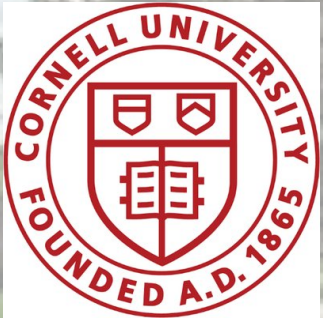
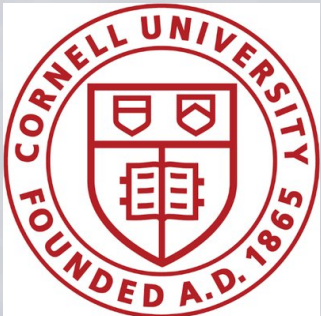


Hot Mix Asphalt Pavements “Super Pave”



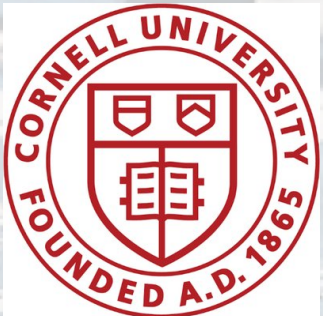
Intro:

- Jim Tofte, Site Civil Engineer
- Over 30 years of Experience in Design and Construction of Asphalt Pavements
NYSDOT, PennDOT, Materials Engineer, Inspector/EIC, & Design Consultant.
- Duties:
 - Provide FE Civil Design Services
 - SME and Campus Stewardship
 - Maintain University Standards for Hot Mix Asphalt Pavement, Aggregates, and Site Concrete.
 - Pavement Planned Maintenance Program Manager
 - Oversee Regular Condition Assessment of University Paved Assets
 - Plan for Maintenance of University Paved Assets



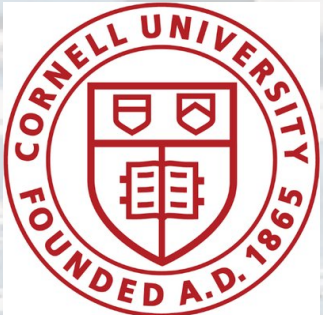
Planned Maintenance Pavement Program

- Goal: Make the “**Right Repair at the Right Time**”
- **Corrective versus Planned Maintenance**
 - **Corrective:** Life/Safety, Potholes, Immediate Response Needed
 - Generally CU Grounds (Dan Shied/Les Sills), with support from FE.
 - **Planned:** Usually Larger Areas, Part of Plan, Contractor Based
 - Condition Assessments, Stakeholders Input, Project Bundling
- Execution: Bid Projects
 - Project Management: Assigned by PM Group (Jake Duell)



Pavement Assessments:

- Abass Ajiboye: Cornell Civil Engineering (Dec. BS Candidate, M. Eng)
- FE Intern Trained by Cornell Local Roads and FE
- Assess Condition of Existing Pavements
- Log Data into GIS Platform
- FE Processes Data and Maintains GIS Conditions Database
- Provide Program Support during summer construction activity.



Pavement Assessments:

