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Tallinn Dynamic Traffic Management Pre-Study. Executive Summary

Client
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Contractor
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Executive summary

The Tallinn Dynamic Traffic Management (DTM) pre-study, commissioned by the Tallinn Mobility Administration and carried out by Civitta in 2026, assessed the capability of the city's current traffic signal control and defined the changes needed to introduce control that adapts to prevailing traffic conditions. The pre-study was funded by the Government Office's Public Sector Innovation Fund from the EU Cohesion Policy Funds 2021–2027 Implementation Plan, measure "Enhancing Public Sector Innovation Capacity". In this summary, "the City" refers to the City of Tallinn, represented by the Tallinn Mobility Administration unless stated otherwise. The study concludes that Tallinn has a sufficient technical base to proceed with a defined pilot, subject to written confirmation of the OMNIA interface terms and a site survey of the test area equipment, and that any decision to expand should follow from the measured results of that pilot. No new control logic was deployed on the street during the pre-study, and its outputs form the basis for the stage II procurement and pilot.

Purpose and scope

The study addressed four linked objectives: preventing intersection blocking, using green time where there is demand, giving public transport priority, and improving service for pedestrians and cyclists. It mapped the systems, equipment, data flows and working practices of traffic management in Tallinn, compared the city with Helsinki, Vilnius and Copenhagen, reviewed market solutions, and translated the findings into a target state, requirements, test area proposals, a legal and procurement analysis, an action plan and a cost model. The detailed technical requirements are set out in Annex 2, and the proposed procurement documentation in Annex 3.

Current situation

Tallinn operates 299 SWARCO traffic signal controllers at 414 signalised intersections, managed through the SWARCO OMNIA central traffic management system. Public transport priority is configured at 45 intersections, and part of the network already responds locally to detected demand, such as vehicle detector signals and pedestrian push-button requests. The network is therefore not a uniformly fixed-time system, and the target state does not require a full replacement of existing infrastructure.

The main barriers lie at the interfaces between systems and in the usability of data. Third-party access to OMNIA is offered through a paid external interface whose functions, permitted commands, performance and price have yet to be confirmed in writing by the supplier. Interfacing options differ between controller generations, and older controllers depend on an adapter for STCIP, the manufacturer's proprietary communication protocol, whose reliability needs improving. Counting, local detection and camera images serve different purposes and do not automatically provide the input needed for phase-level control. Imputed values are not always distinguishable from measured data, and data quality is not monitored automatically. The central public transport priority chain has known shortcomings, and modelling, signal programme management and monitoring still involve manual data transfers.

The common implication of these findings is that procuring a more advanced control algorithm will not resolve gaps in data coverage, usage rights or responsibilities. The next stage is to separate defects that ordinary maintenance can fix, interfacing work, and functions that require genuine development.

Lessons from benchmark cities

Helsinki's experience underlines the need to specify the ordered functions precisely and to account for the city's own expert capacity. Vilnius shows the importance of device-specific interfacing and a phased transition, since connecting about 300 intersections took longer than the six months planned. Copenhagen highlights results measured by road user group, the maintainability of sensors, and the need to verify that

open interfaces actually widen the choice of suppliers. A result from one corridor cannot be transferred to the whole city without evidence.

Target state and requirements

In the target state, traffic measurement, control decisions, signal control, operator work and impact evaluation form one traceable chain. The study identifies two architecture options for reaching this target state; neither has yet been tested in Tallinn. In option A, control commands reach the controllers through the paid OMNIA external interface. In option B, the solution communicates with controllers directly through an open protocol, or through a verified adapter for older generations, without necessarily removing OMNIA from monitoring and management. Both options are subject to the same performance, safety and quality requirements, and the controllers' local safety logic is retained in both. The choice is to be made for the same test area, functions and service period, comparing feasibility, rights, safe transition, maintainability and life-cycle cost. Machine learning is justified only where sufficient data exist and independent evaluation shows added value over a simpler rule-based solution.

Annex 2 sets out 94 requirements, of which 72 are mandatory in the test area, 13 are scored in the tender evaluation and 9 concern city-wide expansion. Each requirement carries a measurable acceptance criterion.

Proposed test areas

The study proposes two complementary test areas. The Pronksi–Liivalaia corridor runs from the Narva mnt–Jõe–Pronksi intersection to the Liivalaia–Juhkentali intersection and comprises seven intersections with seven controllers (five ITC3 and two ITC2 Linux). Its key test site is the Liivalaia–Tartu mnt–Pronksi intersection, where trams and buses cross and the risk of blocking is highest. The Port area (Sadama) comprises three intersections and six signalised crossings controlled by three controllers, where demand is shaped by passenger ferries at the Old City Harbour.

