of in-house staff have migrated towards consultant management, technical support to other departments, infrastructure maintenance, and small project design.

To best meet our mission statement, ideally a minimum staff of 11-12 engineers is needed, one of which is a full-time Deputy Commissioner. Since the division has been perpetually understaffed during the past 10 years, we have looked for ways to implement continuous improvement and streamlining of our procedures and processes to make the best use of the staff and tools to the greatest advantage for the County.

The stated goals and objectives (or the mission statement) of the Engineering Division include five points as follows:

1. To deliver cost effective service that is timely and responsive to all County-wide departmental needs within the limits of the resources provided.
2. To work in unison with Highways, Parks & Recreation, Building & Grounds, and other County Departments in regard to their maintenance needs and Capital Improvement programs.
3. To advance the development of a multi-functional Engineering Division with major emphasis on facilities, highways, bridges/culverts, buildings & grounds, and parks with multi-discipline staff.
4. To continue to reorganize the Division's major reference data bases and filing system for better accessibility and efficiency.
5. To promote high technical standards and encourage leadership and career development.

Working under the umbrella of this mission statement, the question then becomes; what can we do to continue to meet these goals and objectives with existing staff levels and reduced resources?

In 2012, the engineering division developed and began implementation of a group of ideas to help us work more efficiently and effectively, and to continue to meet the mission statement of the division to the greatest extent possible. These ideas included:

- (1) standardizing and streamlining of processes;
- (2) utilizing our tools and resources to the greatest advantage;

- (3) making better use of electronic filing and retrieval systems;
- (4) better communications and coordination with other divisions and departments;
- (5) more recently, in 2018, we also added the need for staff redundancy by way of increased internal cross training.

The following information includes how each of these ideas is being implemented, and progress that has been made on each one since we began this program. At the end of this discussion will be a final section on looking forward with new goals in mind for this DPW division.

## 1. Standardizing & Streamlining Processes:

There are a lot of work-related processes that the Engineering Division does over and over for various projects and in the general course of the work that we do. Historically, each individual engineer is responsible for their own work effort and performs these processes however they have learned them or done them in the past, and since many of these processes are done infrequently, that means going back to find examples of how it was done in the past.

Instead of this approach, we have begun to standardize these processes by creating written steps, checklists and example documents so that everyone is doing things the same way. As each person follows one of these procedures, it is their responsibility to update the information with new or more current forms or data – so many of these things are undergoing continuous update and revision. This not only saves time, but assures that there is consistency and that critical steps are not missed. This is also an important training tool for new staff members.

The following list includes processes that could be (or have been standardized):

- a. Term consultant contact renewal process and annual schedule (legal notices, letters, memos, resolutions, etc.) - **DONE**
- b. Right-of-way acquisition process following County standards and federal procedures (steps, forms, contacts, resolutions, etc.) - **DONE**
- c. Right-of-way abandonment procedures (steps, memos, forms, & resolutions) - **DONE**
- d. Construction contract close-out process (forms that are needed from the contractor, backup documentation, final balancing change order, BAC request) - **DONE**
- e. Road/Bridge closure and notification procedure (certificate examples and notice copies) - **DONE**
- f. Contractor low-bid vetting for “responsible bidder” and award process - **DONE**
- g. Standardization of contract document front ends (standard, federal aid, facilities) - **DONE**
- h. Standardization of folders for electronic project filing - **DONE**
- i. Process for application of, issuance of, and filing of a building permit and occupancy permit for any work within Broome County owned buildings / facilities – **DONE** (as a second part to this goal, county staff is currently working with our code enforcement officer to develop a more streamlined permitting process to aid in the code review process of County projects.)
- j. Federal aid project steps and procedures for Broome County – **ONGOING** (flow charts have been developed for use by staff managing these projects – but requirements are constantly changing and being updated by NYSDOT so this is a moving target to some extent.)

## 2. Utilizing Existing Tools & Resources:

The County has technical resources that in many instances are underutilized. Where these exist, we need to apply them to the best extent possible. For example; Broome County does not have any formal asset management tools or software, however, we do have a good GIS system that could be implemented strategically to assist with asset management and to assist in cataloging and identification of these assets.

