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EL Puente

Congratulations to the Municipality of Toa Baja in The BABM Competition!

UNIVERSITY OF PUERTO RICO
MAYAGÜEZ CAMPUS

Puerto Rico LTAP
www. prltap.org

EL Puente

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Image source: AHP's Video on Adjustable Manhole Risers
https://ahp1.com/video-presentation-mhr/

The Puerto Rico Transportation Technology Transfer Center, PRLTAP/T^2, is part of a network of 52 Centers throughout the United States that comprises of a Local Technical Assistance Program (LTAP) and one National Tribal Technical Assistance Program (TTAP). The mission of the PRLTAP/T^2 Center is to provide training and technical assistance to local transportation officials of the 78 municipalities that comprises the Government of Puerto Rico and the Puerto Rico Department of Transportation and Public Works, with emphasis on promoting a highway safety culture and in the implementation of the Every Day Counts (EDC) initiatives of the Federal Highway Administration (FHWA).

Message from the Director

Welcome to the second edition of the thirty-sixth Newsletter, El Puente. In this volume, two articles that are of great interest and excitement for all professional engineers of Puerto Rico are highlighted.

The first article, *Local BABM Competition in Puerto Rico Announces Its Winners,* presents the activity of awards that took place on July 7, 2022, for the winning municipalities of Puerto Rico, from the Build A Better Mousetrap (BABM) competition. This was an activity carried out by the LTAP, with the purpose of rewarding the five participating municipalities and recognizing their efforts and innovative ideas. Each one had the opportunity to register, develop and present an innovative idea to help transport systems and compete with each other. All the innovative ideas of each municipality with photos, videos and crucial information of each project were presented in this activity.

The second article titled *Toa Baja Champions the National BABM Competition!*, describes the award ceremony of the BAMB 2022 National Competition winner held on August 8, 2022, which was the municipality of Toa Baja of Puerto Rico, with its innovative project for the Intelligent Transformation category. After the award ceremony for the BABM competition at the local level, the innovative ideas were submitted to be part of the competition at the national level, next to other 19 states that competed for the four categories. I attended the National Convention of Directors for the Transportation Technology Transfer Centers, for the grant of this reward.

The third article, *Manhole Cover Risers are On the Rise,* explains the features that a manhole cover should have, along with a video presentation created by American Highway Products (AHP) manufacturer on evaluating the cost and impact of a culvert that is properly constructed and maintained.. The AHP provide products to seal vibrating covers on highways, which greatly enhance the protection and safety of individuals using the highways. Mention is also made about the advantages, disadvantages and characteristics to observe when carrying out any method of installing and raising manholes.

The fourth article, *NHI 132021 Pilot Course: Geotechnical Site Characterization,* held a pilot course in Puerto Rico from April 27 to 28, 2022, as an initiative called Advanced Geotechnical Exploration Methods (A-GaME) that forms part of the Every Day Counts (EDC) program of the United States Department of Transportation. With the focus of providing practical technical training on the benefits and value of developing a comprehensive geotechnical characterization program for highway projects, the course was held at the headquarters of the College of Engineers and Surveyors of Puerto Rico (CIAPR) and was attended by thirty professionals.

This edition closes with the unwavering commitment based on 10 commandments and fundamental principles of road safety. It is the hope of this newsletter that the articles presented in this edition will be of benefit to the readers. Share it with friends and family to help save lives on our roads!

Benjamín Colucci Ríos

Build a Better MOUSETRAP

Local BABM Competition in Puerto Rico Announces the Winners

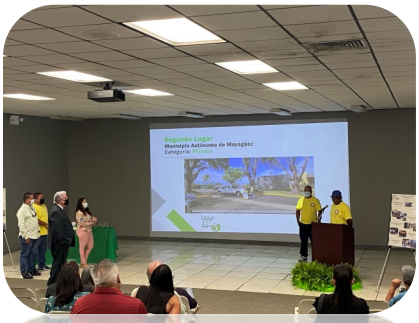
Build a Better Mousetrap, formerly known as the BABM National Competition, is a contest made possible by the Local Technical Assistance Program Centers (LTAP) and the Federal Highway Administration (FHWA). It is the annual opportunity to highlight the innovative minds of civil engineers from all around the United States and in Puerto Rico, to showcase the development of new tools and modified equipment. The implementation of these new ideas will not only improve worker efficiency within the transportation system, but would make the necessary tasks much safer to complete, reduce the usual cost of said tasks, as well as increase citizen safety on the road and in other modes of transportation.