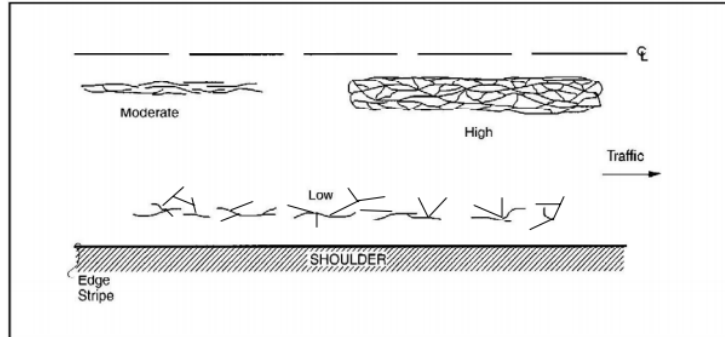


FIGURE 3: Alligator Crack Patterns of Differing Severity



FIGURE 4: High Severity Alligator Cracking

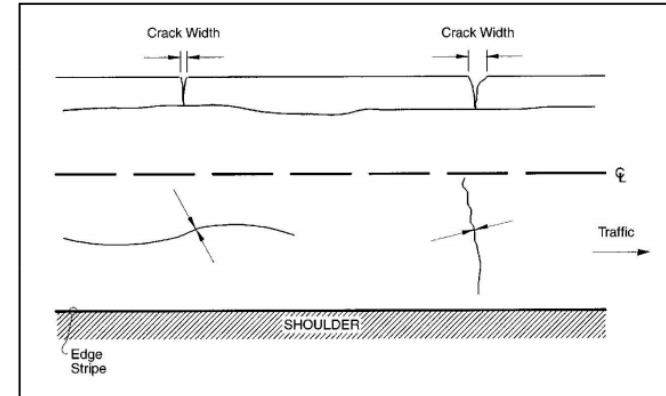


FIGURE 1: Measuring Crack Width on Asphalt Pavement

