

Strategies for the Effective Mitigation of Heavy Trucking on Local Roads

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Introduction

The authors, civil engineers with T.G. Miller P.C., have reviewed the Tompkins County Draft Local Law a, of the year 2011 regarding the regulation of High-Frequency, High-Impact Truck Traffic and, after careful consideration of the document, drafted this white paper to be presented to the Tompkins County Legislature during a public hearing on February 1, 2011.

First, we believe the Draft Local Law (Law) can be enhanced to circumvent substantive challenges associated with accomplishing the stated purpose, which is to insure the safety and welfare of the County residents by regulating the damaging impacts to highway infrastructure from heavy users. Second, we believe the County could choose not to implement the Draft Local Law and instead utilize Road Use Agreements (RUA's) to mitigate damages by heavy users.

In either case, this white paper encourages adoption of a technical Standard Analysis Method (SAM) to guide the structural analysis of roads needed for both approaches. Additionally, if the Law approach is ultimately chosen, we suggest that the language of the law be reduced to a minimum and that a separate Road Use Regulation (RUR) document is utilized to guide the execution of the Law by the administrative functions of County government within the Highway Department. A local law would then reference the SAM and the RUR.

The SAM is a technical document that includes the analysis procedures to determine the structural capacity of a road, including bridges and culverts, and the impact of heavy hauler traffic. It also presents the analysis methods to determine damage liability and repair cost shares of heavy haulers, including pre-existing depreciation and seasonal effects. The RUA (in the case of the RUA strategy) or the RUR (in the case of a local law strategy) is an Administrative Code (AC) that explains the legal, administrative, and business requirements of either process.

Background

In general, control of heavy road users began in New York State, as elsewhere in the country, with the idea of a 'Road Use Agreement' (RUA). RUA's are mutually agreed upon contracts between a municipality and a large developer or heavy hauler that has the potential to do significant harm to municipal roads. They can be initiated by the municipality or the heavy hauler/developer. Such RUA's have typically been utilized for large wind farm or gas drilling construction activity. The RUA may be drafted initially by the municipality or the developer. It is then negotiated until a mutually agreeable version emerges. Therefore, RUA's only address a single heavy road user for the duration of a given project with no application beyond a given project.

An RUA depends on the 'good will' negotiation between the municipality and the developer. Large developers are motivated to enter an RUA because they know their operation will damage local

roads to an extent far beyond normal depreciation and the capabilities of the highway agency. Therefore, in order to insure that roads will support their own operation, be responsible for their own damage, and maintain positive relationships with the local community, such developers enter into RUA's voluntarily. RUA's have been successfully implemented in New York State and recouped hundreds of thousands of dollars in road damages in the municipalities that have implemented them.

The inherent difficulty with the RUA approach is that there are developers of concern who either may not want to enter an RUA or who may not agree to the desired terms of the municipality. There is also the issue of how a highway agency decides which developers to approach for an RUA negotiation and which developers to leave alone. This decision can be affected by important factors such as the perspectives of local municipal officials on contemporary issues and the perspective of large developers who naturally will want the terms of an RUA to be in their favor. Also important for effective implementation is engineering support based on an understanding of local roads, local road materials, and local road construction methods. This should not be assumed to be inherent with developers because they are not necessarily road builders nor are they necessarily familiar with the state of the practice of local road construction in New York State. A good RUA should require local roads technical and engineering expertise applicable to the municipality in New York State and the technology and materials of New York State.

There has been a recent movement in New York State to move away from the voluntary RUA to implementation of local law to manage and mitigate the damage of heavy truck traffic. The local law approach ranges in complexity. On one hand it can consist of a basic requirement for heavy haulers or developers to obtain bonds as surety for potential damages and to repair all damages. On the other hand it can implement engineering technology to sort out regulated versus non regulated traffic relative to the existing roadbed strength and season of the year, account for pre-existing depreciation, and manage multiple heavy haulers using the same route. In general, basic and simple approaches to the issue leave some significant challenges to overcome because of the complexities of such realities. Difficulties with the local law approach especially come to the forefront with the challenge of sorting between very large developers (who are typically willing to assume liability for damages anyway) and the small to medium size local operators (whose activities have historically been considered part of the baseline traffic load) if the local law lacks the technical tools to determine appropriate damage thresholds for regulation that are relative to the trucking operation, season of the year, and road conditions.

A local law could include all of the regulatory language, in the case of a more simple approach, and in the more complex approach point to separate regulatory documents. In general, the approach of using local law to require some form of regulation is termed Road Use Regulation (RUR).