The submission of your project is a moment for the exposition of possible solutions to difficulties in the workplace that could be solved with already existing and available tools. Receive representation and recognition for your town, and for the workers within your town and profession, as you collaborate to solve engineering obstacles. There is potential for improvement within every sector of transportation; Build a Better Mousetrap allows for that improvement to be recognized at a national scale, where participants have the chance to win this contest of innovation.

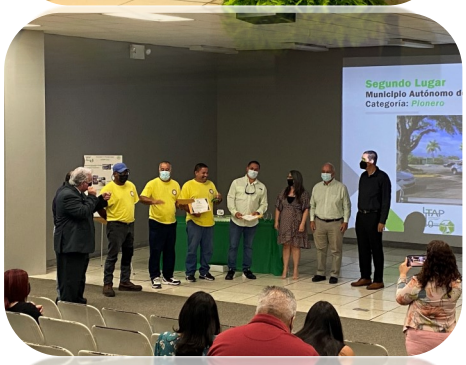
This year, Puerto Rico held its own Build a Better Mousetrap competition, where each municipality had the opportunity to register, develop and submit an innovative idea to aid transportation and other aspects of civil engineering, and compete against one another. There are multiple categories to submit your innovative idea to Build a Better Mousetrap. The following categories for this competition's submissions are: Innovative Project, Bold Steps, Smart Transformation, and Pioneer.

In Puerto Rico's BABM 2022 Competition this year, five municipalities participated. The Toa Baja municipality won first place in the Smart Transformation category. They achieved this with the development of a survey program that aided the municipality by having citizens submit which areas were affected by rainwater, such as roads and bridges, after a storm. This helped the municipality's response time, as they were able to identify high-risk areas and help the citizens quicker.

The municipality of Hormigueros, one of the participating municipalities, won first place within the Pioneer category. Their contest submission was a roadside barrier vegetation cleaner. The purpose of this innovative tool is to remove vegetation from roadsides without the use of typical tools such as machetes, pickers, etc., and without putting workers' lives in danger, since the removal of these plants is done at the side of the road where cars are driving at speeds of 40 to 45 miles-per-hour.



In second place within the Pioneer category was the municipality of Mayagüez. Instead of hauling their patching device, which weighs approximately 200 pounds, on and off of their truck, they created a kind of wooden plank that gets tied to the end of their truck, so they only need to pick up their device once, set it on the ground, patch up the pothole, and then place the device on the wooden plank, so the truck can then pull it to the next nearby pothole.



The innovative idea in third place was a tie between the municipalities of Añasco and Santa Isabel. Añasco needed an asphalt distribution truck, but lacked the necessary funds; additionally, the new truck would have taken approximately six months to arrive, which would have delayed the municipality's duties. What they decided to do was reuse an older truck model and place the necessary parts together to create a new asphalt distribution truck. Approximately $140,000.00 were saved, 6 months of work was saved, and due to the innovation of the municipality of Añasco, the workers now have a completely functional asphalt distribution truck. Santa Isabel, the last participating municipality, had the idea to innovate a trash picker, so that it would be sturdier, pick up more trash at once, and last longer than the typical plastic trash picker.

As one can see, all the submissions to Build a Better Mousetrap are innovative, creative, and very new. Each of the participating municipalities have given their all to demonstrate, that not only are they willing to show their innovativeness, but also show potential solutions to obstacles engineers face all over Puerto Rico. We need more great minds to come together and solve these puzzles that we all face and make Puerto Rico's roads, bridges, and civil engineering spaces more accessible, safe, and efficient for everyone.

Toa Baja Champions the National BABM Competition!

There was an award ceremony for the winning municipalities of the Build a Better Mousetrap Competition in Puerto Rico on July 7, 2022. This was to recognize their efforts and innovative ideas that not only demonstrate their dedication to their profession, but also emphasizes the necessity of evolving the way in which these jobs are done in their day to day in the engineering field. All of the innovative ideas were presented with pictures, videos, and crucial information of each project to the other participants. At the end, the certificates were awarded and the first competition of Build a Better Mousetrap in Puerto Rico was celebrated.

