



# concrete pipe & precast journal

FALL 2022



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## Municipal and Consulting Inspector Information Session

**Jude Tremblay, P.Eng.**  
Region Engineer  
Canadian Concrete Pipe & Precast Association

**As part of our vision on education, the Canadian Concrete Pipe and Precast Association is continually providing training through the following activities:**

- **Lunch & Learns**, held both in person and by webinar,
- **Plant Tours**, where attendees can see how concrete pipes and products are designed and manufactured
- **Seminars (half day)**, that cover various aspects of concrete pipes and precast structures, from design and manufacturing to installation.

Although our Plant Tours, Lunch & Learns and Seminars continue to be well received by the municipal and consulting communities, we have identified a need to provide more in-depth practical knowledge to both the municipalities and engineering consulting firms.

Although delayed somewhat by the COVID-19 pandemic, the CCPPA has recently developed and rolled out a “Practical” information session specifically designed for municipal and consulting inspectors.

The Inspector Information Session involves six (6) separate practical learning stations which have the following themes:

### 1. The Basics

Basic pipe design, manufacturing, handling, and site storage

### 2. The Bedding

Proper bedding requirements including how concrete pipe reduced excess soils generation



Gasket Station with maintenance holes and pipes

### 3. The Gasket

Proper care, inspection, and installation of gaskets – both pipe and maintenance hole

### 4. The Maintenance Hole

Proper connection – Pipe to maintenance hole

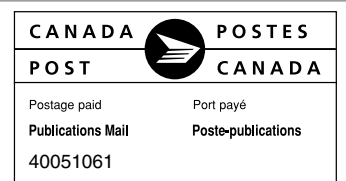
### 5. The Good, the Bad & the Ugly

Common site issues related to the installation of concrete pipe and precast structures. Discussion covers causes and remedial actions.

### 6. Crack Evaluation

Acceptable and unacceptable cracking in concrete pipe.

*continued on page 2*



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Canadian Concrete Pipe And Precast Association, 447 Frederick St, Suite 200, Kitchener, Ontario N2H 2P4



# Inspector Information Session

continued from page 1

The first session was held in the Ottawa area. The attendees were a mix of City of Ottawa staff along with staff from the Ottawa area consulting engineering firms.

As can be seen in both Picture 1 (previous page) and Picture 2, lengths of reinforced concrete pipe, precast structures, gaskets, cages and other concrete pipe and precast components are brought in to enable a high level of practical knowledge exchange.

The attendees were separated into six smaller groups that started the session at one of the stations listed previously. The information exchange at each station lasted approximately 25 minutes after which the groups would move on to the next station. The overall length of the session was three (3) hours. We held both a morning and afternoon session to allow for flexibility. Each of the stations had two individuals that were concrete pipe/precast producer staff. These two individuals would facilitate the information exchange/discussion.

In addition, videos were produced for each station. These videos will be released later this Fall on the Canadian Concrete Pipe & Precast Association's YouTube Channel. Please watch for teaser videos on the Canadian Concrete Pipe & Precast Association's LinkedIn page.

Kevin Lamer, Program Manager for City of Ottawa Inspection Group had the following statement after attending the Inspector Information Session:

**"The City of Ottawa Inspectors were invited to the CCPPA on-site training event on May 18th, 2022, at the City of Ottawa's EY Centre. This was an excellent session that provided detailed presentations and demonstrations from multiple concrete manufacturers. The Inspectors enjoyed the hands-on experience, and it provided them a great opportunity to learn more about the different products available to the industry and make some key contacts with the manufacturers."**



Gasket Station with maintenance holes and pipes

**It was well organized, and the Inspectors liked the open forum to ask common field questions and share knowledge with other attendees from the Consultant Industry. Thank you CCPPA for putting on this important event and bringing the industry back together post COVID-19."**

The CCPPA is looking at holding more of these sessions in 2023. Some of the tentative dates and locations are listed below:

February 2023	Ontario	East GTA	Markham Fairgrounds
March 2023	Ontario	West GTA	TBD
Spring 2023	Alberta	Calgary/Edmonton	TBD

Please visit our website under the "EVENTS" TAB or follow us on LinkedIn to find out when the dates/locations will be confirmed.