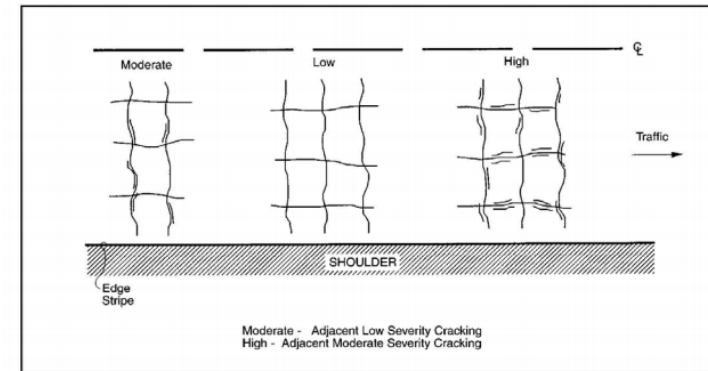
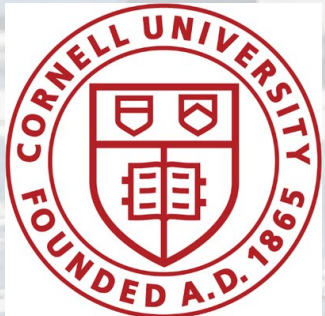
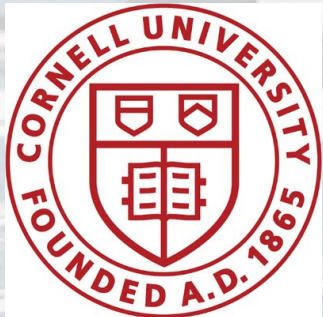
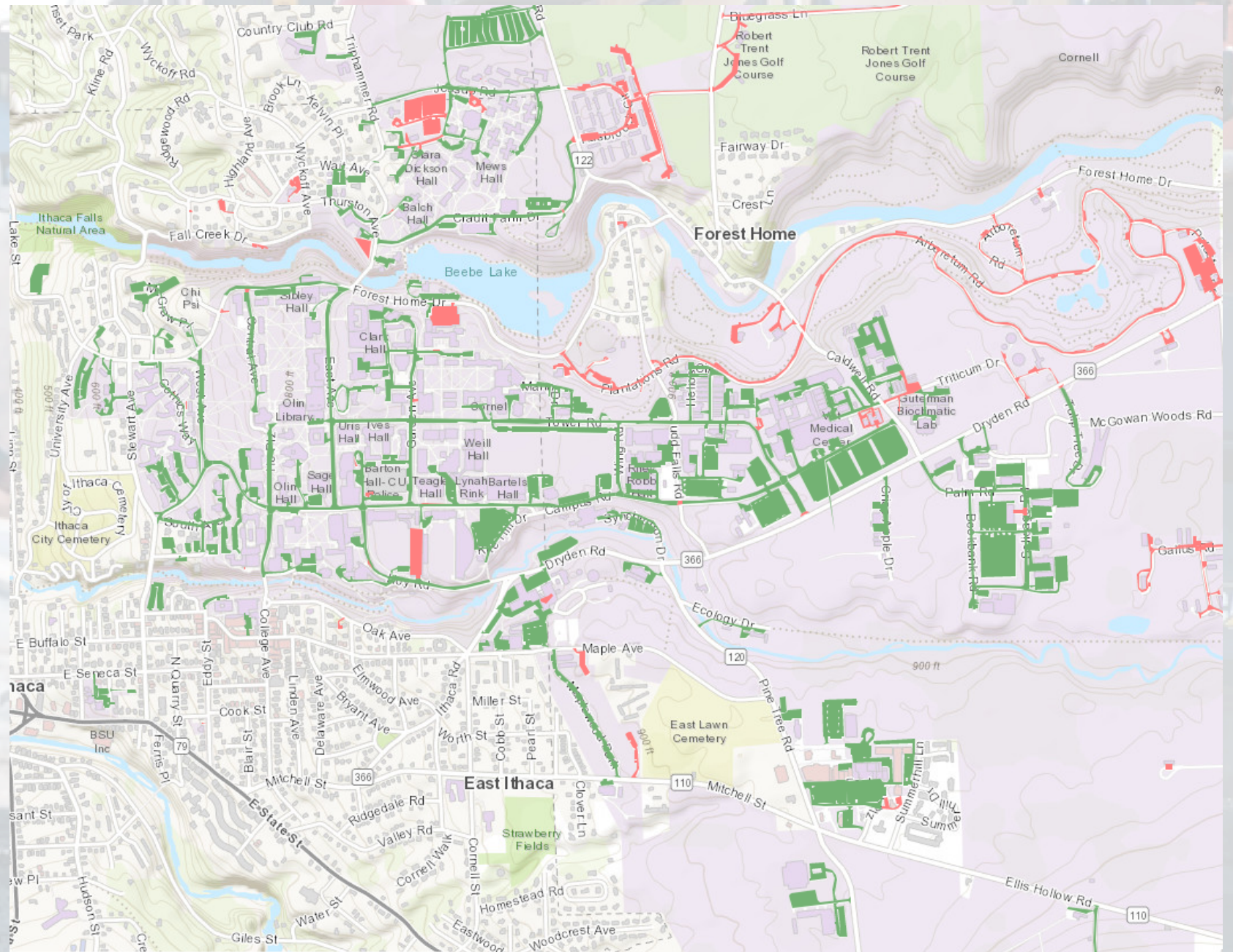
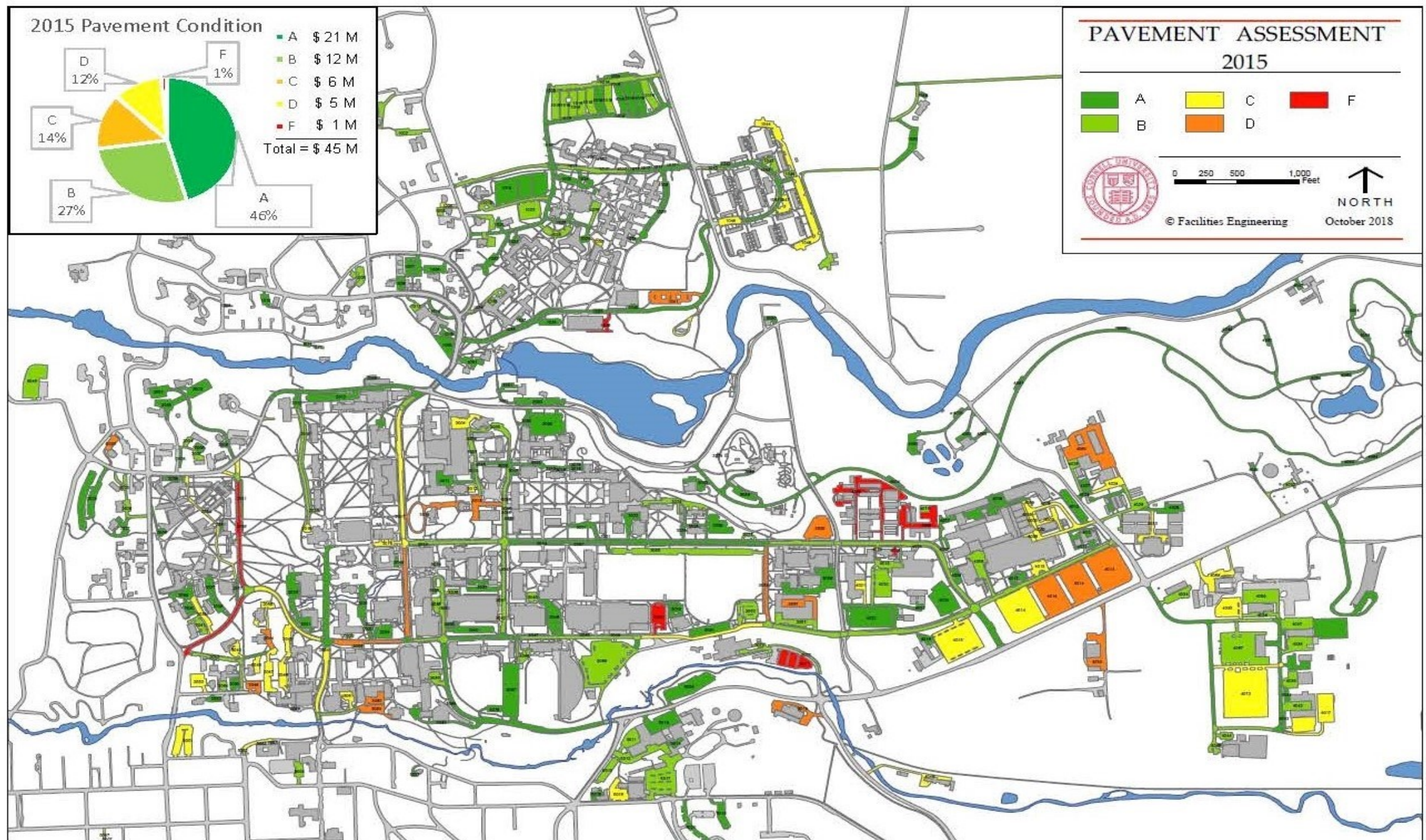


