APPENDIX C

Form C1 – CABINET/CONTROLLER SETUP FORM

Cabinet Database: _____

Controller Test by: _____ Date Completed: _____

Installation

Date Installed: _____

Installed By: _____

Cabinet Type: _____ Brand: _____

Print Number: _____ Serial Number: _____

Communications Established with TransSuite? (YES/NO)

Equipment	Brand/Type	Serial Number
Controller		
MMU		
Power Supply		
Preemption Card #1		
Preemption Card #2		
Detector Brand		
Detector Brand		
Detector Brand		
Detector Brand		
Detector Brand		
Detector Brand		
Detector Brand		

APPENDIX C

FORM C2 – PHASE 1 BENCH TEST

8.1 – Intersection Signal Control General Software Requirement

	Yes	No
8.1.1. Does the software comply with NEMA TS-2 (with NTCIP v02.06) standard?	☐	☐

8.2 – Basic Timing Parameters

	Yes	No
8.2.1 Does the software default to standard dual-ring, 8-phase NEMA configuration with leading left turns (odd-numbered phases)?	☐	☐
8.2.2. Does the software support a minimum of **[16]** vehicles phases?	☐	☐
(*Preferred) Does the software support a preferred **[24]** vehicle phases?	☐	☐
8.2.3. Does the software support a minimum of **[4]** phasing rings?	☐	☐
(*Preferred) Does the software support a minimum of **[6]** phasing rings?	☐	☐
Number of Phasing Rings Supported _____		
8.2.4. Does the software support a minimum of **[8]** pedestrian phases?	☐	☐
8.2.5. Does the software support a minimum of **[16]** overlaps?	☐	☐
8.2.6. Does the software support a minimum of **[6]** transit phases?	☐	☐
(*Preferred) Does the software support a minimum of **[8]** transit phases?	☐	☐
Number of Transit Phases Supported _____		
8.2.7. Does each transit phase have the ability to control two and three section signal heads?	☐	☐
8.2.8. Does each transit phase have the ability to provide advanced warning sign control?	☐	☐
8.2.9. Does the software support stop timing and interval advance?	☐	☐
8.2.10. Does the software provide volume/density phase timing?	☐	☐
8.2.11 Does the software support dual entry, selectable by phase?	☐	☐
8.2.12. Does the software support a “minimum”, “maximum”, “pedestrian”, and “soft” recall mode?	☐	☐
8.2.13. Does the software provide leading and lagging pedestrian intervals?	☐	☐
8.2.14. Does the leading pedestrian interval start at a specified time interval before the adjacent movement phase?	☐	☐
8.2.15. Does the lagging pedestrian interval start at a specified time interval after the adjacent through movement phase, and allow a waiting right-turn queue to be cleared before the pedestrian walk indication is presented?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.2 – Basic Timing Parameters

	Yes	No
8.2.16. Does the software allow for exclusive pedestrian intervals?	☐	☐
Does the software dedicate an additional phase for exclusive pedestrian use in which NO vehicular movements are served concurrently with pedestrian traffic?	☐	☐
8.2.17. Is the software capable of operating a flashing yellow arrow for protected/permissive mode, protected only and permissive only left turn?	☐	☐
Can this mode be programmed and changed by time-of-day (TOD) or day-of-week (DOW) scheduling?	☐	☐
8.2.18. Does the software allow the user to reverse the sequence of phase pair (alternate sequence) without making changes to the ring/barrier structure programmed?	☐	☐
8.2.19. Does the software support for full operation of Pedestrian Hybrid Beacon as described in the 2009 MUTCD, Chapter 4?	☐	☐
8.2.20. Is the software able to activate the following parameters selectable by phase through TOD schedules?		
• Call-to-Non-Actuated (CAN) I & II	☐	☐
• Rest-in-Walk	☐	☐
• Pedestrian Re-service (Pedestrian Re-cycle)	☐	☐
• Pre-time	☐	☐
8.2.21. Does the software provide two sets of walking intervals per phase?	☐	☐
Is Phase I enabled by default?	☐	☐
Can Phase II be enabled by either a TOD command or an extended push button press?	☐	☐
8.2.22. Does the software provide a minimum bike green time, which is selectable by phase?	☐	☐
Is the green time only able to be activated by a bike detector call?	☐	☐
8.2.23. Does the software provide the ability to extend an all-red interval?	☐	☐
Can this red clearance be extended until it reached a pre-defined red maximum (if the red extended detector input is true) or the red extend detector input goes false?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.2 – Basic Timing Parameters

