INTERNAL DOCUMENTATION — ENGINEERING

Inspection System Workflow Reference

Complete business logic, status flows, and validation rules for the backend team

VERSION	DATE	AUDIENCE
1.0	April 2026	Backend / Mobile developers

- Roles (PM, Supervisor, Inspector)
- Actions / Happy path
- Statuses
- Exceptions / Issues
- Terminal / Completed

01 Setup — Service Areas & Team

PM → Adds service area → Assigns area to Supervisor → Supervisor builds team → Inspectors added / removed

Team permissions required on Supervisor account

`UserTeamPermissionEnum::TEAM_VIEW` `UserTeamPermissionEnum::TEAM_MANAGE`

02 Shift Management

scheduled → inspector opens app at shift time → active → all visits done or manual end → completed

any status → supervisor cancels → cancelled → auto-cascade → all visits → unassigned

RULE	CONSTRAINT
Inspector role	Must exist with role = `inspector`
Time range	end_time must be after start_time
Duration	Minimum 1 hour — Maximum 12 hours
Overlap	Inspector cannot have overlapping shifts on same date

Shift cancellation cascade

When a supervisor cancels a shift, the system must automatically move all visits assigned for that date from **assigned → unassigned**. A background job or DB trigger is required. The supervisor then re-assigns manually.

03 Visit Lifecycle & Status Machine

01
unassigned
Created, no inspector yet

02
assigned
Inspector set, awaiting visit date

03
in_progress
Started — geo-fence passed

04
on_hold
Pre-visit issue reported

05
interrupted
Inactivity detected by system

06
submitted
Checklist complete, sent for review

07
under_review
In supervisor's review queue

08
under_approval
Auditor → PM sign-off

09
completed
PM approved — fully closed

10
cancelled
Supervisor or PM — any state

FROM	TO	TRIGGER	WHO
`unassigned`	`assigned`	Supervisor assigns inspector	Supervisor
`assigned`	`in_progress`	Inspector taps "Start Visit" — geo-fence validated	Inspector (mobile)
`assigned`	`on_hold`	Inspector reports pre-visit issue	Inspector (mobile)
`in_progress`	`interrupted`	System detects inactivity threshold exceeded	System (background job)
`in_progress`	`submitted`	Inspector taps "Submit Visit" after completing checklist	Inspector (mobile)
`submitted`	`under_review`	Automatic on submission	System
`under_review`	`under_approval`	Supervisor approves (auditor module: skip to PM if disabled)	Supervisor
`under_approval`	`under_approval`	Auditor approves — forwards to PM (if auditor module enabled)	Auditor
`under_approval`	`completed`	PM gives final approval	PM
`on_hold`	`assigned`	Supervisor marks pre-visit issue resolved	Supervisor
`interrupted`	`assigned`	Supervisor re-assigns after resolving interruption	Supervisor
any status	`cancelled`	Supervisor or PM cancels	Supervisor / PM

04 Geo-fence Validation & Time Tracking

Geo-fence flow (assigned → in_progress)

1. Inspector taps "Start Visit" — app captures device GPS
2. App sends coordinates + visit_id to server
3. Server runs `PostGIS ST_Distance(inspector_coords, facility_coords)`
4. If distance > 100m (configurable) → reject with error: "*You are too far from the facility location. Please move closer to start the visit.*"
5. If within range → set `actual_start_time`, `start_latitude`, `start_longitude`, status → `in_progress`

FIELD	SET WHEN	PURPOSE
`actual_start_time`	Inspector taps "Start Visit"	Performance analytics baseline
`actual_end_time`	Inspector taps "Submit Visit"	Duration calculation
`duration`	Calculated on submit	Stored as (end_time − start_time)
`start_latitude`	On visit start	Proof of physical presence
`start_longitude`	On visit start	Proof of physical presence

Priority: CRITICAL visits

Triggered by complaint, safety hazard, or follow-up to prior incident. Shown with red badge + "URGENT" label in all UIs. Smart Route module places these first in inspector's daily route.

Max visits per day

Inspector cannot exceed configurable maximum per date (default: 15). Enforce at assignment time — not at visit start. Return 422 with clear error if limit reached.

05 Visit Validation Rules

- ✓ Facility must exist and not be soft-deleted
- ✓ Inspector must exist, role = `inspector`, `is_active = true`
- ✓ Supervisor must exist, role = `supervisor`, `is_active = true`
- ✓ Scheduled date must be today or in the future (show warning if in the past)

- ✓ Inspector must be on supervisor's team: `inspector.supervisor_id = supervisor.id`
- ✓ Facility must be within one of the supervisor's assigned service areas
- ✓ Inspector cannot exceed max visits per day (default: 15, configurable)

06 Pre-Visit Issues

What is a pre-visit issue?