## Precast Solutions Provided to the "Imagine Jasper Avenue" Project in the City of Edmonton

**James Kercher, P.Eng.**  
Senior Municipal Engineer  
ISL Engineering and Land Services Ltd.  
Precast Producer: S3 Precast (Alberta)

The City of Edmonton has been working on revitalizing and rejuvenating the downtown core for the last several years. One of their recent projects is the "Imagine Jasper Avenue" project (Phase 1).

Jasper Avenue is Edmonton's premier Main Street, connecting the West End to Downtown. The goal of the Imagine Jasper project is to restore and elevate the avenue, giving it a consistent look and feel. It will highlight the downtown core and provide a safe and enhanced experience for those who walk, bike, drive or use transit. Ultimately, these changes will support the area businesses and attract visitors.

ISL Engineering and Land Services Ltd. were retained by the City of Edmonton to provide design and contract administration support services for the Imagine Jasper Avenue project from 109 Street to 114 Street. In addition to the roadway and streetscape elements, a key component of the project involved addressing the flood risk at a trap low at the intersection of Jasper Avenue and 110 Street.

Under existing conditions, the trap low had potential flood to a depth of 1.9 m during the 1/100-year rainfall event, containing about 2,000 m<sup>3</sup> of surface flooding, with a risk of inundating a number of nearby building openings. The drainage design included a large sub-surface storage pipe to contain the storm runoff and drain at a controlled rate to the existing sewer system to mitigate the surface flood risk to the new roadway and streetscape infrastructure and surrounding properties.

PCL Construction was the successful bidder for general contracting for the project, Whissell Contracting Ltd., was the drainage sub-contractor and S3 Precast was the successful bidder to provide precast concrete components. S3 Precast is based in Alberta, and which provided the project with a local precast concrete supplier.

In addition to their manufacturing capabilities, S3 Precast also provides a full range of design and engineering support for projects. In the case of the

Imagine Jasper Avenue project, the initial design for the project required a significant run length of new 3.0 m dia. concrete piping to be installed under Jasper Avenue. The S3 engineering team proposed the use of a box culvert structure that would maintain the required storage capacity while allowing a reduction in the overall run length of the new conduit. The accepted alternative design that was proposed by S3 Precast was a 144 m run of custom 4 m span by 4 m rise precast concrete box structure.

This resulted in a reduction of project costs as well as a reduction in disruptions as the shortened run length avoided the need to cross a major intersection.

S3 worked closely with the GC, PCL Construction Ltd. and Whissell Contracting Ltd. on the logistical aspects of the delivery of these box culvert sections to ensure safe and timely delivery.

ISL Engineering and Land Services would like to thank PCL Construction, Whissell Contracting Ltd and S3 Precast for their contributions to the successful completion of the Imagine Jasper Avenue project.



4 m x 4 m box culvert being delivered



# Precast Concrete Box Structure Selected as the Material of Choice

**Dylan Gravisi**

Senior Project Manager/Estimator

Coldstream Concrete

Precast Producer: Coldstream Concrete

An existing, 32-year-old, 3.0 m diameter Corrugated Steel Pipe (CSP) culvert was coming to the end of its service life. The CSP was situated on a two-lane highway in Lambton County, just south of Sarnia, Ontario, located at the intersection of Maundaumin Road and Courtright Line.

This CSP, like all culvert/bridge structures, was routinely inspected. Although it had only a 32-year service life, the CSP was showing some signs of deterioration and was added to the list of structures that required replacement.

Black Creek Engineering was selected to provide the design for this structure replacement. Precast concrete box structure was the structure that was selected as a replacement. A key consideration of the selection process was to ensure a service life of over 75 years. Black Creek Engineering reached out to a few local precast producers for budgetary numbers as well as design recommendations for this precast concrete structure. One of those local precast producers was Coldstream Concrete, which is located in Ilderton, Ontario.

The project was tendered in August 2021 and JLH Excavation was awarded the project. Coldstream Concrete was awarded the design, manufacturing, and supply of the structure.

Coldstream provided the engineering design, with support from, MTE Consultants, for the structure. The size of the structure was 3.0 m span by 2.7 m rise with a run length of 24.0 m. Eleven (11) pieces were produced to make up the run length.