8.2.24. Does the start-up process support either of the two start-up options?

Option I	Option II
• Flash all red for the programmed interval	• Flash yellow/red for the programmed interval
• All red for the programmed interval	• Yellow on main street and red on side street for the programmed intervals
• Then begin service on the selected phase greens	• All red for the programmed intervals
• Normal sequence follows	• Normal sequence follows

Yes	No	Yes	No
☐	☐	☐	☐

	Yes	No
8.2.26. Does the software provide a minimum of **[3]** "maximum green" time by phases that can be selected by a coordination plan and TOD schedules?	☐	☐
8.2.27. Does the software support a "backup protection" or "anti-backup" option, which is selectable by phase?	☐	☐
8.2.28. Does the software provide a minimum of **[4]** phase timing plans (phase bank) that can be selected by a coordination plan, free mode or TOD schedule?	☐	☐
8.2.29. Does the software provide a minimum of **[4]** sets of phase recall data that can be selected by coordination plan or TOD schedule?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.3. – Coordination

	Yes	No
8.3.1. Does the software support a minimum of **[128]** signal timing plans/patterns, which can call for coordinated, free or a programmed flash operation?	☐	☐
8.3.2. Does the software support coordination with single and multiple yield points?	☐	☐
8.3.3. Does the software support phase re-service in coordination mode (conditional service)?	☐	☐
8.3.4. Does the software support the following offset recovery options?		
• Short way	☐	☐
• Long way	☐	☐
• Short/Long way	☐	☐
• Dwell	☐	☐
8.3.5. Does the software support programming to run coordination with a vehicle split less than a programmed walk+pedestrian+yellow+all red?	☐	☐
8.3.6. Does the software support phase and pedestrian recall or the omitting of per coordination plan?	☐	☐
Does the software support a cycle-by-cycle split adjustment per coordination plan?	☐	☐
Is the cycle-by-cycle split able to move available time from phases that are under-saturated to phases that are over-saturated?	☐	☐
Does the software allow for the early gap-out of actuated coordinated phases?	☐	☐
Does the software allow for unused time to be distributed to movements with greater demand?	☐	☐
8.3.7. Does the software support floating and fixed force-off modes?	☐	☐
Can the user select a force-off mode for each coordination plan/pattern?	☐	☐

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8.4. – Detector Inputs

	Yes	No
8.4.1. Does the software support a minimum of **[64]** vehicle detector inputs?	☐	☐
Does the software support a minimum of **[8]** pedestrian detector inputs?	☐	☐
8.4.2. Does the software provide the following detector diagnostics?		
• No activity	☐	☐
• Max presence	☐	☐
• Erratic counts	☐	☐
Does the software provide a minimum of **[2]** alternative values for the detector diagnostics, which shall be selectable by TOD?	☐	☐
8.4.3. Does the software provide user-definable cabinet input function mappings?	☐	☐
8.4.4. Does the software support bicycle detection which can be assigned to a bike call, vehicle call, and/or a pedestrian call?	☐	☐
8.4.5. Does the software allow the user to assign any detector as a system detector?	☐	☐
8.4.6. Does the software support a minimum of **[32]** system detectors, capable of accumulating volume and occupancy data on a user-defined incremental interval?	☐	☐
Can the software log and store a minimum of **[72-hour]** volume and occupancy data with **[15-minute]** intervals?	☐	☐
8.4.7. Can the controller enable/disable multiple Car logic (minimum **[2]**) per detection input channel for protected/permissive turn movement where protected turns only appear if the minimum number of cars is detected to start of green?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.5. – Pedestrian Overlaps

8.5.1. Does the software support pedestrian overlaps? ☐ ☐

8.5.2. Does the software support NTCIP normal overlap ☐ ☐

(as described in NTCIP TS 3.5, 2.10.2.2)? ☐ ☐

8.5.3. Does the software support NTCIP MinusGreenYellow overlap (as described in NTCIP TS 3.5, 2.10.2.2)? ☐ ☐

8.5.4. Does the software support an overlap for the following LRT operation described below? ☐ ☐

The overlap indication is a special two-section head driven by the overlap's green and red outputs. During the overlap's yellow clearance interval, the green output flashes.