The RUR approach, such as the proposed Law, focuses on a process of posting roads and requiring bonds as a form of surety before heavy haulers can use the roads. The proposed Law falls on the less complex side of the spectrum. As such it does not reference any technical procedures or regulatory documents associated with the road posting, bonding, and damage liability decisions that are required.

Summary of the Law

The proposed Law defines a threshold for regulation of any single project site that generates more than ten (10) truck trips per day for more than three (3) days in a week (any consecutive seven (7) day period). Trucks must have a gross weight of twenty (20) tons or more to be counted. In a brief summary, the following steps are required by the Law:

1. A project site is identified as the producer of high-impact, high frequency truck traffic as defined by the threshold above.
2. The affected County road is then posted by the County Highway Manager to exclude the high-impact, high frequency truck traffic. This posting, presumably in accordance with NYS vehicle and traffic law, will require a posted weight limit. This creates a scenario whereby trucks heavier than the posted weight limit shall require County permits before traveling the posted road.
3. Permittees must then submit a permit application. Upon approval each truck operating for the permittee shall be required to carry a copy of the permit throughout the duration of the project in order to travel the posted road/s.
4. Permit applicants must declare their trucking activities, including such information as the number and type of vehicles, vehicle axle configurations, materials to be hauled, frequency of trips, daily hauling activities and duration of project etc.
5. Permittees may be required to provide inspection documentation of the road conditions and highway appurtenances prior to use.
6. The Highway Manager determines if the permittee will be required to provide a bond and what the bond amount shall be.
7. The permittee must maintain the road/s in a safe condition throughout time of use.
8. Upon project completion the Highway Manager assesses damage and determines what, if any, repairs are needed. The permittee is then responsible to execute and pay for any and all repairs before the bond is released.

Challenges of Implementing Draft Local Law a

Having worked extensively with municipalities and developers in Tompkins County, it is our assessment that the application of the Law, according to the definition of high-frequency, high-impact truck traffic, will generate numerous instances for road posting, bonding, and regulation. While this

accomplishes the purpose of identifying heavy trucking activities of concern, a difficulty could be the enforcement and execution of the Law. In short, the Law will generate a new service activity for the County Highway Department and the demand for the service can be anticipated to be very high. However, while the proposed Law indicates general procedural steps, there are no specific references to a standard procedure technical document that might guide and explain how the technical decisions required by the Law will be made. This leaves the technical implementation of the proposed Law open to interpretation and judgment which could create the following challenges:

1. **The Minimum Threshold** – The high-frequency, high-impact threshold is useful administratively. However, a single threshold for the entire County network is a challenge because excellent roads in dry summer weather can tolerate a much higher threshold than poor roads in wet weather. Use of a single threshold, in order to be effective, would have to be set for a low ‘common denominator’ – such as poor roads in wet spring weather. The County threshold generally appears to have been set to accommodate poor roads in wet spring conditions but would be very low indeed for excellent roads in good weather.
2. **Bonding** - The Law does not include a reference to an objective method for determining the combination of existing roadbed condition, season of the year, and number of truck trips (above the high-frequency, high-impact threshold) that will trigger the decision to require a bond and how the amount of the bond will be determined. This is a significant decision as it will establish which permittee will be responsible for payment of damages.
3. **Haul Route Control and Enforcement** – A single project site can generate high enough truck traffic to exceed the high-frequency, high-impact limit on a number of approaching corridors in addition to the road the actual site is located on, thus geographically extending the need for route control. Road posting when a project actually appears in the field will trigger points of high stress, for the County, the driving public, and developers, which could be avoided. Also, the requirement for enforcement of individual trucks on the road could become a very costly proposition for local law enforcement agencies.
4. **Multiple Heavy Haulers and Baseline Traffic** – Given the low threshold established by the high-frequency, high impact truck traffic definition, it is very likely there will be cases where multiple persons apply for permits for the same road because various project sites could share haul routes. Another inherent difficulty of implementing a road use regulation is the need to differentiate between existing daily traffic (base line traffic) depreciation and the damage of the permittee. A Permittee will oppose accepting liability for other permittees and for pre-existing damages.

5. **Discrimination** – The lack of a technical procedure to assess when bonds will be required and damage liability assigned could result in legal challenges from permit applicants regarding decisions about who is required to bond and pay for damages.

Resolving the Challenges of the Draft Local Law a

The legal approach could be strengthened by addressing the above challenges and to manage those permittees who are required to bond, repair damages, and assume the costs of damage. To resolve the challenges it is suggested here that the County Law could be backed by a Standard Analysis Method (SAM) *and* a Road Use Regulation document (RUR). There are advantages of having these documents separate from and referenced by a local law. First, it keeps the local law short and simple. Secondly, updates and changes to the SAM *and* an RUR document can be made without having to review and amend the local law. Such revisions will be periodically needed. These technical documents would address the problem areas presented above in the following manner.