Although it was put out for tender in August 2021, a recent drop in the water level in 2022, revealed a structure that required immediate replacement. A complete section loss of this CSP can be seen just below the water level (in picture #1). Replacement of this structure became an emergency.



Installed precast concrete box structure



Complete section loss of existing CSP

As with most projects, Coldstream worked with the GC to provide the required logistical support to ensure rapid installation. JHL Excavation completed the installation of all 11 pieces in four (4) hours.

Unfortunately, due to the premature deterioration of this CSP, the road needed to be closed for two weeks. Having lower than expected service life of infrastructure does create a significant impact on the carbon footprint in terms of the replacement of the structure but also the congestion created the reduced or closure of roadways.

Fortunately, the CSP did not completely fail, no one was injured, and it was replaced by a precast concrete box structure that will provide a very long service life for this roadway.

# Customization Provides Wildlife Crossing Box Culvert

**Matthew Coles, CAN-CISEC**

Project Manager

DSEL

Precast Producer: M CON Products Inc.

As the City of Ottawa continues to expand, more challenges are encountered given that the prime land has been developed and the remaining developable land has more restrictive characteristics such as flood plain restrictions and environmental habitat considerations.

In the case of the Mattamy Homes Half Moon Bay West and Glenview Homes Flagstaff subdivisions, an existing channel that primarily served to convey flows from the swamp of the Cambrian Woods to the Jock River had to be realigned. The realigned channel would replace the old conveyance route, while providing a travel corridor and habitat for frogs between the swamp and the river. The new channel was required to pass under Flagstaff Drive, a main roadway within the subdivisions. In order to pass the 100-year flows the hydraulic design of the channel required twin 800 mm diameter culverts.

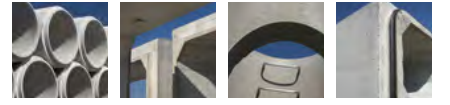
Given the importance of this roadway, precast was selected as the material of choice to ensure the maximum service life of this critical infrastructure. A precast concrete box culvert with a 1200 mm span by 900 mm rise was selected. The culvert was produced and designed by M CON Products Inc. of Ottawa, according to OPSS 1821 standard as well as CHBDC. The overall length of the structure would be 32.5 m with a total of 13 pieces.

Due to the dual purposes of the culvert to both convey flow and provide a travel corridor for frogs, the culvert included a unique design feature. It was decided to add a 300 mm x 150 mm shelf inside the culvert along its entire length to allow frogs to traverse the corridor in high flow conditions. M CON Product's engineering and fabrication teams were able to design the required shelf and fabricate the necessary formwork to achieve the secondary casting which resulted in the creation of an amphibian shelf within the precast concrete box culvert.

DSEL would like to thank M CON Products Inc. for their ability to provide timely design and manufacturing solutions that addressed both the environmental challenges of this development as well as keeping the project on schedule.



Completed culvert with integrated amphibian shelf



# Precast Concrete Flood Box Saves Town from B.C. Floods

**Joel Thomson, P.Eng.**  
Communities Engineer  
Urban Systems

Precast Producer: **Langley Concrete Group**

In 2020, the District of Kent in Agassiz, British Columbia engaged Urban Systems to design the replacement of the Agassiz Flood Gate. Agassiz is a small-town NW of Chilliwack and about a 90-minute drive from Vancouver. The flood gate is located on Dyke Road west of Highway 9 (Agassiz-Rosedale Highway) and south of Whelpton Road. Adjacent to Dyke Road on the north end (upstream) of the existing drainage culvert, is the Agassiz slough. This slough sees most of the storm water runoff from the Town of Agassiz.

The upstream and downstream aprons were also precast concrete and required the installation of timber piles below. These piles would counteract the potential settlement of the aprons and ensure proper vertical alignment with the channel for the duration of structures life. There were 4 piles for each apron. The upstream end features a full width and height trash grate. The downstream end has a full width and height vertical slide gate. The gate is mounted directly to the precast concrete by a stainless-steel wall thimble frame embedded into the downstream precast section. Langley Concrete Group completed the structural design of the precast concrete box complete with the design for the integrated fish baffles, trash grate, and vertical gate attachment. In addition to this, there was a significant amount of engineering required for the precast end treatments consisting of head-walls, wing-walls, and aprons. The size of the end treatments was challenging for manufacturing, transport, and installation. The final design utilized modular section, for ease of transport, with in-cast weld plates, for onsite assembly.