FIGURE 2: Effect on Severity Level of Alligator Cracking due to Associated Random Cracking



Real Time

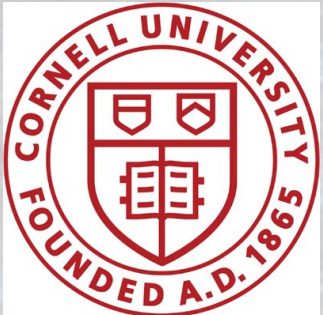


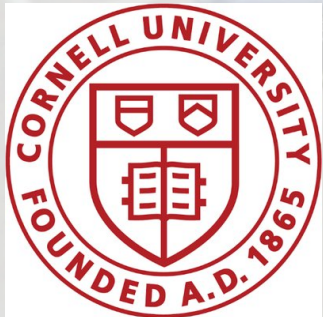


GIS Based Pavement Assessment Map

Asphalt History

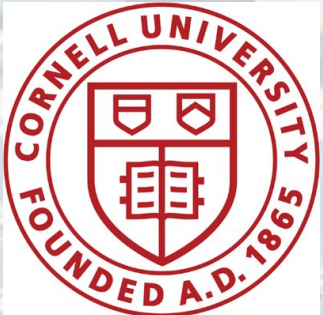
- Late 1800s first US patents for Hot Mix Asphalt
 - Newark NJ → Washington DC
- Trinidad Asphalt
- Replaced with byproduct of Oil Production
- HMA: 6% bituminous cement, and graded aggregates
- What is the History of Your Pavement?
 - Record Drawings, Cores?





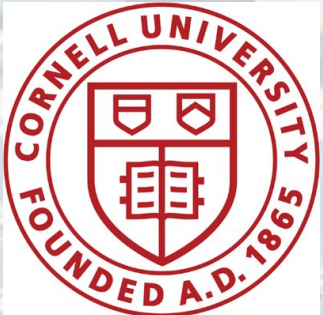
Recent History of Asphalt Mixes

- Marshall Mixes , (2008, Section 403)
- Mix Types
 - Type 7 or 7F Top
 - Type 3 Binder
 - Type 6 6F Top
 - Type 1 Base
 - Type 5 Shim
- NYSDOT stopped maintaining in 2008
- Removed Totally in 2012 FHWA Mandate
- No Longer Supported, Tested, Monitored



What is Super Pave ?

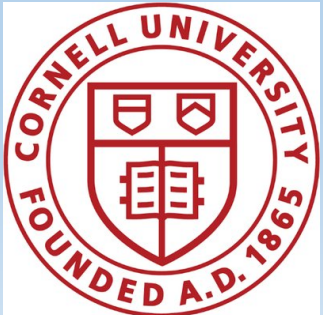
- Mandated on Federally funded projects
- NYSDOT Standard Specification - Section 402
- Suited for Equivalent Single Axle Loads (ESALs), Traffic, and Climate
 - 1 ESAL = 18,000 # Single Axle
 - 1 Loaded Passenger Car = .003 ESAL, 1 Loaded Semi 3 ESALS
 - Damage inflicted by 1 Loaded Semi = 1,000 Loaded Passenger Cars
- Minor Mix Changes but similar to Conventional Mixes
- Performance Graded Asphalts
- Lab Testing Methodology (Gyratory vs Impact Compaction)
- New Placement Procedures
 - Common Sense Practices
 - Tack Coat Between All Layers
 - Joint Adhesive (Top Course)
 - Keep Paver Moving (Material Transfer Vehicles)
 - Other Methods, Performance Standards (Ride Quality Specs, Density)