1. **The Minimum Threshold** – There is no single ‘threshold’ of truck trips that should trigger a cause for alarm about damage, posting of a road, and the need for a bond. This is because actual damage risk depends on a number of variables including: the season of year the trucks are running (road beds are weakest during winter thaws and in April and May for example); the truck types and axle configurations (for example, a tandem axle dump truck will do more damage than a tridem axle dump truck); and finally the strength of the road bed (poor roads can tolerate far less heavy loads than good roads). The number of road postings and permit applications could be greatly reduced and efficiently managed if a pavement structural analysis method were employed, for example the American Association of State Highway and Transportation Officials (AASHTO) method. The AASHTO method incorporates all of the above mentioned variables. This could be done in several ways. Preferably, it could be done network wide, at the outset, for each county road to establish a threshold for each road. Alternatively, it could be done on a case by case basis for a road when an actual development project happens. In both cases the trigger to compare the heavy hauling activity to the threshold would be if the trucking activity has required any sort of a permit typically issued for development projects, including local permits, State permits, DEC permits, or Corp of Engineer permits. Normally, any sizeable project that could have potential damage impacts to local roads from trucking will have required some such permit.
2. **Bonding** – Permit applicant activities generated by the threshold will surely span a wide range of trucking intensity, from small local operators to large developers such as gas drilling companies. Somewhere within this wide span of trucking activity decisions for bonding and damage liability will have to be made. In general poor roads will require high bond amounts because damages can

be expected to be more severe. Excellent roads, if total trucking loads and season of year warrant a bond, will require less of a bond because damages may be expected to be low. Bond amounts should be relative to road conditions. Furthermore, the decision of whether or not to require a bond (and the amounts) constitutes the decision to further regulate the heavy hauling activity. These decisions can be made objectively with a SAM using the AASHTO pavement design method. Furthermore, all permit applicants required to bond will be required to adhere to the articles of the RUR. This RUR can be a standard document, with room for minor customization for a given applicant. The difference between the SAM and the RUR is that the SAM is the technical procedures to determine if a permittee is bonded and regulated (based on engineering science) while the RUR is the regulatory articles governing the period after the decision to bond and regulate is made. The SAM and the RUR together make the task of regulation straight forward and doable so permit applications can be speedily processed and managed throughout the duration of the project. As an example, if a permittee insists on doing work in April and his traffic loads are significant enough for the road conditions, the SAM may indicate the need for a bond and implementation of the governing RUR. On the other hand, if the work is to be done in July an analysis done in accordance with the SAM may indicate no bond and no further regulation is needed and the requirement for a permit is waived. A SAM and an RUR in support of the proposed law would create an efficient system for the County. It will prevent bonding and regulation when it is not necessary and yet insure that bonds and supporting RUR's will be implemented where actually needed.

- 3. Haul Route Control and Enforcement** – Absent a method which creates a haul route network with traffic flow patterns and which restricts project traffic to that network, the proposed law can be rendered ineffectual by shifting traffic onto other County roads and roads of other municipalities that are not controlled. Also, the proposed local law requires every truck associated with the permittee's activities to carry a copy of the actual permit in the vehicle for the given route. However, in the absence of an integrated haul route planning process, involving community stake holders, enforcement will rely heavily on control of individual trucks by law enforcement officials, a difficult and expensive task to be sure. An RUR typically incorporates articles to define a haul route plan. This would greatly reduce the need for micro-enforcement of individual trucks. Then, the limited needs for enforcement that may still arise can be much more easily handled by law enforcement officials without over burdening them. This in turn focuses the potential damage assessments, need for bonds, and the amount of bonds on a set of roads that are actually dedicated to the project. A haul route plan should also have a traffic safety and control plan which may include one-way trucking routes in and out of the site to minimize congestion

and maximize the safety of the public. It would also stipulate signage needs. All of the elements of the haul route plan would then greatly relieve the burden on law enforcement.