After the project was tendered, the precast concrete sections were manufactured. All the precast was complete before the contractor began work on site. The precast structure not only provided the contractor with the potential for an accelerated construction schedule, but also mitigated the risk of delays due to manufacturing, weather, and/or labour shortages. The Langley Concrete Group assisted the contractor with the delivery details as well as the crane placement. The site logistics were challenging due to the small footprint available for construction. The project was successfully completed in 2021. Urban Systems and The District of Kent would like to thank Langley Concrete Group for their innovative solutions for the many challenges associated with this project.

In November 2021, the lower mainland of British Columbia experienced a significant weather event. This event was labeled as an “Atmospheric River” and brought heavy rain fall to the area of southwestern British Columbia and northwestern Washington State. The result of this storm event was the declaration of a state of emergency for the area, flooding in select areas within the region, significant transportation disruption, and the loss of a considerable amount of transportation and drainage infrastructure. It has been estimated that the event was between a 1/200-to-1/500-year event. The District of Kent has stated that the Agassiz Flood Box handled the flows adequately with water levels reaching within a few inches of the top of the concrete

box structure. The flood waters did not overtop or surcharge the structure. Without this structure, it was likely that the Town of Agassiz would have seen widespread flooding.

The town is fortunate that the new structure was installed and completed when it was.



Installation of box culvert pieces

The existing culvert was a 1.5 m diameter corrugated steel pipe with a top-mounted flap gate. This structure was roughly 50 years old and provided flood drainage away from the Town of Agassiz by transporting slough water through Dyke Road. There were several issues with the existing structure that made it less than ideal and a risk to the community. The 1.5 m diameter CSP was significantly undersized for a 1/100-year flood event. The age of the structure made it a high-risk of failure, and the original structure design, with a top-mounted flap gate, did not permit adequate fish passage. Replacement of the structure was well justified.

The Urban Systems Engineering Team explored the various options for this site and ultimately chose to use a precast concrete box structure. This choice provided the best option for mounting the heavy and large steel slide flood gate. The precast concrete option was also a good choice for incorporating integrated fish baffles and providing a design life of over 100 years in a constantly submerged condition. At this point, the Langley Concrete Group was contacted to lend their expertise in precast concrete design and manufacturing.

A 3.66 m wide by 1.83 m tall precast concrete box was determined to provide a hydraulic design flow capable of withstanding a 1/100-year flood event. 300 mm tall by 254 mm long fish baffles were cast integral to the precast concrete box for the entire width of the opening. One baffle was required at each of the precast sections on the downstream side with the first upstream box section requiring one at both the upstream and downstream ends.



Downstream end with vertical slide gate

# The Langley Concrete Group – A Brief History of the Omelianiecs

**Mafe Pinzón, P.Eng.**  
 Technical Marketing Manager  
 The Langley Concrete Group

The following is an excerpt from the Langley Concrete Group newsletter “The Precast Insider” that was published in June.

With almost 70 years of production history, the Langley Concrete Group has become the largest independent precast operation in Western Canada. This achievement has come with a lot of hard work and sacrifice from the owners and their past and current employees. For this reason, to get the history behind the company’s past and future, we wanted to dedicate our first “Langley Concrete Who?” section of our first newsletter to the four (4) Omelianiec brothers that currently work in the company!



Langley Brothers, from left to right, Mark, Kevin, Jason and Michael

To provide background, Langley Concrete and Tile Ltd. wa officially incorporated in 1960, fifteen years after being started in 1945 when Jacob Omelianiec began making well linings (tile) for his neighbors and other farmers in Aldergrove. In 2003 the company passed on to the four sons: Mark as President, Kevin as VP of Manufacturing, Michael as Human Resources Manager, and Jason as Technical Sales. The four brothers are actively involved daily in the business in a variety of

ways but in a very synergistic method that gets the job done.

An interview with 3 of the brothers gave us some insight into their and the company’s history. All the brothers started working with their grandfather and father back in their teenage years. Mark had his first full paid shift when he was 14 years old, the same as Mike, the oldest of the brothers. Jason, the youngest, recalls being 13 years old working a few weekends/holidays, and then working summers between grades until he graduated from High School.