Asphalt Joint Adhesive



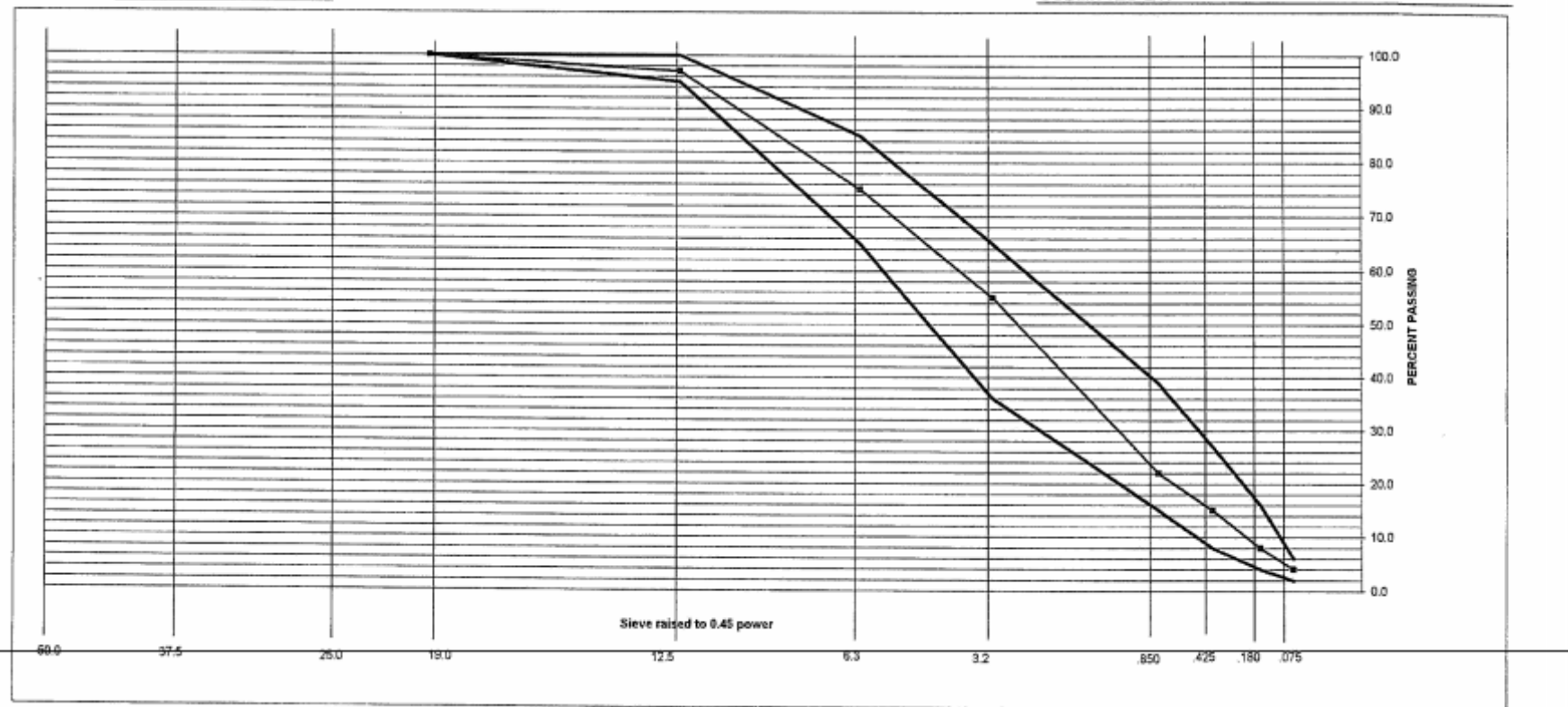
Tack Coat Application



NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
JOB MIX FORMULA

MIX TYPE 6 Top

JMF NO.
FACILITY NO. 10067
REGION 3 ITEM 403.16
PRODUCER Hanson Aggregates
LOCATION South Lansing
SUBMITTED BY:



Sieve Size (mm)		50.0	37.5	25.0	12.5	6.3	3.2	0.850	0.425	0.180	0.075	% Asphalt	Asphalt Grade	AGGREGATE INFORMATION			
% Passing	General Limits			100	95-100	65-85	36-65	15-39	8-27	4-16	2-6	5.8-7.0	PG 64-22	Aggregates	Source Number	Aggregate Blend %	
	JMF Range			100	95 - 100	68 - 82	48 - 62	15 - 29	8 - 22	4 - 12	2 - 6	---					
	Target Value			100	97	75	55	22	15	8	4	6.4					
Recommended for Approval for Regional Director by: _____ Date: _____														Coarse	3 or 3A		
Approved by Quality Control Manager: <u>Grace Penilla</u> _____ Date: _____															No. 2		
Remarks: _____															No. 1	3-3RS	28
														Fine	No.1A	3-3RS	27
															Manufactured	3-3RFM	45
														MINERAL FILLER			