The overlap output shall be green in the following situations:

(1) When an overlap parent phase is green, and an overlap modifier phase is NOT in service and no termination detector is actuated.

(2) When an overlap parent phase is yellow (or red clearance) and an overlap parent phase is next, and an overlap modifier phase is NOT in service and no termination detector is actuated.

Any modifier phase in service or selected as phase-next will stop the overlap from outputting green. If pedestrian service is enabled for the overlap, it'll time concurrently with the overlap green timers.

The overlap shall be able to flash red indication prior to the overlap going green. This indication will be displayed during the preceding non-parent phase.

8.5.5. Does the software support overlap trailing (Green Clearance)? ☐ ☐

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FORM C2 – PHASE 1 BENCH TEST

8.6. – Preemption

	Yes	No
8.6.1. Does the software support the minimum required [8] preempt inputs?	☐	☐
8.6.2. Are preemption routines in the software in accordance with the NEMA TS-2 specifications (v02.06)?	☐	☐
8.6.3. Is the software capable of activating warning lights, blankout signs and other auxiliary devices during a preemption sequence?	☐	☐
8.6.4. Does the software accept infrared preemption input?	☐	☐
Does the software have the ability for the active coordination plan to run in sequence behind the preemption, and to exit preemption in sync or choose exit phases?	☐	☐
Does the software permit or allow any combination of vehicle phases, overlap and pedestrian phases during preemption operation?	☐	☐
8.6.6. Does the software support rest-in-walk for pedestrian phases? during dwell interval of preemption?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.9. – Time Base Schedule

	Yes	No
8.9.1. Does the software provide the following scheduling types?		
• Time of Day/Day of Week	☐	☐
• Holiday	☐	☐
• Temporary	☐	☐
8.9.2. Does the software automatically sort the schedule chronologically by the TOD entry?	☐	☐

8.9.3. Does the software provide (or the ability to provide) the following schedule priority?

1. Holiday – Overrides all other schedule types
2. Temporary – Overrides active TOD/DOW schedule
3. Active TOD/DOW

Yes	No
☐	☐

	Yes	No
8.9.4. Does the software support the minimum required **[32]** events in each schedule that can be activated by TOD/DOW?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

8.9. – Time Base Schedule

8.9.5. Does the software support the minimum required **[32]** TOD/DOW schedules? ☐ ☐

8.9.6. Does the software schedule support, as a minimum, the following operation functions?

- Call-to-Non-Actuated (CNA) I & II ☐ ☐
- Rest-in-Walk ☐ ☐
- Pedestrian Re-service (Pedestrian Re-cycle) ☐ ☐
- Phase omit ☐ ☐
- Second Walk/Ped Clearance interval ☐ ☐
- Second/Third phase maximum greens ☐ ☐
- Plan sets ☐ ☐
- Flashing operations ☐ ☐
- Special functions ☐ ☐

8.9.7. Does the software have the ability to schedule holiday events at least one year in advance? ☐ ☐

8.9.8 Does the software support both fixed and floating holidays? ☐ ☐

8.9.9. Does the software support temporary event patterns? ☐ ☐

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9. – Security

	Yes	No
9.1. Does the software provide username and password protection?	☐	☐
9.2. Can the username and password be reconfigured to the City's preference?	☐	☐
9.3. Does the software allow for multiple security levels of access (such as a "view only" mode, access to modify timing parameters, and access to modify phasing configurations)?	☐	☐