After this local ceremony, these innovative ideas were submitted to be a part of the 2022 Build a Better Mousetrap Competitio, where other 19 states submitted their own innovative ideas within the four categories. It was the first time that Puerto Rico was a part of the competition, and in being the first time, Puerto Rico submitted four different innovative projects. This has never been seen before.

Dr. Benjamin Colucci Rios was present for the awarding of first place in the Build a Better Mousetrap Competition, held in Seattle Washington for the Directors National Convention for Technology Transfer Centers. To his surprise, the winner was the municipality of Toa Baja with their innovative project in the Smart Transformation category. Dr. Benjamin Colucci, representing Toa Baja, went up to receive the award. Their project is planned to be implemented throughout the United States, since it would help tremendously with response time for rainwater affected areas.

This past August 8, 2022 had a ceremony where the municipality of Toa Baja was able to receive the award which Dr. Benjamin Colucci brought to Puerto Rico. In the ceremony, many people were present to witness this astounding achievement. It was a resounding success for all of those involved in the creation, adaptation and implementation of the first BAB< Competition in Puerto Rico. It is the first of many years of successful innovations from Puerto Rico getting the recognition they deserve.

In the ceremony where first place to Toa Baja was given the following were present: Eng. Michael Avery, Sub-Administrator for the Puerto Rico and Virgin Islands Federal Highway Administration Division; Eng. Juan C. Rivera Ortiz, Transportation Engineer of the Federal Highway Administration of Puerto Rico and the Virgin Islands, Dr. Benjamin Colucci, Director of the Transportation Technology Transfer Center in UPRM; Toa Baja mayor Betito Manquez; Dr. Edwin Gonzalez, Executive Director of the Transportation and Highway Authority; Honorable Migdalia Padilla Alvelo, Senator for Bayamon District; and Vice-Mayor Oscar Rodriguez.

Manhole Cover Risers are On The Rise

The American Highway Products (AHP) manufactures and offers manhole cover riser, basin/inlet riser and compression water/gas box riser products. The main purpose of these products are to seal rattling lids found on roads. These sealing products provide many benefits for both construction workers and pedestrians, such as protecting motorcycle users during projects of road construction, reduce vibrations in roads caused by traffic and any kind of infiltration in the substructure. This article features AHP's video presentation on their product of Manhole Cover Risers, it evaluates the cost and impacts of a properly vs. improperly built and maintained manhole. When manholes aren't up to grade, they deteriorate in pavement quality. A study conducted in Kansas City showed that 30% of manholes did not match grade, as they were found to be either substantially above or below grade.

What are manholes?

They are a major roadway feature pavement around uneven manholes that were three times more likely to be rated bad, while only 11% of the pavement surrounding manholes at grade was rated bad. 35% of the pavement around uneven manholes were rated bad.

A sunken manhole is a pothole with a steel bottom and raised manholes get excessive wear from ordinary traffic, snow blades, and other traffic related equipment (supported by the National Automotive Parts Association,, NAPA). The NAPA states that smooth pavement lasts longer.

Assessing the costs of raising manholes to grade:

Materials should not be considered if the cost of labor is not evaluated first.

In Shoreline Washington near Seattle, the wastewater district manager analyzed three years of maintenance records and determined that raising manholes was costing about 500 dollars per manhole for labor and materials.

There are certain liability claims to consider when constructing a manhole, such as the claim where manhole rims are exposed, where cities and contractors can be liable for the damage of cars.

Common claims include broken rims and damaged tires. Uneven manholes are associated with pavement damage. Manhole covers that bounce or rattle out of loose risers can lead to expensive claims.

What can cause pavement damage?

Hot mix, poor film mix, and bad compaction can cause subsidence and pavement damage.

Image source: https://www.forconstructionpros.com/asphalt/article/11314066/manhole-risers-cut-costs-and-preserve-pavement

The expenses and details of sustainability

Digging up the resetting utility frames usually unearths 500 to 1,000 pounds of material.

Jackhammering and hauling have substantial energy costs, and infilling with new asphalt consumes yet more material. Precast grade rings can weigh a hundred pounds or more.

Lane closures:

Lane closures increase expenses and inconveniences and lead to more expenses and paperwork. Manholes are a major source of I&I (inflow and infiltration), which is a phenomenon where stormwater and groundwater enter the wastewater system. When concrete grade rings are used, cracks in the rings and grout layers are significant sources of excess I&I.