Recommended for Approval for Regional Director by: Baco Bennett Date: _____

Approved by Quality Control Manager: _____ Date: _____

Remarks: _____



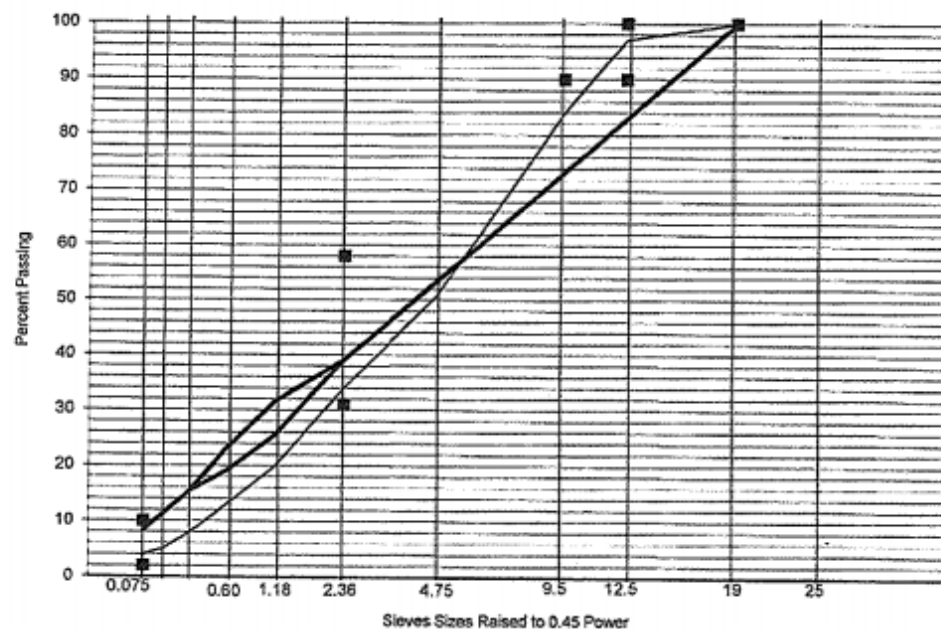
Department of
Transportation

DESIGN ESAL LEVEL
< 30

MATERIALS BUREAU
 SUPERPAVE Job Mix Formula
 12.5 mm Nominal Maximum Size

H034911001

12.5 mm Nominal Maximum Size



Sieve Size (mm)		0.075	0.150	0.300	0.600	1.18	2.36	4.75	9.5	12.5	19.0	25.0	% PGB	Binder Grade	
% Passing	General Limits	2 - 10					31 - 58		< 90	90 - 100	100			PG - 64-22	
	JMF Range	9	10	3 - 13	8 - 18	15 - 25	29 - 39	45 - 56	79 - 89	92 - 100	95 - 100				
	Target Value	4	5	8	13	20	34	51	84	97	100		5.6		

PRODUCER BARRETT PAVING MATERIALS		
LOCATION JAMESVILLE, NY		
REGION 3	FACILITY # H0349	
JMF #	AC	Spark Plug
H034919101	64S-22 HMA	12F22HBR
H034919102	64V-22 HMA	12F22HCR
H034919103	64S-22 WMA	12F22WBR
H034919104	64V-22 WMA	12F22WCR

Aggregates		Source Number	Blend %	
Coarse	No. 1 Stone	3-3RS	16.0	1 Fric. Blend
	No. 1 Non-Carbonate Stone	7-9RS	17.0	52%
	No. 1A Stone	3-3RS	18.0	1A Fric. Blend
	No. 1A Non-Carbonate Stone			
Fine	Manufactured	3-3RFM	29.0	Sand Blend
	Natural Sand			
	Mineral Filler			
	RAP	Perp	20.0	

Aggregates		Blend Limits to Maintain C.A.P.'s		
		C. A. A.	F. A. A.	Flat / El.
Coarse	No. 1 Stone	100		
	No. 1 Non-Carbonate Stone	100		
	No. 1A Stone	100		
	No. 1A Non-Carbonate Stone			
Fine	Manufactured		48.6	
	Natural Sand			
	RAP		47.1	