The following list includes assets that could be (or have been) identified and mapped for a comprehensive DPW layer in our GIS system for easier location and identification and for constituency of coordinates for permitting and repairs:

- a. County MS4 outfalls and inspection areas – **DONE** (currently staff has been adding to the MS4 layer by including facility catch basins (CB's) and roadways CB's within the MS4 boundary that require cleaning and maintenance per program requirements.)
- b. County Watersheds – **DONE** (because we have been getting numerous calls from companies regarding use of these properties for solar development, we are in the process of adding flood storage delineations at these sites in order to easily designate areas which cannot be developed.)
- c. FHWA and FEMA road classifications - **DONE**
- d. County and local bridges with BIN numbers- **DONE**
- e. County large culverts with CIN numbers and culvert data - **DONE**
- f. County smaller culverts (cross culverts and driveway culverts) – **ONGOING** (all of the 48-60" culverts have been added to the large culvert inventory that is inspected and monitored by engineering division staff, mapping and CIN numbers for all of these have been completed. Remaining smaller culverts are being mapped by summer interns when they are available.)
- g. County road signs – location and type **HAVE NOT STARTED**
- h. County GR - locations and types **UNDERWAY**
- i. County-owned easements and maps – **DONE**

As this GIS layer gets populated with the basic information, we can then go back in and add data such as inspection schedules, structure flags, repair needs, type of sign or guiderail, etc. An additional goal under this heading that we have added as this goal progresses is as follows:

- j. Work with GIS staff in the Planning Department to make sure our collected GIS data meets existing standards and best practices as we transition to using GIS more actively for both internal information and public outreach.

## 3. Electronic Filing and Retrieval Systems:

It is important to utilize electronic technology to benefit our efficiency and productivity. The following initiatives are planned and/or underway, including a description of the importance of each.

- a. Reorganizing our K-drive; which is where the Engineering Division stores all of its electronic files. The intent of this goal is to have all of the electronic information about any one road, or bridge or facility or culvert in one place. We have been working on this for a number of years, but the continued decline in staff and intern resources has made this a very slow process. **ONGOING**

- b. Conversion of project work to electronic format. We have basically been functioning on a paperless basis for a number of years now. All the way from design reports, to design plans, to bidding documents, to invoicing is basically done electronically. We print documents when needed. **DONE**
- c. Scanning County ROW/easement plans and tying these into our GIS database. Staff has scanned 3700 easement plans and drawn these easements into the GIS system. When clicking on the easement shown in GIS, the actual easement plan is pulled up and can be saved or printed. **We went live with this system to the public survey firms about a year ago, and it has been a huge success. We are now working interactively with many of these firms where they will share additional ROW and easement data and maps with us (including shape files) that we can add to our system. The public system is updated periodically with new information as needed. DONE**
- d-1. Scanning paper record plans into electronic format and filing in our revised K-drive (by road, bridge, facility, etc.) to save time researching and copying, as well as the cost of paper and copy equipment/supplies. This includes cross referencing plans – for example one set of road plans may have roadway information as well as bridge and/or culvert information, so they need to be tied to both a specific road as well as a specific bridge/culvert. This is a multi-step procedure to (1) scan the mylars, (2) check and name the scans, (3) file the scans, and then reorganize the engineering flat files. **Staff continues to work on this goal as time allows. We have created a naming system for our electronic drawing files for easier cross reference. ONGOING**
- d-2. Tying scanned plans into our GIS database: Since the ROW / easement process has been so successful, we have added a “part 2” to the record plan scanning – and that is to tie these as-built plans into our GIS system in a format similar to what we have done for the easement plans. This will allow our staff the ability to pull up site specific project data quickly without a lot of wasted research time. **NEW GOAL**
- e. Reorganization of our flat file system and distributing documents to facilities/departments: A corollary of the scanning objective (above) is the reorganization of our flat file system. The first step of this process is to scan and distribute documents to facilities that currently manage their own engineering programs, such as BCC and Aviation (**DONE**). The second step is to scan each group of plans; facilities (**DONE**), parks (**DONE**), road/bridges (**UNDERWAY**), and to discard any progress prints, copies, etc. and only keep as-built drawings (**ONGOING**). ~~The third step is to catalog and file remaining plans in our flat files in a logical system by facility, road, park, bridge, etc.~~ **We have revised the final step in this process as follows: we will make sure that all plans and mylars are correctly filed in the flat files by project number once they are scanned. Since our new file naming system includes this project number, we can cross reference projects easily if needed. The truth of the matter however, is that once we have a good scan of the hard copies, we really do not need to pull the plan sheets out for any reason, so spending time to reorganize these does not make a lot of sense.**