A situation where the inspector arrives but *cannot begin* due to a logistical failure — wrong address, facility closed, access denied, unsafe conditions. This is distinct from an Incident (which occurs during the inspection itself).

Inspector arrives → problem found → Report Issue (app) → visit → on_hold → Supervisor notified

Supervisor resolves → visit → assigned → Inspector re-notified

ISSUE TYPE	EXAMPLE EVIDENCE	TYPICAL RESOLUTION
incorrect_location	Photo of empty lot, street sign	Update facility address + geolocation, re-assign
facility_closed	Photo of locked door with "Closed" sign	Reschedule for later date
access_denied	Audio note describing interaction	Supervisor contacts facility management
unsafe_conditions	Photo / video of hazard	Cancel or reschedule after conditions addressed

Multi-media attachments on pre-visit issues

Photos, videos, and audio are supported via the `PreVisitIssueAttachment` table. At least one attachment is strongly recommended. GPS coordinates are always captured by the app at the time of reporting.

Validation

Visit must be in `assigned` status (not yet started). Issue type must be from predefined enum. Description is required. Resolution is entered by supervisor: sets `resolved_at`, `resolved_by`.

07 Re-assignment Scenarios

SCENARIO A	SCENARIO B	SCENARIO C

Manual workload balancing

Supervisor moves visits between inspectors. System updates `inspector_id`, notifies both. Apps sync + recalculate Smart Route.

Inspector unavailability

Supervisor uses "Bulk Re-assign" on all `assigned` visits for the day. Distributes to other team members. All apps update routes.

Shift cancellation

Supervisor cancels shift → system **auto-moves** all visits to `unassigned`. Supervisor must manually re-assign. No automatic distribution.

Offline mode exception (inspector unavailability detection)

System tracks `last_seen` per inspector. If 30+ minutes with no API call, system checks for the `offline_mode` flag set by the app before losing connectivity. If `offline_mode = true`, do NOT flag as unavailable. When connectivity returns, app syncs and `last_seen` updates automatically.

08 Supervisor Availability

Planned absence (availability toggle)

Supervisor sets `is_available = false`, selects delegate supervisor.
System moves all pending reviews to delegate's queue.
PM is notified. On return, clears delegate — reviews return to original supervisor.

Unplanned absence (account deactivated)

PM sets `is_active = false`.
System auto-moves pending reviews to PM's queue.
PM manually re-assigns inspectors to another supervisor. Future visits from that team route to new supervisor's queue.

09 Incident Review Workflow

> **Incidents vs Pre-Visit Issues**
>
> Incidents are created *during* the inspection — a defect, hazard, or compliance violation discovered while filling the checklist. They are not standalone; they are always attached to a visit and reviewed as part of the visit's approval chain.

1. Inspector records incident during visit (photo, video, audio) and links to a compliance rule
2. Inspector taps "Submit Visit" — status → `submitted` → auto-transitions to `under_review`
3. Supervisor reviews incident evidence, adds notes, approves — status → `under_approval`
4. If Auditor Module is enabled: Auditor reviews against compliance requirements, approves, forwards to PM
5. If Auditor Module is disabled: goes directly from supervisor approval to PM
6. PM gives final approval — status → `completed`
7. Compliance Dashboard updated: fine amounts from linked compliance rules are tallied
8. System generates automatic alert to facility management (if configured)

> **Auditor module is conditional**
>
> Design the approval chain to conditionally skip the auditor stage without duplicating logic. Use a feature flag or system setting. The `under_approval` status is used for both auditor and PM stages — distinguish via an internal approval_stage field if needed.

10 Key Implementation Notes for Developers

AREA	NOTE
State machine	`on_hold` → `assigned` and `interrupted` → `assigned` are valid "backwards" transitions — do not block them
Geo-fence	Server-side only via PostGIS. App sends coordinates; server validates. Default radius: 100m (configurable in system settings)
Shift cascade	Shift cancellation must auto-unassign all visits for that date. Implement as DB trigger or background job on shift status change

Auditor module	Conditional stage in approval chain. Must be skippable via feature flag without code duplication
Offline mode	App must send `offline_mode = true` flag to server before losing connectivity so inactivity detection is suppressed
Bulk re-assign	Must support updating multiple `inspector_id` values in one operation + batch notifications to all affected inspectors
Smart Route	Critical visits always sorted first in daily route. Recalculate route on any re-assignment or new visit added
Max visits/ day	Default: 15. Configurable per system settings. Enforce at assignment time — return 422 if exceeded