Submitted for Review by: K Todd DeWolfeDate: 03/15/2019

Revised

Accepted for Verification / Production by: *[Signature]*Date: 3/20/19

Super Pave - Marshall Mix Comparison

Marshall

Type 7 or 7F Top

Type 6 or 6F Top

Type 3 Binder

Type 1 Base

Super Pave

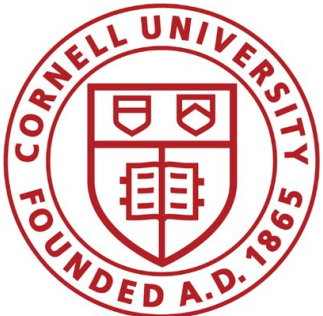
9.5 mm Top

12.5 mm Top

19 mm Binder

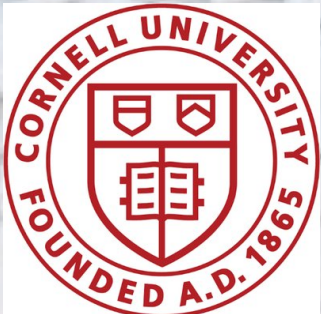
37.5 mm Base

25 mm Binder



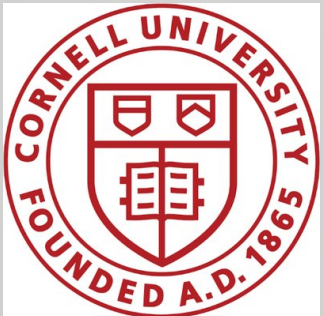
Subgrade and Subbase Conditions:

- Verify Subgrade Stability – Employ Testing Lab (Proctor, Nuclear Gauge)
 - Non-Movement, Proof Roll. Protect Subgrade
 - Limit exposure of erodible and susceptible subgrade
 - Scarify, Air dry, Re-Compact, Undercut as needed.
 - Fabric
 - Underdrains?
 - Subbase – Place in acceptable lifts, testing compaction
- Seal and Slope to Drain & Maintain Drains.



Paving Operations:

- Set University Expectation and Standards on Day One
- Testing Labs are not Inspectors
 - Test Materials, Temperatures, Compaction, Depth Checks
- Check Subbase prior to paving (Conditions Change)
- Verify use of tack coat (curing) & joint adhesives
- Check Depths
- Monitor Lift Thicknesses
- Inspect Joint Construction
- Temps:
 - 275-325° Delivered, Ground Temps, Air Temps
 - No Rolling below to 185°
 - No Traffic until lower than 140°



FE Project Engagement :

DESIGN/PLANNING PHASE:

- Standard Details

- Design Standard

- Specification Language

CONSTRUCTION PHASE SUPPORT:

- Pre-Installation Meeting with Paving Entity

 - Review Materials, assure adequate number of trucks

 - Review nuances- Tack Coat, Joint Adhesive

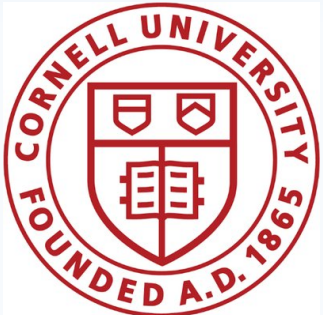
 - NYSDOT Plant Inspection (State-side)

 - Other: Haul Routes - Local Regulations


- On-Site Observations

 - During Placement

 - Post Placement: Trouble Shooting & Evaluation



Design Guidance:

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AND **CAMPUS SERVICES** 



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
2018 Design and Construction Standards











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DESIGN and CONSTRUCTION STANDARDS **CORNELL UNIVERSITY**

321216 HOT MIX ASPHALT (HMA) PAVEMENTS

Cornell's Design and Construction Standards provide mandatory design constraints and acceptable or required products for all construction at Cornell University. These standards are provided to aid the design professional in the development of contract documents and are not intended to be used verbatim as a contract specification nor replace the work and best judgement of the design professional. Any deviation from the Design and Construction standards shall only be permitted with approval of the University Engineer.

PART 1 GENERAL

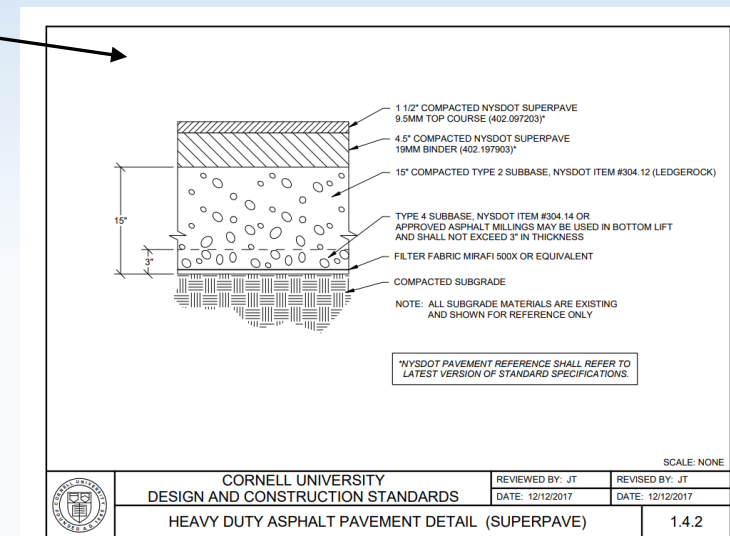
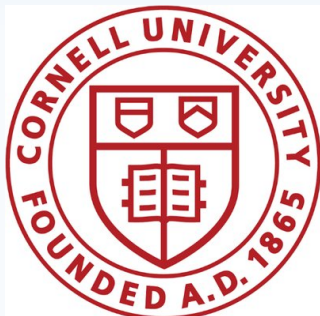
1.01 SUMMARY