#### 4. Better Communication & Coordination with other Departments:

The goals of the Engineering Division include working in unison and providing support for other County Departments and Divisions. This can only be accomplished through continued and better communication and coordination. Along these lines, specific engineering staff have been assigned to major areas for contact / coordination and better flow of communications as follows:

Facilities / Buildings:

Scott Mastin, P.E. / Mitch Cromer

Building Permit Issuance:	Scott Mastin, P.E.
Watershed Coordination:	Patrick Hogan
PBS / SPCC:	Patrick Hogan
Parks Repair & Permitting:	Brenda Gowe
Planning / 239 review:	Brenda Gowe
Highways:	Tom Sullivan, P.E.
Pavement Management:	Tom Sullivan, P.E.
ADA Transition/ Compliance:	Tom Sullivan, P.E.
Bridges & Culverts:	Nazar Logvis, P.E.
Division Research:	Marty Haley
MS4 Program Compliance:	Emily Giordano

### 5. Staff Redundancy – Internal Cross Training:

To be as versatile as possible as a division, it is important for each individual engineer to be cross-trained so that knowledge is shared among the staff and we all get the advantage of experience (both good and bad). Along these lines, beginning in 2018 we implemented a monthly training / mentoring program to increase staff redundancy, knowledge depth, and to increase employee engagement (from the standpoint of providing the staff the potential to develop their talent through the opportunity to learn). This program directly addresses one of our long-term goals, “to promote high technical standards, and to encourage leadership and career development.” Each of the senior staff members will be tasked with providing one of these monthly learning opportunities on a rotating basis. (In 2020 we decided to add all staff members to this rotating training / enrichment schedule.) The table below is a record of this program to date. **CONTINUOUS / ONGOING**

Month:	Date:	Trainer:	Topic:	Status:
<b>2018</b>				
Jan.	02-01-18	Leslie B.	Guidelines for Inspecting Earth Dams & Associated Outlet Works – ASCE Webinar	<b>DONE</b>
Feb.	02-27-18	Pat H	Aquaphalt roadway patching in wet and freezing conditions – vendor demonstration with Highway and NYSDOT staff	<b>DONE</b>
March	03-20-18	Tom S.	Culvert Hydraulics – Guidelines to HydroCAD analysis for sizing determinations	<b>DONE</b>
April	04-11-18	Brenda G.	Full Depth Reconstruction – presented by Ruston Paving with Highway staff.	<b>DONE</b>
May	05-02-18	Scott M	Building Codes & Building Permits – what are the County’s roles and responsibilities	<b>DONE</b>
June	06-15-18	Nazar L.	Common bridge problems and common bridge solutions	<b>DONE</b>
June	06-26-18	Pat F.	Process and procedures for internal research of right-of-way and construction plans	<b>DONE</b>
July	07-23-18	Pat H.	Environmental Permitting for DPW projects	<b>DONE</b>
Aug.	POSTPONED	Leslie B.	Following the federal aid process for DPW projects within the framework of Broome County requirements.	<b>POSTPONED</b>
Sept.	09-26-18	Tom S.	Ground Works Solution – foam injection beneath concrete slabs for stabilization	<b>DONE</b>