10. – Alarms

	Yes	No
10.1. Does the controller provide one of the following alarms classified as the following?		
• Critical	☐	☐
• Non-Critical	☐	☐
• Detector Fault	☐	☐
• Coordination	☐	☐
• Communication	☐	☐
• Preempt	☐	☐
10.2. IF the controller alarm is classified as Critical, mark if the following features are provided:	Yes	No
• Power failure	☐	☐
• Stop time	☐	☐
• Local flash	☐	☐
• MMU flash	☐	☐
• Cycle failure	☐	☐
10.3. IF the controller alarm is classified as Non-Critical, mark if the following features are provided:	Yes	No
• External start	☐	☐
• Uninterruptible Power Supply (UPS) Low battery	☐	☐
• Cabinet door open	☐	☐
• Cabinet Fan out	☐	☐
• Local override	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

10. – Alarms

10.4. IF the controller provides detector fault alarms, mark if the following features are provided:

	Yes	No
• No activity fault	☐	☐
• Max presence fault	☐	☐
• Erratic count fault	☐	☐
• Communications fault	☐	☐
• Configuration fault	☐	☐

10.5. IF the controller provides detector fault alarms, mark if the following features are provided:

	Yes	No
• Cycle fault	☐	☐
• Coordination fault	☐	☐
• Coordination failure	☐	☐
• Offset transitioning	☐	☐
• Coordination active	☐	☐
• Local free	☐	☐

10.6. IF the controller alarm is classified as Communications,

mark if the following features are provided:

	Yes	No
• System communication failure	☐	☐
• Peer-to-peer communication failure	☐	☐

10.7. IF the controller alarm is classified as Preempt,

mark if the following features are provided:

	Yes	No
• Preempt input active	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

10. – Alarms

	Yes	No
10.8. Does the software log all alarms?	☐	☐
10.9. Does the software allow for the configuration of alarms to the messages that will be transmitted to the Central Traffic Control Software?	☐	☐

11. – Communications

	Yes	No
11.1. Does the controller simultaneously support both Controller-to-Central Traffic Signal Control Software and P2P between local controllers?	☐	☐
11.2. Does the controller simultaneously support center-to-field communications through the following interfaces? • 10100 Ethernet RJ45 connector • EIA/TIA 232-E compliant 9-pin connector • FSK modem	☐	☐
11.3. Is the controller able to be polled every one second?	☐	☐
Does the controller support the request to download all data from the Central Traffic Signal Control Database to the controller through the front panel?	☐	☐
11.4. Does the controller support receipt of a Traffic Control System Time Broadcast for setting the clock?	☐	☐
11.5. Does the controller support File Transfer Protocol (FTP) for uploading and downloading files?	☐	☐
11.6. Does the controller comply with NTCIP 2202:2001 Internet (TCP/IP and UDP/IP) Transport Profile?	☐	☐
11.7. Does the controller provide the ability to ping at least **[4]** network devices simultaneously and show success or fail and latency in millisecond?	☐	☐
11.8. Does the controller support upload/download of all front-panel programmable data within one minute with direct IP connection using NTCIP protocol to a desktop computer or a laptop?	☐	☐
11.9. Can the Controller Ethernet interface withstand an Address Resolution Protocol (ARP) Storm, Denial of Service (DoS or DDoS) attack and a MAC spoofing attack of any size and duration without causing the controller to go into flash or effect any of the primary traffic control functions other than communication to the Central Traffic Control system or to other controllers?	☐	☐

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FORM C2 – PHASE 1 BENCH TEST

11. – Communications

	Yes	No
11.10. Is the MAC address of the controller network interface card unique?	☐	☐
11.11. Is the MAC address of the controller network interface card printed on a serial number label affixed to the controller enclosure?	☐	☐

12.7. Can the controller communicate with NextPhase via P2P to exchange the following information?

	Yes	No
• Phase status	☐	☐
• Detector calls	☐	☐
• Preemption status	☐	☐
• Priority status	☐	☐
• Special functions	☐	☐
• Alarm inputs	☐	☐

APPENDIX C

FORM C3 – PHASE 2 BENCH TEST

8.7 – Transit Signal Priority

	Yes	No
8.7.2. Does the software allow for the ability to extend a dedicated transit priority phase green by a pre- determined time for up to **[90]** seconds?	☐	☐
8.7.3. Does the software provide the ability to truncate selected non-priority phases to a predetermined value when a transit priority call is received while the intersection is in a phase other than the priority phase?	☐	☐
8.7.4. Does the controller stay in coordination while truncating/extending/omitting phases for a transit priority call?	☐	☐
8.7.6. Does the controller provide a queue jump indication for a transit vehicle before the adjacent vehicles receive a green indication?	☐	☐
8.7.7. Does the software have the ability to switch to alternate sequences to better serve an early arriving transit vehicle?	☐	☐