A. Asphalt pavements on the main campus are to be surfaced with Hot Mix Asphalt (HMA) concrete. Paved surfaces in low use areas off-campus may be of oil and stone penetration for light or medium duty service upon approval by Cornell University's Department of Facilities Engineering.

B. Pavement Sections:

- In general, Heavy Duty HMA Pavements shall be designed for areas where heavy traffic volumes occur or trucks/mass transit vehicles operate. See Cornell Standard Detail 1.4.2.
- Medium Duty HMA Pavements shall be designed where traffic is moderate and is limited to passenger vehicles. See Cornell Standard Detail 1.4.1.
- Light Duty HMA Pavement shall be designed in limited circumstances where no vehicle traffic is expected or in temporary situations when approved by the University.
- Pavement can be designed such that a combination of pavement sections are used in parking facilities where heavy duty is used on travel lanes, and medium duty is used in parking stalls. In all cases, the design professional shall consider cost impacts to the project and constructability when specifying varying pavement sections.
- All pavements shall be designed with a suitable subbase course.
 - Subbase specified in roadways shall consist of a crushed ledge rock meeting the requirements of NYSDOT Type 2 Subbase.
 - Pavements in low use areas, or under sidewalks may use subbase consisting of crushed gravel meeting the requirements of NYSDOT Type 4 Subbase.

REVIEWED BY: JMT	REVISED BY: JMT	HOT MIX ASPHALT (HMA) PAVEMENTS	321216
DATE: 11/5/18	DATE: 11/5/18		Page 1 of 3



Program Contacts:

Program Management:

Jim Tofte

jt743@cornell.edu

Office: 255-6613

Mobile: 222-4787

Project Management:

Jake Duell, Project Manager (PM)

jd922@cornell.com

Office: 255-2768

Mobile: 283-1143

Corrective Maintenance:

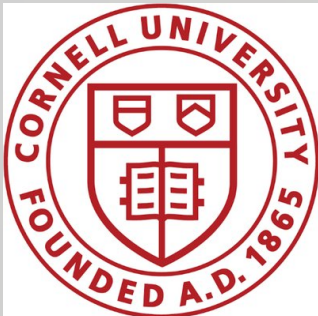
CU Grounds Dan Shied, Les Sills, FE

Service Request:

<https://maximo.fs.cornell.edu/kerb/apps/index.cfm/serviceRequests>

City of Ithaca, Report a Pothole

<https://ny-ithaca.civicplus.com/publiclogin.aspx?dn=www.cityofithaca.org&txtRedirect=RequestTracker.aspx&strAction=Login&nev>



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* Indicates required field

Please enter your message in the areas provided below.
Note: Service Requests entered via the web may take up to 24 hours to process.
Emergency Service Requests should be phoned in to Facilities Customer Service at 5-5322 from a Cornell land line or 867-255-5322 from a cell phone or off campus.
If you are experiencing technical difficulties filling or submitting this form please submit a ticket here.

Name: *

Phone: *

Email: *

Facility: *
You may search on Facility Name or Code. When using the enhanced search capability you may experience a slight lag. Please be patient.

Room/Area: *
Please enter the room number or area that pertains to your request. To look up a room for the Facility entered above, enter at least two characters.

Request Type: *
If your request is for IPP Projects, Administration small projects, large projects, or engineering services, please select "Project". For corrective maintenance or other services (including events) performed by Facilities Management, please select "Repair, Maintenance, Service, Estimate".

Cornell Dining Unit? ☐
Check this box if your request is for a Cornell dining unit, such as a dining room, cafe, food court, coffee house, or convenience store.

Request Summary: *
(100 characters remaining)

Request Details:

Maximo Location:

Maximo Asset #:

Account #:

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