Oct.	10-30-18	Brenda G.	Navigating the 239 Review Process	<b>DONE</b>
Nov.	11-15-18	Scott M.	Public Work's Role in Emergency Management	<b>DONE</b>
Dec.	12-11-18	Leslie B.	Permeable Pavement – Design, Construction & Maintenance	<b>DONE</b>
<b>2019</b>				
Jan.	01-16-19	Leslie B.	Following the federal aid process for DPW projects within the framework of Broome County requirements – Work Group – Part 1	<b>DONE</b>
Jan.	01-30-19	Leslie B.	Following the federal aid process for DPW projects within the framework of Broome County requirements – Work Group – Part 2	<b>DONE</b>
Feb.	03-07-19	Scott M.	HVAC Systems & filter options	<b>DONE</b>
March	03-14-19	Nazar L.	Snap-Tite Pipe Lining use and installation	<b>DONE</b>
April	04-23-19	Pat H.	SPCC (Spill Prevention, Control & Countermeasure) program & plans within Broome County & regulatory requirements	<b>DONE</b>
May	05-21-19	Tom S.	Non-destructive testing of concrete and other materials in bridges, highways, culverts, etc.	<b>DONE</b>
June	06-25-19	Brenda G.	Green Infrastructure Implementation – retrofit and new development	<b>DONE</b>
July	07-29-19	Leslie B.	Natural Stream systems and manmade causes of instability and erosion. (USFWS)	<b>DONE</b>
Aug.	08-29-19	Brenda G.	Green Infrastructure Implementation	<b>DONE</b>
Sept.	09-17-19	Scott M.	Lidar & High-Speed Data Collection	<b>DONE</b>
Oct.	10-17-19	Nazar L.	Paint System Application on Bridges	<b>DONE</b>
Nov.	11-06-19	Pat H.	Watershed Site 9A Improvements	<b>DONE</b>
Dec.	12-19-19	Brenda G.	SEQR Process	<b>DONE</b>
<b>2020</b>				
Jan.	01-08-20	Tom S.	Pavement Repairs (Suit-Kote)	<b>DONE</b>
	01-28-20	Leslie B.	Job Order Contract Construction (Gordian)	<b>DONE</b>
	01-29-20	Leslie B.	Cooperative Purchasing (Omnia)	<b>DONE</b>
Feb.	02-19-20	Leslie B.	ADA Compliance and Issues (NYSDOT)	<b>DONE</b>
March	04-01-20	Nazar L.	Phoscrete field demonstration on Old Vestal Rd bridge (Phoscrete reps)	<b>DONE</b>
April		N/A	No in person trainings were held during this period due to COVID restrictions and working remotely. All staff members took advantage of free webinars and other online training during this period.	N/A
May		N/A		N/A
June		N/A		N/A
July		N/A		N/A
Aug.		Nazar L.	Micropile driving – construction site	<b>DONE</b>
Sept.	09-23-20	Tom S.	Correct Sizing of Culverts (Shumaker)	<b>DONE</b>
Oct.	10-07-20	Leslie B.	Low Impact Development & Green Infrastructure Use in Redevelopment (E.J. Prescott)	<b>DONE</b>
Oct.	10-13 to 10-22	Cornell Local Roads	Annual Bridge Conference via Zoom – various training sessions over 2 weeks.	<b>DONE</b>
Nov	11-18-20	Scott M.	Roundtop Discussion: lessons learned in 2020 projects	



Dec.		Marty H.		
<b>2021</b>				
Jan.		Mitch C.		
Feb.		Emily G.		
March		Pat H.		
April		Brenda G.		
May		Nazar L.		
June		Tom S.		
July		Leslie B.		
Aug.		Scott M.		
Sept.		Marty H.		
Oct.		Mitch C.		
Nov.		Emily G.		
Dec.		Pat H.		