Since so much time has passed, when you ask the brothers if they thought their grandfather would ever imagine what they have built they all said, NO! “I don’t think he would understand why we did what we have done over the past 20 years, it would be outside of his comfort zone. I am not sure that even my Dad would believe how far we have come now, to be honest. They both would be very proud though and they would definitely be bragging to people about it.” Mark stated.

Because of the way they speak and how their faces light up when they are talking about the family business, it made us curious to ask them: What does Langley Concrete mean to you? After a short silence, Mark stated: “Proud family legacy of providing a quality product while employing 100’s of people allowing them to support their families and live a comfortable life.” Mike added: “We produce products designed to protect the environment in an environmentally friendly way. And provide secure, well-paying employment to our employees in a safe work environment so they and their families can prosper. I like working as a family with our employees”. Lastly, Jason said: “Langley Concrete is a key supplier to a very important construction industry in BC and beyond; the Langley Concrete name is synonymous with Quality and Service.”

To read the entire article go to: <https://mailchi.mp/672f3934bc18/xmmwournta-9047801>

# Diane Mauro Retirement and New Office Manager Marion Brown

Diane Mauro, Canadian Concrete Pipe & Precast Association Office Manager, has decided to retire from her position of 12 years.

We would like to thank Diane for her many years of support and dedication. We wish Diane all the best as she embarks on her next chapter in Quebec cottage country, north of Montreal.

We would also like to welcome Marion Brown as the new Office Manager for the CCPPA. Marion has held various positions in a number of organizations throughout her career.



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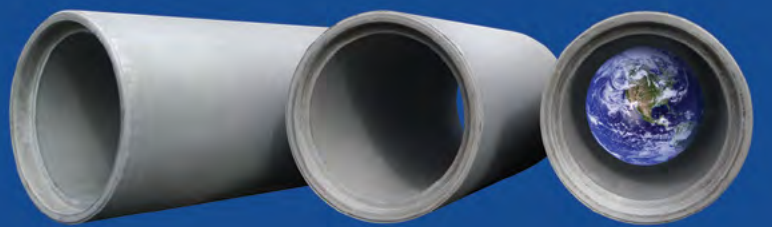
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# Replacement of Scarlett Road Culvert over Humber Creek

**Luis Ayala; EIT**

**WSP Canada Inc.**

**Precast Producer: CON CAST PIPE**

WSP Canada Inc. (WSP) was retained by the City of Toronto to undertake the preliminary and detailed design for the replacement of the Scarlett Road culvert over Humber Creek. The culvert is located under Scarlett Road in the City of Toronto, Ontario, approximately 0.72 km north of Eglinton Avenue West and 1.1 km south of Lawrence Avenue West. Scarlett Road is considered to have a north-south alignment, and the culvert to have a west-east alignment.



*Existing structural plate corrugated steel pipe culvert*

The 1960's existing Scarlett Road over Humber Creek structure is a 61.2 m long 4.3 m diameter galvanized circular Structural Plate Corrugated Steel Pipe (SPCSP) culvert with a 0.15 m thick concrete liner along the entire length of the culvert. The 2015 Ontario Structure Inspection Manual (OSIM) inspection report, provided by the City of Toronto, showed the existing culvert to be in good condition with a Bridge Condition Index (BCI) of 69.94. A preliminary condition survey, performed by WSP Canada Inc. in 2017 and 2019, showed the existing structure to have medium to severe corrosion in the steel barrel with several perforations, severe cracks and deterioration of the concrete liner, permanent SPCSP deformation at the north side of the barrel, and severe spalls and delamination on the wingwalls, inlet, and outlet components. On the east side of the culvert, a concrete end treatment and several gabion baskets had collapsed into the creek, causing it to scour. On the west side, severe sediment increased the elevation of the creek past the inlet of the culvert. There is no record of any rehabilitation work for this structure. Picture 1 shows the collapsed concrete end treatment and gabion gaskets into Humber Creek.