Liivalaia Street carries a fairly even load through the working day, with a substantial share of through traffic in the evening peak and some approaches at the core intersection operating at capacity in the outbound direction. In the Port area, ferries from Helsinki and Stockholm arrive several times a day from morning until after midnight, typically every half hour to three hours in daytime. Arrivals at Terminal A load the Mere pst–Sadama–Kai intersection towards the city centre, where vehicles, the harbour tram line and pedestrians overlap. Passenger and cruise traffic peak in summer. The duration of the arrival peak at the intersections cannot be established from public sources and is to be measured in the baseline.

Five of the seven corridor intersections run fixed-time plans, and existing detection serves isolated functions such as left-turn detection and bus priority. In the Port area, detection is concentrated at the Põhja pst–Sadama–Kursi intersection. The main need in both areas is to add detection and to interface and configure the existing controllers, rather than to replace them. Two corridor intersections are connected over DSL lines whose capacity has to be checked. Equipment, its condition and its use in control are to be confirmed through a site survey before the call for tenders.

Pilot evaluation

The pilot is to answer three separate questions: whether the solution operates safely and as specified, whether it improves the achievement of the City's objectives, and whether the benefit justifies the investment and running costs. Technical acceptance relies on threshold values set in the requirements, including a maximum waiting time of 90 seconds for pedestrians and cyclists, a maximum cycle length of 140 seconds, detection of at least 90% of blocking events, and a green-time prediction deviation of no more than 2 seconds for 95% of predictions. Traffic impact is measured against a baseline of at least four consecutive weeks outside school and public holidays, with at least 80% measured records. The study proposes that the pilot is successful in terms of traffic impact if the core indicators of at least three objectives

improve and the fourth does not deteriorate. No improvement elsewhere can offset a safety shortfall, and the City confirms the target rate of improvement after the baseline measurement.

Legal, organisational and procurement conditions

The pilot can be implemented within the current legal framework, provided that traffic signal rules, data protection requirements and permits are observed. A control solution that uses artificial intelligence may fall within the high-risk category of the EU Artificial Intelligence Act, whose high-risk obligations apply from 2 December 2027 following the 2026 amendment. Liability between the City, the contractor and the maintenance partner, insurance cover, and usage rights to software, configurations and data are to be fixed in the contract. For operation during the pilot, the study recommends a Mobility Administration operator working office hours, with the maintenance partner receiving alarms around the clock.

The study recommends the open procedure if the City fixes the permitted architecture options, the test area composition, the OMNIA interface conditions and the numerical requirement values before the call for tenders. Otherwise, the competitive procedure with negotiation is recommended. With the architecture and the OMNIA interface terms still undecided, the current situation corresponds to the second case. The legal basis is to be verified against the version of the Public Procurement Act in force at the time of the call.

Costs and expansion

The scope of the pilot is limited by the funding available for the DTM project. The pilot investment is to be compared with the remaining budget of the DTM project, and the test area scope and work packages are to be adjusted to fit it before the call for tenders. Cost estimates prepared during the study are indicative and are to be confirmed through the procurement. The study recommends a region-based life-cycle cost model, with funding decisions taken area by area on the basis of measured pilot costs and impact.

Recommendation and next steps

The study recommends that the City proceeds with the stage II procurement and a defined pilot. The architecture choice and the scope of further areas are to be confirmed on the basis of their feasibility, benefit and cost. The recommended steps are summarised in Table 1.

Table 1. Recommended next steps and conditions for proceeding.

Step	Expected output	Condition for proceeding
1. Confirm the procurement baseline	Unified test area and equipment list, interface functions and rights, permitted A/B options, priority principles, and written confirmation of the OMNIA interface with a proof-of-interface test	All bidders price the same scope, owners and deadlines of critical dependencies are set, and the pilot scope fits the available funding
2. Prepare and run the procurement	Market consultation where needed, justified choice of procedure, phased order, comparable price form, and separate evaluation and acceptance	Work packages, measurable results, rights and service period are described before the call
3. Prepare the test areas	Needs-based infrastructure work, interfaces, detection, data quality checks and baseline measurement	Inputs, technical tests, roles and test conditions are verified
4. Run and evaluate the pilot	Controlled start-up, corridor test, impact by road user group, and a report on reliability, workload and actual costs	Impact is demonstrated on comparable data, with limitations and side effects disclosed
5. Decide on further scope	Decision to expand, refine and retest, or limit the application, with a ranking of areas and the funding need	Sufficient evidence and technical, organisational and financial readiness in the areas concerned

The deliverable to the City has to be more than software. Documented interfaces and configurations, agreed usage rights, test evidence and trained users give the City the ability to manage and verify the solution and, where necessary, to change service provider, and allow investment to be directed where it demonstrably supports the City’s mobility objectives.