## 6. Infrastructure Funding:

One of the primary goals of the Engineering Division – and one that we do exceedingly well is to find and apply for various types of federal and state funding to help pay for infrastructure repair and replacement work. In the past 5 years engineering division staff has applied for and been awarded approximately **\$21-million** of funding through federal transportation funding, transportation enhancement funding, climate smart communities funding, and BRIDGE NY funding. These funding sources have allowed the County to replace 4 deficient bridges and 4 deficient large culverts, complete 2 major bridge rehabilitation projects, address wearing surface deficiencies on 7 County bridges, paint and repair one major river truss bridge, complete 2 ADA sidewalk projects, one road/bridge project within Dorchester park, and steel cleaning and painting on one major bridge system. Climate Smart Community funding will help the County provide remote monitoring at our watersheds and complete replacement of the Second Street drainage system in Deposit.

Currently, engineering staff is completing 6 applications for FEMA-BRIC funding of projects that were identified in the County's Hazard Mitigation Plan. These include upgrades to our watersheds as well as flood mitigation measures to embankments, bridges/culverts, and drainage systems within the County right-of ways.

## 7. Looking Forward:

In an ongoing effort to look forward and establish new goals that will support the County and the Public Works Department, the engineering division has identified the need to provide technical support in different ways to both other DPW Divisions, as well as to other County Departments. A list of some of these ideas is included below:

- A. **Work with OMB to centralize CIP program on a more County-wide basis.** In discussions with Jerry Knebel it has become apparent that with numerous different departments trying to get individual needs met through the CIP program that perhaps we are not addressing some items in the most economical and expeditious manner. By better coordination between OMB

and engineering we believe that we can begin to centralize some of the infrastructure types of repair back under this division. For example – the 2020 CIP requests included pavement work for parks (at multiple sites), and parking pavement work for OES (at Wayne Street). There is also a current need for parking pavement work at En-Joie. In the past there have been capital projects for parking pavement at the senior centers, at the transit facility, at Willow Point, at the RAMP building, and several for various parks projects. Pavement outside of the County roads is a part of our infrastructure that requires ongoing maintenance / upkeep and rehabilitation. If we do not address this need, then replacements become necessary at much greater costs. If we can group these County-wide needs under the umbrella of one comprehensive CIP, then we gain the advantage of scale in pricing and can use the technical expertise of engineering to specify the maintenance methodology that will provide the best long-term results.

**B. Work with other Departments to provide CIP and grant development support:** Provide technical guidance in developing accurate and realistic project budgets and timelines to aid other County Departments in the annual CIP planning process and in their efforts to apply for grant funding. In many instances departments try to ask for capital improvement monies (or apply for grant funding) for projects without having a good idea of how much they should be asking for or what kind of time frame it will take to accomplish a project. Engineering staff can assist with development of a realistic project budget and timeline so that sufficient funding is obtained to complete the project that is desired.

**C. Work with Other DPW Divisions to implement asset management systems, tracking, and forecasting infrastructure repair needs.** One of the things that is lacking within the other divisions of Brome County DPW is a good record of assets being managed and maintained by the division and then systems to track the maintenance and repairs of these assets including what, when and how much it has cost. For example, Engineering has developed a good asset management system for the large County culverts where they are inspected on a regular interval, rated and flagged if repairs are needed, prioritized for repair funds and replaced when they can no longer be repaired. Our files include inspection reports, as-built plans for construction and repairs, costs associated with these repairs, and GIS maps and coordinates.

Staff has also begun working on similar asset management for some of Highways assets – for example we have begun a similar type of asset management tracking for the smaller culverts (under 48” diameter), and other highway features such as guiderail, and signs (as noted above). The pavement management program is a form of asset management.

The largest need at the present time is to develop asset management for the County facilities. This will be a huge push with the Buildings and Grounds staff but can also be applicable at facilities managed by other departments such as transit, willow point, and aviation. For example, with a good asset management systems Buildings and Ground staff should be able to produce accurate building and floor plans, tell you how much they have spent on utilities and repairs during any one-year period, have good basic knowledge about the mechanical systems and components in a building including what the maintenance schedule is for various mechanisms and how these schedules are being met. Each facility should have O&M manuals for all of their systems and copies of the most recent inspection reports available and on hand.