8.8 – Peer-to-peer Communication

	Yes	No
8.8.1. Does the software support peer-to-peer communication between any other controller within its network?	☐	☐
8.8.2. Does the software allow the user to assign a minimum of **[8]** peer controllers?	☐	☐
8.8.3. Are peer controllers configurable by the user via the controller front panel?	☐	☐
8.8.4. Does the software allow the user to select peer controllers by entering intersection identification and/or IP addresses?	☐	☐
8.8.5. Does the software allow the user to select any peer controller's input, output, or event data to initiate a p2p message which can be received by the local controller?	☐	☐
Do the available p2p messages include the following?		
• Phase Green, Phase Yellow, Phase Red	☐	☐
• Ped Walk, Ped Clearance, Ped DontWalk	☐	☐
• Overlap Green, Overlap Yellow, Overlap Red	☐	☐
• Overlap Ped Walk, Overlap Ped Clearance, Overlap Ped DontWalk	☐	☐
• Vehicle Detector, Ped Detector, Priority Detector	☐	☐
• Preempt Call, Preempt Actuation, Preempt Entry, Preempt Dwell, Preempt Exit	☐	☐
• Special Functions, Auxiliary Functions, Alarm Inputs	☐	☐
• Active Plan, Active Priority	☐	☐

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FORM C3 – PHASE 2 BENCH TEST

8.8 – Peer-to-peer Communication

	Yes	No
8.8.6. Does the user have the ability to assign an internal control to the receiving controller upon the receipt of a p2p message from its peer controllers?	☐	☐
Does the software allow for the following internal control functions?		

	Yes	No
• Phase Call, Ped Call, Overlap Call	☐	☐
• Vehicle Detector, Ped Detector, Priority Detector	☐	☐
• Special Function, Auxiliary Functions, Alarm Inputs	☐	☐
• Phase Hold, Phase Omit, Ped Omit, Walk Hold	☐	☐
• Force Off, Ped Recycle	☐	☐
• Min Recall, Walk Rest, Free	☐	☐
• Overlap WalkHold, Overlap PedOmit	☐	☐

8.8.7. Does the active peer link communication status (Success or Fail) update on the TransSuite TCS ATMS Map on a second-by-second basis?	☐	☐
8.8.8. Does the software display the status of all active peer connections between the local controller and peer controllers? Is the format similar to that shown within the specs?	☐	☐
8.8.9. Does the software actively display the current status of all peer messages that are actively being sent/received to and from the controller? Is the format similar to that shown within the specs?	☐	☐
8.8.10. Does the software allow the user to assign priority request (check-in) and priority release (check-out) detector inputs to each transit priority phase?	☐	☐
Does the software allow the user to reverse detector inputs for transit detectors check-in/check-out?	☐	☐
8.8.11. Does the software provide a delay timer for priority request detector and priority release detector?	☐	☐

Miscellaneous Features

	Yes	No
12.1. Does the software provide web access to the controller database?	☐	☐
4.6. Does the software allow for dynamic pin configuration?	☐	☐

Form C4 – FIELD TEST LOG

1. Field Testing Controller Setup

   Fields shall be checked off when databases have been set up and tested successfully in the shop environment for at LEAST **[48]** hours and installed in the field cabinet.

Control Database 1	Control Database 2	Control Database 3
☐	☐	☐

2. Peer Setup Configuration and Testing

	Intersection Name	IP Address	Peer Communication Check			
			Peer 1		Peer 2	
			Pass	Fail	Pass	Fail
Controller 1			☐	☐	☐	☐
Controller 2			☐	☐	☐	☐
Controller 3			☐	☐	☐	☐

3. TransSuite Verification

Did the controller connect successfully to the Central Control System?	
Yes	No
☐	☐

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Form C4 – FIELD TEST LOG

Controller IP: _____

Intersection: _____

Observation	Action Item	Resolution