Source of information: https://ahp1.com/video-presentation-mhr/

Pros and Cons of Various Manhole Raising Methods:

1) Ignore until needed

Pros: Its expedient, limited roadway damage, some manholes are rarely assessed.

Cons: Hard to recover, damages roadway when recovered, emergency access impeded, can generate explosive gas water pressure.

2) Dig up later

Pros: Voids delays during the paving season.

Cons: New pavement is always damaged.

3) Raise manholes with precast grade rings or brick

Pros: Most common low-cost method, is structurally solid and offers to rehabilitate chimneys.

Cons: Very expensive in terms of labor and lane closures, exposes crews to pinching and straining injuries, damages pavement and requires excavation and hauling. Grout is also required and can leak or crack due to freeze-thaw cycles. Difficult to match new pavement grade precisely.

4) Raising manholes with rubber or plastic rings

Pros: Lightweight and won't crack or leak incremental sizes, allows precise grade matching vibration and noise is reduced in some situations, being reasonably priced.

Cons: Nearly as labor and time intensive as brick or precast grade rings. Damages pavement and requires excavation and hauling, bulky, difficult to store and haul.

Image source: AHP's Video on Adjustable Manhole Risers
https://ahp1.com/video-presentation-mhr/

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https://ahp1.com/video-presentation-mhr/

5) Raise manholes with cast iron risers

Pros: Reasonably priced and widely available, minimum labor is relatively light weight, excavation and payment damage are not required.

Cons: Unreliable, lid can rattle because it is not tight, This lid can lead to an accident and vehicle damage, limited riser heights are available, plus incline risers are not available and not permitted in certain places.

6) Adjustable manhole risers

Pros: Minimum labor, no excavation required, it's lightweight, reasonably priced, and easy to store and haul. Its reliability ensures tight bonding to the original rim riser. Incline risers can be installed by one person before paving and safely stand up to traffic when a manhole safety ramp is used. They also qualify as a sustainable practice, since little energy is used and no waste is generated.

Cons: There are a few cons to this type of manhole, but they are not approved in some jurisdictions and not appropriate if manhole rehab is required.

One of the best ones are adjustable manhole risers, as they are potentially the ideal manhole raising solution because they avoid most of the disadvantages of other manhole raising methods. They're a good solution for maintenance departments and paving contractors. There are certainly some pitfalls.

Roadway departments and contractors should look for lever force when considering risers. A riser with a thick upper lip bar riser has a lifting force eight times greater than that of a riser with no lip bar.

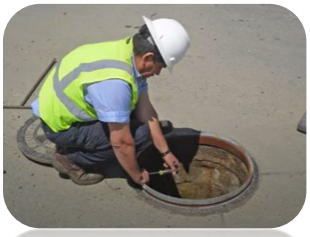
Features to Look For in an Ideal Adjustable Manhole Riser:

Easy to install

Adjustable mantel riser should be easy and quick to install. With specialized tools or power tools, it should ideally take 5 minutes or less to install.

Easy to adjust

Mechanism should apply significant force so that it will fit the existing rim and will be tight. The riser stays put and the manhole lids fit well.



Available in custom sizes

They should be readily available in incremental sizes to match existing and new paving thickness.

Good track record

They are an important part of a critical infrastructure. Risers should be a known quality.

Lightweight

If adjustable risers are lightweight and compact, they can be easily stored and transported. Ideal risers should be light enough for one man

Welded and Pivoted Expanding Mechanisms

Welded Expansion

Expansion mechanisms or turnbuckles must not bend, break, or seize up when expanded or contracted.

Welded expanding mechanisms produce built in moments at each end. With the expanding mechanism welded to the bar to be expanded, three events or their combinations can occur:

1. The expanded device bends
2. The welded ends of expanded device break
3. The bar bends inward, away from the manhole casting at the welded joint taking away the full circumferential engagement.

Pivoted Expansion

To provide a reliable manhole riser installation, you must obtain full circumferential engagement. To achieve this, a pivoted expanding device is necessary.

Galvanized risers are better than painted risers.

Expansion mechanisms or turnbuckles must not bend, break, or seize up when expanded or contracted.

Image source: AHP's Video on Adjustable Manhole Risers https://ahp1.com/video-presentation-mhr/

NHI 132021 Pilot Course: Geotechnical Site Characterization

The National Highway Institute (NHI) held a pilot course in Puerto Rico this past 27-28 of April 2022. The course was offered at the College of Engineers and Surveyors of Puerto Rico (CIAPR) in Hato Rey, with a total of 30 participants.