The City of Toronto prefers to replace current corrugated steel pipe (CSP) structures based on previous experience with lower durability of either relining or replacement of CSP structures with new CSP pipes or plates. The city's preference for precast concrete and its higher durability was the main factor in the decision between the rehabilitation or replacement of this CSP structure.

The preliminary design considered investigations of existing culverts, identification of suitable replacements, detailed design, permit approvals, construction administration, and post-construction services. The key issues of this assignment were the following:

- Adequate hydraulic and structural evaluations
- Addressing concerns from adjacent property owners, Toronto Forestry and Ravines, and the Toronto and Region Conservation Authority (TRCA)
- Detailed field investigations
- Life cycle costs for structure replacement; and
- Utility coordination at all phases of design and construction.

The replacement of the existing structure created an opportunity to improve the hydraulic performance of the culvert. The city of Toronto's two criterium are as follows:

- Proposed culvert shall provide a freeboard of 0.3 m or greater under the 100-year storm event. A "freeboard" is defined as the clearance provided between the water surface elevation and the road low point elevation; and
- Proposed culvert shall not increase water levels, upstream or downstream, under all storm even as compared to existing conditions.

Hydraulic analyses were performed by WSP to determine the existing hydraulic conditions of the structure. A HEC RAS hydraulic model was obtained by the TRCA. The significant findings are as follows:

- The 100-year water surface elevation for the existing SPCSP culvert is 118.940 m
- The upstream elevation and downstream elevation are 111.597 m and 110.002 m, respectively. The top of road elevation in the vicinity of the culvert is at 120.454 m
- The existing structure does satisfy the freeboard under the 100-year storm event and does satisfy the City of Toronto's freeboard criterion.

Through hydraulic analyses, a hydraulic opening of 8.535 m span x 3.350 m rise was found to satisfy these criteria.

The following two structures were considered for the replacement of the existing culvert:

- Precast concrete rigid frame box culvert
- Precast concrete rigid open-footing culvert on cast-in-place concrete footings.

Precast concrete units are recommended, in lieu of cast-in-place structures, for the following reasons:

- Precast concrete will reduce the in-field construction duration and impact on traffic as there is no need to erect/remove formwork and there is no concrete curing time; and
- Precast concrete construction offers a higher quality product than cast-in-place concrete due to improved quality control under "factory" conditions.



*Lifting precast unit into place*

Precast box culvert structures are advantageous as they provide an invert that does not erode, thus eliminating future scour concerns. Precast boxes also eliminate the need to construct footings, thereby reducing the overall construction duration. However, a flume pipe was required within the existing culvert to convey flows during construction; this precluded the installation of precast box units. Therefore, an open-footing structure was selected at this site to span over the temporary flow passage system.

*continued on page 7*

# Culvert Replacement



Placing backfill over completed structure

continued from page 6

An 8.534 x 3.350 m CON/SPAN precast open footing structure, manufactured by CON CAST PIPE, was utilized for the replacement of this structure. Coupler connections and hook inserts were pre-installed at the edge of the top slab for each precast concrete unit to connect to adjacent units via a steel plate to facilitate shear force distribution throughout the entirety of the culvert.

The erection of precast concrete units was performed by a Liebherr LTM 1400-7.1 – 500 ton AT crane. Each 26,536 kg precast concrete unit was off-loaded by its lateral handling anchors and rotated to its final installation position. Holding chains were then connected to the top four (4) installation anchors and lifted into their final position on top of precast open footings. Stage 1, approximately half the length of the culvert, comprised of a total of (19) precast concrete units. Overall, 38 precast units were placed for a total culvert length of 61.4 metres.

TRCA concerns focused mainly on the erosion of creek and habitat preservation. An adjacent City of Toronto project restored Humber Creek upstream of the culvert, ensuring a seamless transition of both in-stream works, and improvement of fish passage and flow conditions through the culvert. WSP implemented several erosion controls and fish passage solutions such as fish ladders and rock filled protected slopes. As per TRCA's request, armour stone retaining walls were constructed at the inlet and outlet of the culvert. Picture 2 shows the partially completed outlet with armour stone and fish ladder.

By replacing the existing SPCSP structure with a precast concrete rigid open footing culvert on precast concrete footings, the City of Toronto's criterium on durability, hydraulic and structural improvements were met, along with TRCA's requirements for improvements in flow conditions and fish passage.



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