- 4. Multiple Permittees and Baseline Traffic** – The likelihood of the presence of multiple project sites at any given time, in the County, will generate overlapping haul route systems and permittees of different projects using the same haul routes. Therefore, any given permittee will have legitimate concerns about the damage contributions of other permittees using the same road. The potential damage and bonding liabilities must then be appropriately proportioned among multiple users of varying potential impact and with no inherent business relationship. This will definitely create the need to determine how to divide bond shares, damage costs and the responsibilities to execute repairs among multiple bonded permittees using the same road/s. A similar challenge is how to handle the issue of ‘baseline traffic’ which is the normal daily traffic of cars and light trucks, as well as heavy trucks that do not meet the County law definition of high-impact, high frequency truck traffic. Permittees will claim that they should not be accountable for damage by unregulated users. This will be a significant issue on roads typically used by local heavy trucks day in and day out (causing considerable damage throughout the year) but which do not concentrate their activities to meet the weekly threshold of the law. The proposed law makes no mention of how to deduct the costs of damage caused by baseline traffic running the road at the same time as the permittee/s. Sorting out and assigning damage responsibilities to multiple users and the municipal baseline traffic can be accomplished by a technical application of pavement design principles, such as those incorporated in the AASHTO Pavement Design Method. Implementation of a SAM would set in place procedures to deal with these challenges in a highly objective and technical manner.
- 5. Mitigating the Potential for Discrimination-** Indeed, the activities of trucking, even small to medium haulers, has the potential to cause significant and costly damage to the highway infrastructure. Historically such damages have been absorbed by the highway agency and tax paying public. Yet on the other hand, the challenge confronting municipalities today is the advent of large development activities associated with the production of energy (wind farms, gas drilling, gas pipelines etc.). These activities cause damage that exceeds the historical capabilities of local highway agencies. It is these large energy developers that are primarily driving the movement to establish heavy road use regulation. The lack of a supporting SAM and RUR system in the proposed law leaves the County vulnerable to inconsistent implementation. The SAM and RUR are designed to focus bonding and regulatory efforts on the roads and hauling activities where the potential for damage actually exists based on the physical parameters of highway design. This

efficiency allows for effective implementation of the law across the County network in a disciplined and consistent manner.

Road Use Agreements as a Strategy

An alternative to the Draft Local Law is a damage mitigation strategy that utilizes Road Use Agreements. As described in the previous sections, RUA's have been successfully employed in New York State. The RUA approach has a number of advantages including:

- 1. No traffic threshold needed** – The RUA strategy has no law that requires some 'trigger' to implement. This reduces the analytical requirements of the strategy and the perpetual need for analysis of permit applications generated by a law.
- 2. A Record of Success** – RUA's have been utilized in New York State and Pennsylvania to manage and mitigate road damage by large development projects. Millions of dollars of repairs have been executed on local roads in New York and Pennsylvania under the RUA strategy and paid for by the developers. In most cases, municipalities have seen increased road structural capacity on roads that have been used and repaired by large developers.
- 3. Mutual and Cooperative** – RUA's work on good will and cooperation and therefore promote efficiency and a high level of service for the driving public. This is because the developer is willing to assume liability and usually responds quickly to needed repairs.
- 4. Reduced Complexity** – Because RUA's are private contracts entered willingly by large developers there is no need to require minimum thresholds of traffic that trigger regulation. This means no complex analysis method is needed to determine who is regulated and who is not in a non-discriminatory way.
- 5. Reduced Engineering Costs** – Engineering efforts can be redirected from determining who is regulated (a perpetual need generated by the local law approach) to assessing and mitigating damages for only those RUA's actually initiated.
- 6. Private Contract** – An RUA is a private contract between a developer and a municipality. Therefore, it will be far less vulnerable to regulatory actions that could materialize in the future by State or Federal Agencies. Such regulation, if it happens, could preempt and even invalidate any local law and associated strategy that is implemented in the present.

Challenges of Implementing an RUA Strategy

- 1. Participation** - The primary challenge of the RUA strategy is that it relies on voluntary participation by large developers. Sometimes, developers may avoid having to enter into an RUA.
- 2. Haul Route Control and Enforcement** – As with the Local Law approach there is still the challenge of controlling and enforcing the use of haul routes.

3. **Multiple Heavy Haulers and Baseline Traffic** – It is possible that multiple projects in a municipality would require simultaneous RUA's to be in force at any given time. Therefore, the RUA strategy will also have to be able to handle the issue of multiple developers using the same haul routes. Furthermore, the need to differentiate between existing daily traffic (base line traffic) depreciation and the damage of the developers will also have to be considered to be fair to the developers. Developers will oppose accepting liability for other developers using the same roads and for pre-existing damages.
4. **Discrimination** – Because RUA's are not mandated, discrimination could become an issue with respect to what developers are asked by the County to enter an RUA.