This pilot course emerged from the Advanced Geotechnical Methods in Exploration (A-GaME) initiative, which is part of the Every Day Count (EDC) Initiative of the United States Department of Transportation (USDOT). This pilot course was first delivered to a select group of professionals before publishing on the NHI public website. The course was offered by Jerry DiMaggio and Robert Bashir. Members of the NHI and the Federal Highway Administration (FHWA) were present during the course to evaluate the delivery of the course and to make the necessary adjustments, if necessary, offering it to the public. The target audience for this course is federal, state, and local transportation agency employees, college students, university faculty, and consultants.

Image source: The Federal Highway Administration

Image source: The Federal Highway Administration

The NHI 1322021 "Geotechnical Site Characterization" course focused on providing practical technical training on the benefits and value of developing a comprehensive geotechnical site characterization program on highway projects. These programs include major geotechnical features such as structural foundations, earth retaining structures, and engineered soil and rock earthworks. Topics included in the course were exploration methodologies, types of exploratory equipment and their sustainability for various subsurface conditions, laboratory testing techniques, and interpretation of data. The objectives of the course were for participants to be able to identify, describe and compare geotechnical site characterization studies and reports, and be able to explain and compare technical language related to geotechnical site characterizations.

U.S. Department of Transportation
Federal Highway Administration

NHI 132021 Pilot Course: Geotechnical Site Characterization

Course Outcomes and Goals

Upon completion of the course, participants will be able to:

1) Explain how effective geotechnical site characterization can reduce risk.

2) Identify challenges to geotechnical site characterization.

3) Describe different classes of geotechnical site characterization studies.

4) Compare the different types of geotechnical site characterization Reports.

5) Identify benefits of a site characterization program.

6) Explain the difference between variance and uncertainty.

7) Compare site investigation strategies for a retaining wall, a bridge, and large embankment.

8) Explain communication details regarding the scope of investigations.

9) Describe index and performance tests.

10) Identify the variables used to classify rock.

11) Contrast behavior of rock and rock mass behavior.

12) Describe the geohazards and problematic soils and/or rocks that an agency/region encounters and solutions used by an agency.

13) Describe tools used to identify and assess these geohazards.

14) Describe one-dimensional consolidation and shear strength test.

15) Identify advantages/disadvantages of consolidation and shear strength parameter correlations.

16) Explain why modulus at working stress measurements are important.

17) Describe what is meant by modulus degradation.

18) Compare and contrast RMR and GSI.

19) Contrast a monitoring well and a piezometer.

20) Explain how to develop a subsurface stratigraphy for a specific site.

21) Explain how to address uncertainty and variability in the development of geo-material parameters.

COMISIÓN PARA LA SEGURIDAD EN EL TRÁNSITO

Where are we...

IN ROAD SAFETY IN PUERTO RICO?

DURING THE MONTH OF AGOSTO	
2020	25
2021	34
2022	24
CHANGE	-10

DURING THE YEAR	2020	2021	2022	CHANGE
	161	227	154	-73
Pedestrians	42	60	37	-23
Drivers	66	82	66	-16
Passengers	19	25	16	-9
Motorcyclists	27	51	29	-22
Cyclists	7	8	5	-3
Riders	0	1	0	-1
Four Track	0	0	0	0
Others	0	0	1	1

Together we can save lives on our roads towards a culture of road safety in Puerto Rico!

DECADE OF ACTION FOR ROAD SAFETY 2021 - 2030

Pledge to Save Lives Today!

I, _____, pledge to do my part to help save lives on the road.

- ☐ 1. Do not text or use your mobile phone while driving.
- ☐ 2. Obey traffic laws.
- ☐ 3. Don't drive under the influence of drugs or alcohol.
- ☐ 4. Don't get distracted while driving.
- ☐ 5. Share the road with pedestrians, motorcyclists, and bicyclists.
- ☐ 6. Always use the seat belt.
- ☐ 7. Require all occupants to wear seat belts.
- ☐ 8. Comply with speed limits.
- ☐ 9. Use safety equipment while using a motorcycle, bicycle or any motor vehicle.
- ☐ 10. Use the protective seat correctly.

Unite to help Save Millions of Lives on the Roads!

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