Resolving the Challenges of an RUA Strategy

1. **Participation** - The solution to getting developers to enter RUA's already exists in the statutes of the highway law. That is, highway superintendents are granted authority by the law to post roads. Road posting can always be used to stop heavy truck traffic on a local road as a means to get a large developer to the table, if the development traffic is significantly damaging local roads.
2. **Haul Route Control and Enforcement** – As with road use regulation, haul routes can be planned, managed and enforced through the stipulations of the RUA and the SAM. These documents can specify the planning and analysis procedures used to establish haul routes. Once an effective haul route is set up and stipulated to the developer the demands for enforcement of individual vehicles can be largely eliminated by the developer's own 'self-policing' of its work force.
3. **Multiple Heavy Haulers and Baseline Traffic** – As with the local law approach, an RUA strategy still relies on the SAM to proportion damage liabilities and repair cost responsibilities between multiple users and the municipal baseline traffic in the event that haul routes are shared by more than one developer and the stipulations of the RUA document spell out who is responsible for the execution of repairs.
4. **Discrimination** – Typically an RUA strategy is employed by municipalities seeking to mitigate the potential damage of large developers, not the damage of small to medium local operators. The distinction of 'operators' is important. Local operators can consist of farmers, loggers, gravel pits, and local home builders. These types of operators, who generate heavy truck traffic, have historically been considered part of the local municipal 'baseline traffic'. An RUA strategy assumes that these operators will not be approached to enter into an RUA. Rather an RUA strategy assumes that it will be used for large developers (such as energy developers) who will, with certainty, damage roads to an extent far beyond normal depreciation. The effectiveness of

the RUA strategy is that these developers are already willing to acknowledge their liability and assume responsibility, and they are financially capable of doing so. Therefore RUA's are used under circumstances that are mutually agreeable between the municipality and the developer and therefore avoid the issue of discrimination entirely. Herein exists the overall effectiveness of the RUA strategy. It focuses the RUA where needed and avoids creating a significant regulatory challenge for small to medium local operators who are a part of the baseline traffic the municipal highway agency is already capable of providing services for.

Conclusions

The proposed Law provides one possible course of action for mitigating the affects of heavy truck traffic on County Roads. Alternatively, an RUA strategy could be used.

Regarding the Draft Local Law approach; the lack of a technical procedure to define the high-frequency, high impact threshold results in a low trucking threshold, i.e. a low common denominator. If the law is implemented the low threshold will generate many road postings. Many of the postings will be unnecessary because they will be triggered on good and excellent roads, during dry summer months. Or unnecessary posting could even be triggered by 'medium' haulers on poor roads in dry summer months because a hard, dry, poor road can handle heavy traffic. In general road postings will start to occur throughout the year on roads where the public would not expect to see such restrictions. The law will then generate an entirely new highway department function of having to enact the postings and process permit applications for scenarios that pose little risk of excessive damage (good roads in good whether with the low traffic loads defined by the threshold). This anticipated regulatory burden can be greatly eased by the implementation of a Standard Analysis Method (SAM). The method would be designed to differentiate between scenarios that should actually require posting and identify heavy road users that should actually be regulated. The regulated permittee could then be managed under the articles of a Road Use Regulation (RUR), referenced by the local law, for those permittee's whose hauling activities warrant a bond and further regulation (as determined by the SAM).

Regarding the RUA approach; this strategy focuses only on mutually amicable and voluntary agreements with large developers who pose the threat of road damage that is of primary concern. This eliminates the need for a local law and the associated trigger. In turn, this eliminates the technical difficulty of analyzing what permit applicants should be regulated or not. RUA's have been successfully implemented with excellent results. They focus efforts on projects that will impose excessive damage on the highway infrastructure and avoid the need to sort out the small and medium local operators who have been historically considered part of the local baseline municipal traffic.

Recommendations

1. Adopt a Standard Analysis Method (SAM) that can be used with either the local law approach or the RUA strategy. The SAM must accomplish the following:
 - a. Define heavy hauler traffic in the AASHTO standard of Equivalent Single 18-kip Axle Loads (ESAL).
 - b. Adopt a standard technical approach to define pavement structural capacity.
 - c. Establish the structural capacity of the road network in terms of an accepted standard such as the AASHTO structural number (SN) method. This can be done network wide at the outset of a local law approach or an RUA strategy. Alternatively, it could be done on a road-by-road basis.
 - d. Compare the heavy hauler's proposed traffic to the road capacity, including baseline traffic, using ESAL's.
 - e. Proportion damages to multiple heavy haulers and the base line traffic using the road at the same time based on ESAL's, road structural capacity, and season.
 - f. Determine bond requirements and damage repair cost shares for single or multiple, simultaneous users.
2. Adopt an Administrative Code (AC) for use with either the local law approach or the RUA strategy approach. This code is essentially the same general document for either approach. In the RUA approach it is the actual RUA. In the local law approach it is the RUR document that a brief local law would reference.